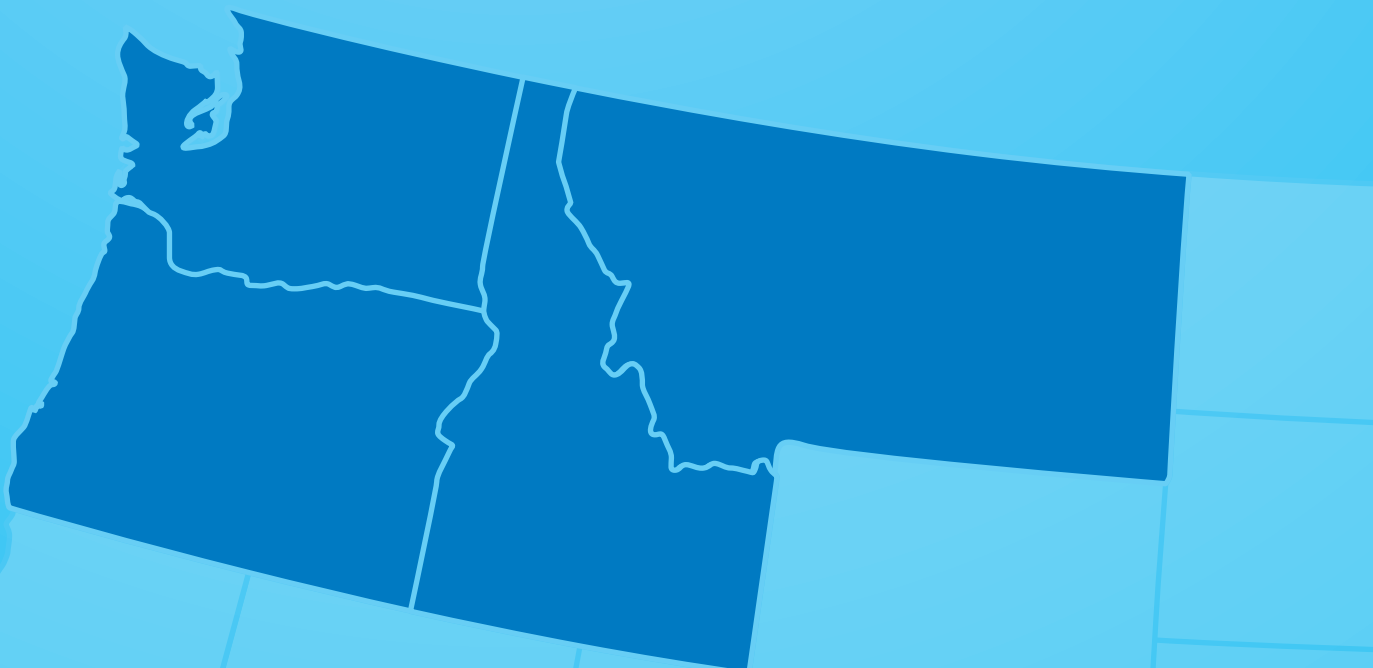
RESIDENTIAL BUILDING STOCK ASSESSMENT II

Manufactured Homes Report

2016-2017



Updated March, 2019
See Addendum for a Summary of Updates

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Acknowledgements

A study of this magnitude requires extensive coordination, thought leadership, and input from numerous organizations. Cadmus would like to thank the following people and organizations for their contributions:

Anu Teja
Northwest Energy Efficiency Alliance project manager
Anu provided countless hours of strategic guidance and management to Cadmus. Her overall leadership was critical to the success of this project.

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The contributions of the RBSA advisory groups were essential to designing and planning another successful RBSA study.

NEEA is an alliance of more than 140 Northwest utilities and energy efficiency organizations working to accelerate the innovation and adoption of energy-efficient products, services and practices in the Northwest.

Many thanks to all of the Northwest utilities that participated in the quarterly meetings, provided billing data, and contributed suggestions throughout the course of the project.

About this Study

Primary Objective

Key Findings

Executive Summary

The Northwest Energy Efficiency Alliance (NEEA) completed its second Residential Building Stock Assessment (RBSA) in the fall of 2017. The RBSA is a broad, regional study that characterizes the building stock within three housing types: single-family homes, manufactured homes, and multifamily buildings. This is NEEA's second residential building stock assessment since its first comprehensive, regionally representative study in the 2011-2012 timeframe. For this study, NEEA continued the work of the first RBSA (referred to as RBSA I in this report) and, wherever possible, data were collected in a similar manner to ensure continuity and comparability between the studies. Cadmus conducted the second RBSA (referred to as RBSA II in this report) and collected data in the 2016-2017 timeframe, with recruiting support from Nexant.

This report presents findings for manufactured homes, based on data collected from 411 site visits, which includes the core RBSA study (funded by NEEA), as well as data collected for one oversample funded by Bonneville Power Administration (BPA). Cadmus developed and applied sampling weights to ensure that all manufactured home observations were weighted proportionally to the segment of the population represented by the sample; see Database User Manual for a description of the weighting methods and procedures.

The primary objective of the RBSA is to characterize the existing residential building stock in the Northwest region based on data from a representative sample of homes. NEEA and its partners designed the RBSA to account for regional differences, such as climate, building practices, and fuel choices, by using a large-scale residential sample. The characterization includes the principal characteristics of the homes (e.g., square footage, insulation level, and heating systems), their occupants (e.g., household size and income levels), and their end-use equipment (e.g., lighting, appliances, electronics, and water heating). The sample size chosen for the RBSA II allows benchmarking of energy use within households at sufficient detail to assess the progress of changes in energy efficiency and home characteristics within the region.

The following section presents the study's key findings by end use or measurement. All values in this section are weighted to represent the northwest population. These key findings represent notable and statistically significant differences between the RBSA I and RBSA II, and in some cases, the emergence of new or different technologies that were not observed in RBSA I.

Lighting

LED adoption has soared

The data from this study reveal a dramatic shift in efficiency of lighting in manufactured homes. LEDs have increased from less than 1% six years ago to 18% of all installed bulbs, which is consistent with other housing types. The percentage of installed incandescent bulbs greatly declined, while CFLs remained relatively flat.

	Incandescent	CFL	LED
RBSA I	59%	28%	*Less than* 1%
RBSA II	39%	27%	18%

Mechanically Cooled Homes

More Northwest manufactured homes include mechanical cooling

The percentage of homes using some type of mechanical cooling increased in all three cooling zones. The only noticeable change in cooling equipment was an increase in the number of air source heat pumps observed.

	Cooling	Air Source Heat Pump
RBSA I	54%	33%
RBSA II	72%	45%

Connected Devices

Connected devices have emerged in homes

Though found in only a small percentage of manufactured homes, connected lighting products have emerged since RBSA I, largely without program support. Wi-Fi and smart thermostats, which have been rebated through regional programs for several years, were also observed in this RBSA study.

	Connected lighting	Smart/Wi-fi Thermostats
RBSA I	0%	0%
RBSA II	2%	3%

HVAC Efficiency

Electric heating and cooling equipment are more efficient

The efficiency of heat pumps and central air conditioners increased relative to the previous RBSA study. Gas furnace efficiencies also increased.

	Heat Pumps (HSPF)	Central Air Conditioners (SEER)
RBSA I	7.7	10.7
RBSA II	8.1	12.3

Television Technology

Television technology has shifted

The share of televisions using cathode ray tube designs has plunged since RBSA I, as the older technology gives way to LCD and LED televisions. With the rapid adoption of these more-efficient technologies, there was a large drop in average television power draw.

	Cathode Ray Tubes	Power Draw (watts)
RBSA I	58%	103W
RBSA II	11%	80W

Electronic Devices

Composition of electronics are changing

Fewer homes had set-top boxes than in the previous RBSA. While relatively small in quantity, smart strips are beginning to appear in manufactured homes.

	Smart Strips	Set Top Boxes
RBSA I	0%	79%
RBSA II	2%	67%

Home Tightness

Homes are tighter on average

Blower door testing measured less air leakage for the region on average in this study than the previous study, and about the same for manufactured as for single-family homes. The RBSA I study also found air leakage to be similar for manufactured (11.8 ACH50) and single-family (10.3) homes.

	Blower Door ACH
RBSA I	11.8
RBSA II	8.9

This is NEEA's second comprehensive manufactured home building stock assessment.

NEEA conducted 10 working group sessions.

RBSA Overview

About this Report

This report includes key findings and themes from the manufactured homes data collected as part of RBSA II, organized by building component and end-use equipment. Each report section provides a high-level summary of data collection protocols, procedures, and findings. Where practical, these sections also highlight key differences between the RBSA II and RBSA I. Cadmus used two-sided t-tests for means and proportions to test the hypotheses that the current RBSA results were equal or not equal to the RBSA I results. We identified metrics where significant changes have occurred over time when tests resulted in p-values of $p<0.01$ and this is denoted by either ▲ or ▼ symbol, to indicate whether the value is higher or lower than in the previous study. We did not account for uncertainty of the RBSA I results and treated them as fixed values. Appendix A provides additional detail and supplemental data tables.

To streamline the results, the report includes only a snapshot of the collected and analyzed data. Readers may select the SEE THE DATA > button (presented throughout the report) to view the detailed tables in the appendix. These tables provide all weighted manufactured home data from the study, with sample sizes and error bounds. In some instances, Cadmus rounded values to whole numbers for better readability. In these instances, values may not sum exactly to 100%.

The RBSA II database contains additional data, including the full data from the inventory of each home. For more details regarding the database go to neea.org/data or www.NEEA.org.

Facilitation of Working Group Sessions and Production Pretest

The RBSA provides data vital for planning and evaluation at the regional, state, and local utility levels. As such, NEEA engaged regional stakeholders in the study design and planning. Cadmus facilitated 10 working group sessions with NEEA funders and other regional stakeholders, including sessions focused on customer contact, sample design, data collection, and database development.

These sessions provided a mechanism for NEEA, Cadmus, and regional stakeholders to review and provide feedback on the proposed methods and activities planned for the RBSA II. Following the working groups, Cadmus delivered a set of interim protocols documenting the agreed-upon approach for all aspects of the RBSA data collection process such as procedures for customer engagement and interactions, the sample design, and the data points collected as part of the RBSA.

As agreed upon with NEEA, the team pretested the recruiting and data collection protocols developed during the working group sessions to ensure that the processes and tools operated as designed. During the pretest period in February 2016, the Cadmus team identified and recommended a number of small changes to improve the recruitment and data collection processes. Over the course of the study, the team made minor adjustments to the original plan, with most changes aimed at improving the recruitment process.

Implementing the RBSA II

The RBSA data collection effort included recruiting and surveying participants, acquiring signed billing release forms, and collecting data on observed equipment and home characteristics. Field technicians recorded observed information on nearly every characteristic that impacts the energy consumption of the home—from construction details to the wattage of light bulbs. The field team implemented lessons learned from the previous RBSA to improve data collection and measurements. These differences are called out throughout the report where applicable.

Customer Survey

Participants completed two short surveys about their home and its occupants: one as a part of a screening and opt-in process and another as part of the site visit. The in-home survey also collected information to help field technicians identify unusual types of equipment they should look for during the site visit such as Wi-Fi enabled equipment, electric vehicles, or seasonal heating and cooling equipment that may be kept in storage.

As the final step of the on-site interview, field technicians recorded the customer's utility (electric and gas) and utility account information and had the customer electronically sign a billing release form.

Observed Equipment and Home Characteristics

The RBSA on-site data collection was wide-ranging and, while the data collected varied based on the type of equipment in the home, generally included these characteristics:

- **Building configuration:** room square footage and conditioned area and volume
- **Building envelope (shell):** window characteristics, insulation types and thicknesses, and construction materials
- **Air leakage:** air leakage in cubic feet per minute at 50 pascals, as measured by a blower door test
- **HVAC:** equipment characteristics, nameplate information, location, and TrueFlow® air handler flow testing and pressure measurements for electric central forced air heating systems
- **Domestic hot water:** equipment characteristics, nameplate information, and flow rate measurements for shower heads and faucets
- **Appliances:** equipment characteristics (size and configuration) and nameplate information
- **Electronics:** equipment characteristics and nameplate information
- **Lighting:** type, style, wattage, quantity, control type, and location

A comprehensive list of the types of equipment information field technicians collected by equipment category and home type and specific details for how field technicians collected data and tested home performance can be found at neea.org/data or go to www.NEEA.org.

Observed Equipment

Field technicians conducted whole-home air leakage and HVAC airflow testing.

Home Diagnostic Testing

Through the working groups, Cadmus and NEEA learned that regional stakeholders desired more comprehensive information about whole-home air leakage and HVAC airflow. As such, field technicians performed blower-door testing on all manufactured homes in the study where they could run the test safely, without detracting from participant satisfaction. They also conducted TrueFlow testing and gathered pressure data for households with an electric central forced-air furnace or heat pump as the primary heating system.

A blower-door test measures the amount of air leakage (or air tightness) of a structure, which is a primary determinant of thermal energy efficiency. Air leakage can also affect occupant comfort, indoor air quality, and building durability. Field technicians conducted a two-point blower-door test, striking a balance between the expediency of single-point testing and the greater reliability and accuracy of multipoint testing.

Where practical, field technicians used the TrueFlow Air Handler Flow Meter to collect data and calculate airflow across air handlers in electric central HVAC systems such as furnaces and heat pumps. Considered with other information, such as the condition of the filter and the type and capacity of the current heating system, this data can help assess the adequacy of the duct system for the current system and/or an air source heat pump.

Data Cleaning and Building and Equipment Characteristic Analysis

Throughout the field data collection process, Cadmus performed continuous quality assurance (QA) reviews on data collected for randomly selected homes. The QA reviews focused on critical equipment categories, such as lighting and building construction, and emphasized identifying missing, incomplete, or inconsistent data (i.e., building construction attributes that were inconsistent with the other home characteristics). Where applicable, Cadmus updated data points based on data collection notes, photographs, or product lookup and provided feedback to its technicians to improve data collection.

After completing the site visits, Cadmus cleaned and analyzed the data. This process included reviewing the data for outliers, using field notes and photographs to determine whether a change to a data point was required, and correcting data where appropriate. The final data review also included a systematic review of each home and its equipment to ensure internal consistency. For example, Cadmus compared the type of wall framing to the age of home and reported R-value. If there was a discrepancy between these values, the team investigated the issue further and made appropriate changes if required.

The analysis relied on R statistical software to process, compile tables, and apply case weights to estimate population means and proportions as well as their error bounds. Each end-use table and reported statistic includes data on the associated population estimates and their error bounds (calculated at 90% confidence)

Billing Data Collection and Analysis

Cadmus conducted interviews to capture participant electric and gas billing information such as utility, account number, and meter numbers. Near the end of the field collection phase, Cadmus requested up to 24 months of participant billing data from utilities and reviewed them for completeness and to ensure Cadmus received data for every site, following up directly with utilities for clarification as necessary.

Cadmus performed the following checks to assess the quality of the billing data:

- Reviewed the premise address and accounts for each requested site to ensure they matched those in our database.
- Reviewed the data for inconsistencies such as duplicate reads, multiple readings on the same date, and missing data.
- Reviewed plots of each site's usage data to identify anomalies in the data, such as vacancies or erroneous readings, and removed consumption data and/or further investigated sites as needed.

Cadmus investigated anomalous data and, if possible, corrected the issue. If unable to correct the issue, Cadmus removed the customer from the energy use intensity (EUI) analysis.

The billing analysis relied on a PRISM-type variable-based degree day model. Cadmus used this model to process each home's monthly billing data to produce weather-adjusted annual consumption values. For each household, Cadmus modeled energy usage as a function of heating degree days and cooling degree days, collected from the nearest NOAA weather station. This allowed Cadmus to disaggregate energy into heating, cooling, and baseload components and then apply typical meteorological year (TMY)3 data to these components to derive a normalized annual usage for each household. Finally, to calculate a home's EUI, Cadmus divided the household's normalized usage by the home's conditioned living area.

Database

Results for the RBSA II are derived from data collected through participant surveys, on-site data collection by trained technicians, and historical energy consumption data furnished by regional utilities. Cadmus cleaned, anonymized, and compiled these data, including a number of calculated fields, into a publicly available database. The database includes data from all three housing types—single-family, multifamily, and manufactured—and is available for download through the NEEA website. The RBSA database is a relational database provided in CSV format. Users can import the flat files into other database software (i.e., Access or SQL) or spreadsheet programs such as Excel.

Cadmus also developed a database user manual and data dictionary. The user manual provides guidance on how to effectively use the database and includes instructions for incorporating sampling weights. The data dictionary defines each field in the database and provides example data for each field to give the end user a better idea of what the data mean and represent.

The database and associated documents are available at neea.org/data or go to www.NEEA.org.

Cadmus collected homeowner billing consumption data to develop an energy use intensity (EUI) for each home.

The RBSA II database contains complete data from the inventory of each home.

Sampling

Background

Cadmus designed the manufactured home sample to achieve the desired level of confidence and precision (90% confidence with ±10% precision) for population estimates within each of four geographic sub-regions. The sampling plan was designed so that these targets and the requisite sample sizes would be met wholly through NEEA project funding. Although NEEA expected some utilities and regional organizations to fund oversamples for their individual service territories, the core sample design accepted by NEEA did not rely on oversamples to meet the desired confidence and precision. This is a key difference between the current study and the previous RBSA; that is, the RBSA I did incorporate an oversample (the BPA oversample) into the core sample design; this study did not.

The following sections describe Cadmus's approach to developing the sample frame, determining the sample sizes for the core and the oversamples, and estimating population quantities using post-stratification to incorporate data from the core and oversamples.

Sample Frame Development

The goal of the manufactured home sample design was to draw samples that were representative of the population within the following four geographic sub-regions:

- Idaho
- Western Montana
- Oregon
- Washington

To ensure that the sample was representative of the target population within each region, Cadmus purchased a randomized address-based sample generated by the U.S. Postal Service (USPS) within each geographic sub-region. Cadmus provided USPS with a list of counties and the number of residences required to reach the sample size targets in each geographic region. After identifying the total number of homes in each county that were proportional to the population of homes in the region, Cadmus requested those amounts from USPS. That is, if one county represented 50% of the total regional home population, approximately 50% of the address-based sample would be from that county.

Core Sample Sizes

Cadmus determined the sample sizes within each geographic sub-region for the core sample. The team calculated the target sample size within each sub-region and then combined them to determine the sample size for the entire region.

Table 1 lists the target and achieved sample sizes for the RBSA II manufactured home core sample by sub-region.

Table 1. Target and Achieved Sample Sizes

Sub-Region	Manufactured Homes	
	Target	Achieved
Idaho	81	84
Western Montana	81	83
Oregon	81	86
Washington	81	88
Total	**324**	**341**

Bonneville Power Administration Oversample Sample Sizes

Bonneville Power Administration (BPA) requested oversamples in their service territory to include additional manufactured homes. The Cadmus team calculated the sample sizes for the oversample using the same approach as used for the core sample, with inputs specific to BPA.

Cadmus designed the BPA manufactured home sample to complement the NEEA core sample to achieve the desired level of confidence and precision (90% confidence with ±10% precision) for BPA homes within each of three geographic sub-regions. Based on the population of homes served by BPA, relative to the population in the region, Cadmus predicted the number of homes that would eventually be included in the core sample and reduced the total oversample sample size by that amount. Table 2 shows the resulting oversample sample sizes for BPA.

Table 2. BPA Oversample Sample Sizes

Sub-Region	BPA
Idaho/Western Montana	2
Oregon	22
Washington	46
Totals	**70**

The goal of the manufactured home sample design was to draw samples that were representative of the population within four sub-regions.

Sampling Weights

Cadmus used stratified sampling to select households for the core sample where strata were defined by geographic sub-regions. Cadmus calculated and applied sampling weights to estimate the overall population quantities and ensure that observations are weighted in proportion to the population represented by the sample. The oversamples introduced additional sampling within each core stratum and, thereby, the need for an adjustment to the core stratified sampling weights to account for sample size increases in the oversampled territories.

Cadmus used post-stratification to account for the combination of stratified sampling in the core and the additional sampling in the oversamples. To post-stratify, Cadmus divided each sub-region into BPA and non-BPA territories. When the data was available, Cadmus used additional information on service territories to determine the most accurate population sizes for each site in the sample. Cadmus determined the population sizes in each post-stratification stratum based on home data from the 2014 American Community Survey (ACS) and achieved sample sizes.

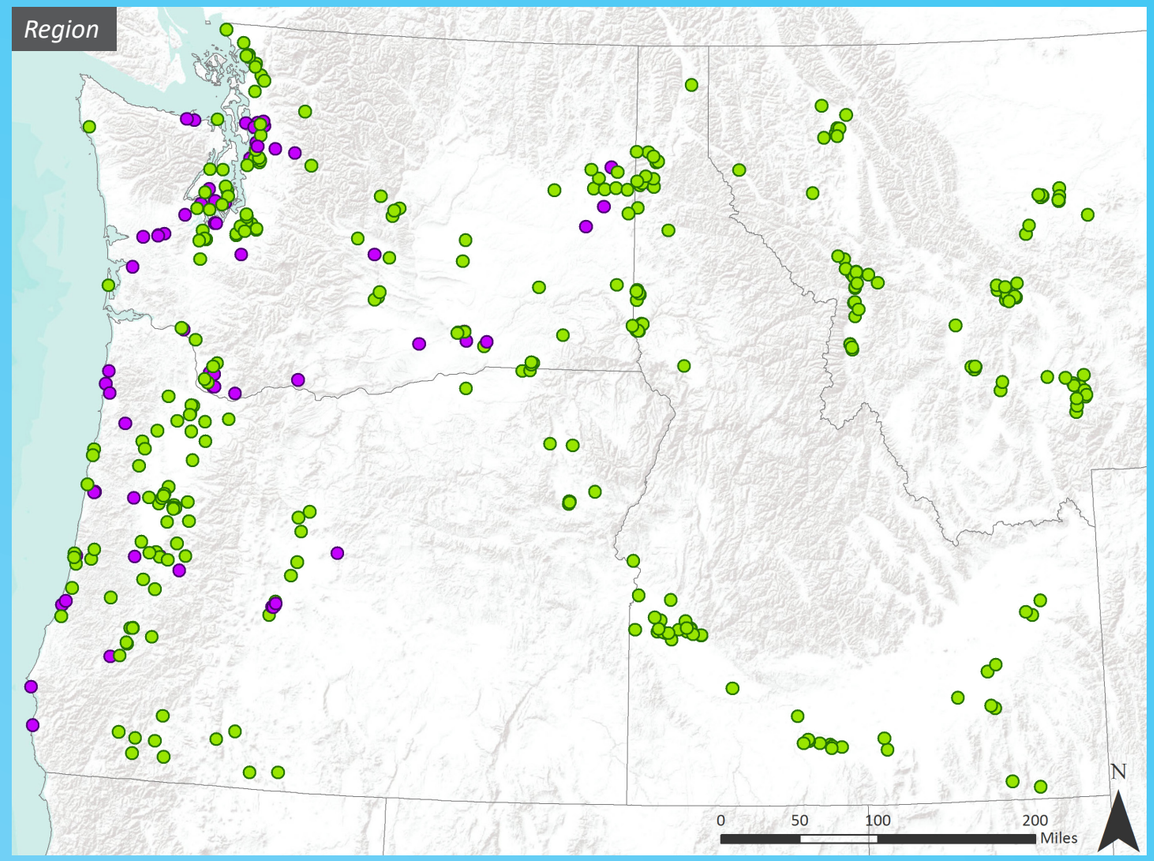
The Cadmus team mapped home population sizes from the ACS data to the zip codes in each sub-region and service territory to determine stratum population sizes and counted the achieved sample sizes in each stratum. The team applied sampling weights to all observations within each stratum to estimate population totals, means, and proportions.

Table 3 lists the post-stratification strata within each sub-region.

Table 3. Post-Stratification by Sub-Region

Sub-Region	Recruitment Strata	Post-Stratification Strata
Western Montana	Western Montana	• Bonneville Power • Non-Bonneville
Idaho	Idaho	• Bonneville Power • Non-Bonneville
Washington	Eastern Washington	• Bonneville Power • Non-Bonneville
	Western Washington	• Bonneville Power • Non-Bonneville
	Puget Sound	• Bonneville Power • Non-Bonneville
Oregon	Eastern Oregon	• Bonneville Power • Non-Bonneville
	Western Oregon	• Bonneville Power • Non-Bonneville

The following maps show the distribution of manufactured site visits across Idaho, Western Montana, Oregon, and Washington by NEEA's core RBSA II sample, as well as the BPA oversample homes.



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SUMMARY OF BUILDING CHARACTERISTICS

The following sections provide detailed findings by manufactured home characteristic, measurement, and end use. All values in these sections are weighted. These findings represent notable and statistically significant differences between the RBSA II and the previous RBSA, and in some situations, the emergence of new or different technologies not observed in RBSA I.

Where practical, these sections also highlight key differences between the RBSA II and RBSA I. Differences that are statistically significant are denoted by either an ▲ or ▼ symbol, to indicate whether the value is higher or lower than in the previous study. Where Cadmus observed new or different technologies, or if we developed tables for this RBSA that were not present in the RBSA I, we did not conduct statistical significance testing.

Appendix A provides additional detail and supplemental data tables, as well as references to comparable RBSA I table numbers.

Description

Key Findings

Age and Type

The RBSA II defined manufactured homes according to the Northwest Power and Conservation Council's definition, the same definition used in RBSA I. Explicitly, manufactured homes are factory-built homes constructed in accordance with the Federal Manufactured Home Standards. The terms single-wide, double-wide, and triple-wide refer to homes built in a controlled environment on a permanent chassis and brought to the site in one, two, or three sections, respectively. The term modular or pre-fab refers to a home built in a controlled environment and assembled on site, but not attached to a permanent chassis.

Cadmus identified the age of the home first by asking the participant and then verifying through online sources.

Key findings for home type and vintage include:

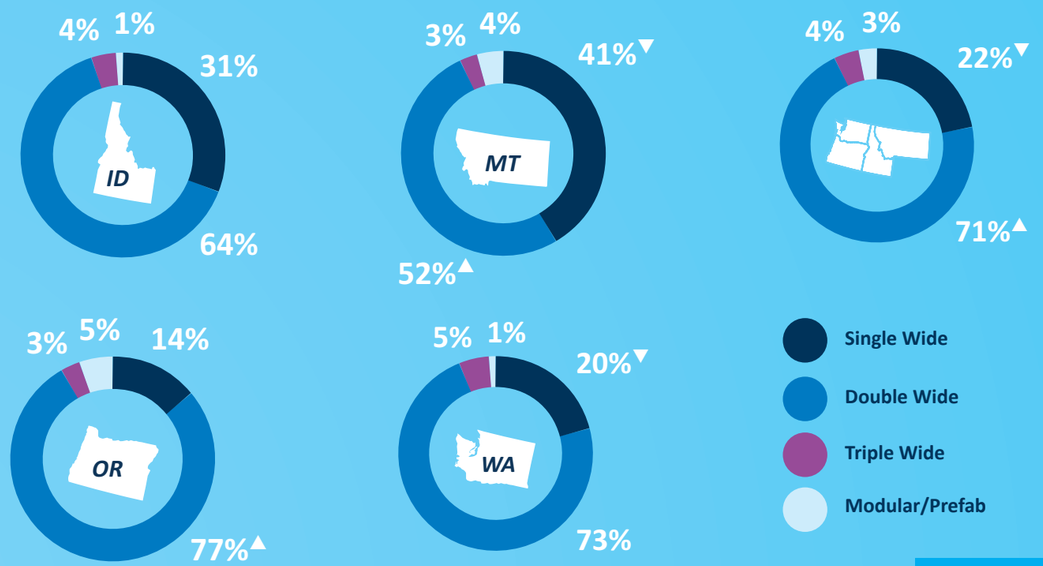
- Three decades stand out where new manufactured homes construction spiked (1970s through 2000), and these spikes are consistent for all states. The spike is most pronounced in Idaho, with nearly half of the observed homes in Idaho constructed in the 1990s. There is a noticeable decline in new manufactured homes after 2000, which is consistent with the last RBSA.
- Cadmus conducted over 90% of RBSA II site visits in single and double wide homes, which is similar to the previous RBSA. There was an increase in site visits to double wide (12%) and decrease in site visits to single-wide homes (10%) compared to the previous RBSA.

Distribution of Homes by Vintage and State

	Pre 1951	1951-1960	1961-1970	1971-1980	1981-1990	1991-2000	2001-2010	Post 2010	Total
ID	1%	0%	4%	24%	15%	46%▲	7%	3%	100%
MT	1%	2%	11%	27%	10%	36%▲	13%	0%	100%
OR	0%	0%	6%	23%	18%	38%	12%	2%	100%
WA	0%	1%	10%	29%	19%▼	27%	11%	2%	100%
	0%▲	1%	8%	26%	18%▼	34%▲	11%	2%	100%

SEE THE DATA

Distribution of Homes by Type and State



SEE THE DATA

▲▼ *Statistically different from 2011 RBSA*

Building Envelope

Description

The building envelope comprises the surfaces and insulation that separate conditioned space from the outdoors and is a key determinant of the energy use of any building. Field data collection for manufactured homes included characterization of envelope components including ceilings, walls, floors, and windows and doors.

Manufactured homes often present barriers to collecting information about insulation through direct observation. For instance, the small attic space above the ceiling is often inaccessible, and floor insulation is protected by a thick "belly" membrane that can make direct observation challenging at best. Field technicians used a variety of technique to attempt characterization of insulation through direct observation. With exterior walls, field technicians used a combination of infrared thermography and probing around electrical boxes to determine whether a surface was insulated. Probing also often allowed an estimate of the thickness of wall insulation. Infrared thermography also sometimes allowed a determination of the completeness of attic insulation when no attic access was available. Where practical, field technicians observed the underside of the home to attempt to determine insulation type and thickness, and to look for signs that the floor insulation had been upgraded. Unless otherwise noted, R-values represent only the R-value of the insulation, not of the wall, attic, or floor assembly as a whole.

Where characterization through direct observation was not practical, the RBSA II study used manufactured home construction standards to infer insulation levels. With homes that included labels documenting compliance with relevant construction standards, field technicians noted the insulation levels provided on these labels. Represented programs or authorities include the U.S. Department of Urban Development (HUD), ENERGY STAR Certified Manufactured Homes, and the Northwest Energy Efficient Manufactured (NEEM) Housing Program. Labeled insulation levels were assumed accurate for the home except in cases where direct observation revealed different information. Consistent with RBSA I, where no label was present, the RBSA II assumed a construction standard consistent with the home's age and with information gathered through direction observation.

Key Findings

Key findings for manufactured home building envelope include:

- RBSA II shows a higher percentage of homes with ceiling insulation levels between R-22 and R-30, but a smaller percentage of homes with ceiling insulation levels of R-31 to R-40. The differences in R-values likely reflect differences in methodology.
- The table at right shows manufactured wall insulation by state, which was not reported in RBSA I. Idaho showed the highest percentage of homes with at least R-15 wall insulation, followed by Oregon and Washington.

Distribution of Attic Insulation R-Value

*HUD construction standards ensure that manufactured homes built since 1976 have **at least R-11 ceiling insulation**. More recent standards require from R-22 to R-40.*

	R0-R8	R9-R14	R15-R21	R22-R30	R31-R40
RBSA I	15%	41%	4%	18%	23%
RBSA II	19%	37%	3%	31%	11%

SEE THE DATA

**Due to differences in methodology between the RBSA I and RBSA II studies, testing for statistical differences was not performed.*

Distribution of Wall Insulation R-Value by State

*Across the region, **81% of manufactured homes** have at least R-9 wall insulation.*

	ID	MT	OR	WA	
R0-R8	13%	12%	14%	25%	19%
R9-R14	55%	71%	60%	52%	57%
R15-R21	31%	16%	26%	24%	25%
R22-R30	1%	1%	0%	0%	0%
Total	100%	100%	100%	100%	100%

SEE THE DATA

**Due to differences in analysis methodology between the RBSA I and RBSA II studies, testing for statistical differences was not performed.*

▲▼ *Statistically different from 2011 RBSA*

Description

Air Leakage

High air leakage in homes squanders energy as conditioned air leaks to outside. It can also lead to occupant discomfort and to moisture-related problems caused by condensation as warm air from inside meets cold surfaces inside walls, attics, or crawlspaces. Where safety protocols allowed, field technicians conducted a blower door test on homes to provide a measure of air leakage.

As prescribed by study protocols, field technicians used a two-point process for conducting the blower door tests, meaning results were measured at two house pressures—roughly 25 pascals and 50 pascals. These data allowed calculation of two commonly used indications of the air tightness of a building: air leakage in cubic feet per minute (CFM) at 50 pascals—denoted CFM50—and air changes per hour at 50 pascals, which is commonly denoted as ACH50. A two-point blower door test allows calculation of an approximation of the slope of the flow curve for each site, which must be assumed when testing at a single pressure. This increased the accuracy of results and allowed a level of quality assurance during testing.

For sites that met eligibility criteria and where practical, visits included a test of airflow across the air handler using the Energy Conservatory's TrueFlow Air Handler Flow Meter. Eligibility requirements included that the primary heating system use electricity as the heat source and that the system configuration allowed a TrueFlow plate to be placed at or near the air handler.

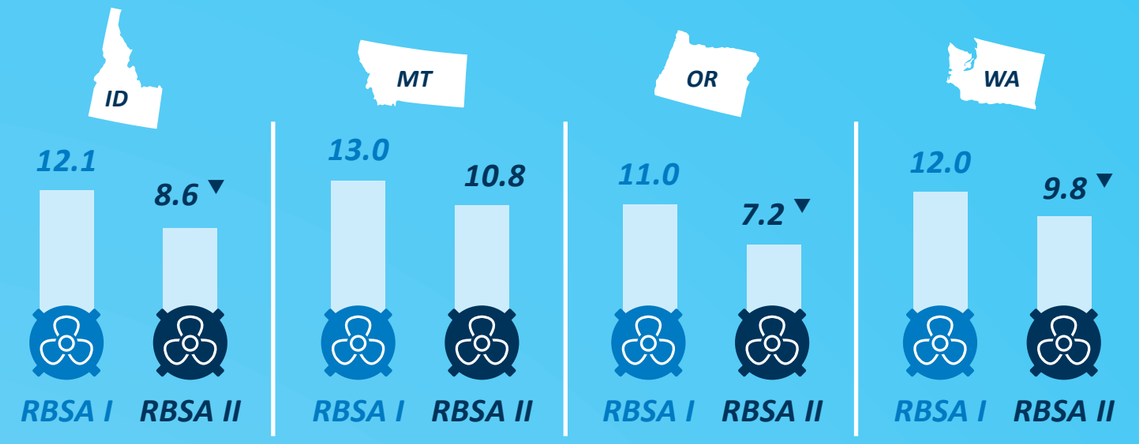
Key Findings

Key findings for homes air tightness include:

- The RBSA II blower door data show less air leakage on average across the region. The RBSA II weighted regional average of 8.9 ACH50 represents 75% of the RBSA I average. This reduction is likely, in part, from home improvements such as air sealing, installation of high-efficiency sealed combustion furnaces, and window replacement.
- RBSA II blower door data show higher ACH50 for manufactured homes in Montana than the other three states, indicating more air leakage on average in those homes. As expected, air leakage is higher on average with older homes, with average ACH50 ranging from 5.3 for homes built after 2001 to 16.2 for homes built between 1961 and 1970.
- During TrueFlow testing, air source heat pumps averaged 344 CFM per ton of heating capacity across the region, and electric forced air furnaces averaged 189. The report Appendix A includes summary tables of TrueFlow results. The RBSA II database shows results for each home, along with other relevant information.

Blower Door Air Tightness (ACH50) by State

*RBSA II blower door testing showed **less air leakage** on average than the previous RBSA.*



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Blower Door Air Tightness (ACH50) by Home Vintage

*Air leakage is **higher on average** with older homes.*

	Pre 1951	1951-1960	1961-1970	1971-1980	1981-1990	1991-2000	2001-2010	Post 2010
RBSA I	-	16.5	22.5	14.8	10.8	7.7	4.8	-
RBSA II	6.1	14.3	16.2▼	11.7▼	8.9▼	7.0▼	5.3	5.0

SEE THE DATA

▲▼ *Statistically different from 2011 RBSA*

Description

Code Updates

Key Findings

HVAC Systems

Data collection included extensive characterization of the heating, cooling, and ventilation equipment in each home. These systems include central equipment such as forced-air furnaces and heat pumps as well as zonal equipment such as baseboard heaters, heating stoves, and ductless mini-split heat pumps. Field technicians also collected information such as the make, model number, capacity, and year of manufacture of heating and cooling equipment where practical. Where year of manufacture was not included on the manufacturer's label, technicians collected serial number data, which often included encoding that allowed the team to determine the year of manufacture after the site visit. Where practical, Cadmus also used post-visit lookups to provide equipment efficiency ratings. The RBSA II groups electric baseboard and wall heaters together but characterizes electric ceiling heat and other zonal systems as Other Zonal Heat.

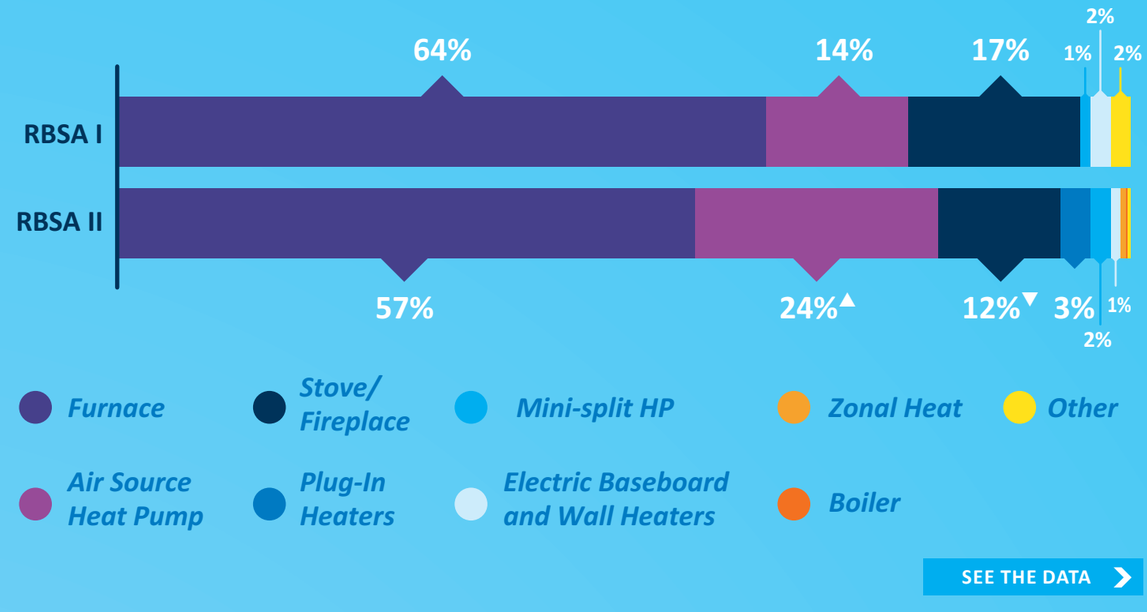
Changes in federal efficiency standards since the last RBSA mandate higher minimum efficiency ratings for some HVAC equipment. For instance, as of November 19, 2015, the minimum annual fuel utilization efficiency (AFUE) of mobile home gas furnaces increased from 75 to 80, and the AFUE of other non-weatherized furnaces increased from 78 to 80. As of January 1, 2015, the minimum seasonal energy efficiency ratio (SEER) of split system heat pumps increased from 13 to 14, and the minimum heating seasonal performance factor (HSPF) increased from 7.7 to 8.2.

Key findings for HVAC include:

- Two notable changes were observed in primary heating systems: first, use of heating stoves and fireplaces as the primary heating system decreased from 17% to 12%, and second, use of central air source heat pumps increased from 14% to 24%.
- For mechanically cooled homes, the percentage of households using an air source heat pump increased from 33% in RBSA I to 45% in RBSA II.
- The percentage of homes using some type of mechanical cooling increased from 54% to 67%. An increase in the use, or identification, of portable air conditioners, packaged air conditioners (window units), and ductless heat pumps appears to account for this difference.

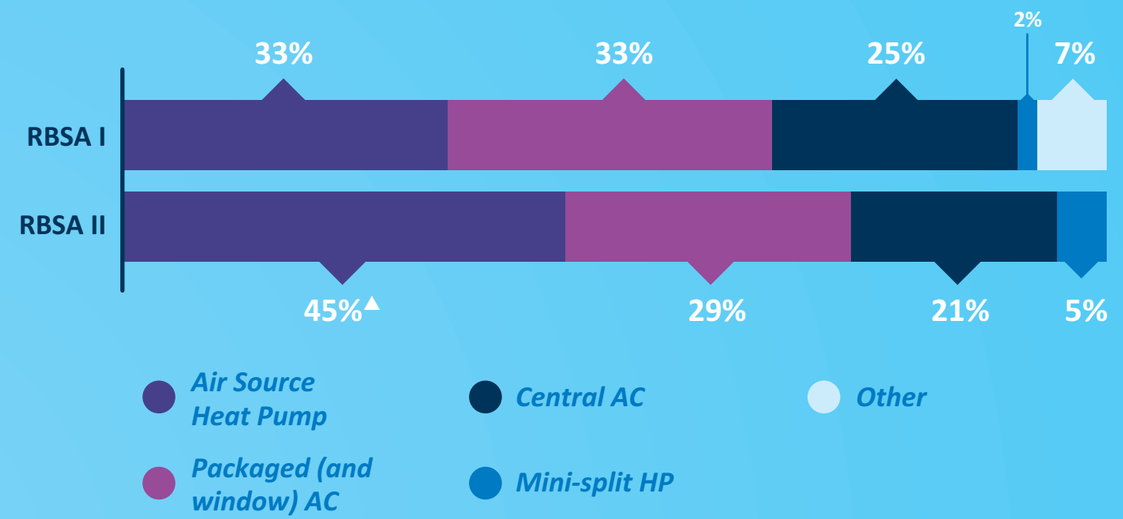
Distribution of Primary Heating Systems

Notable changes in primary heating systems included an ***increase in the number of air source heat pumps*** *as well as a decrease in heating stoves and fireplaces.*



SEE THE DATA

Distribution of Primary Cooling Systems



SEE THE DATA

▲▼ *Statistically different from 2011 RBSA*

Distribution of Primary Heating Fuel Type by State

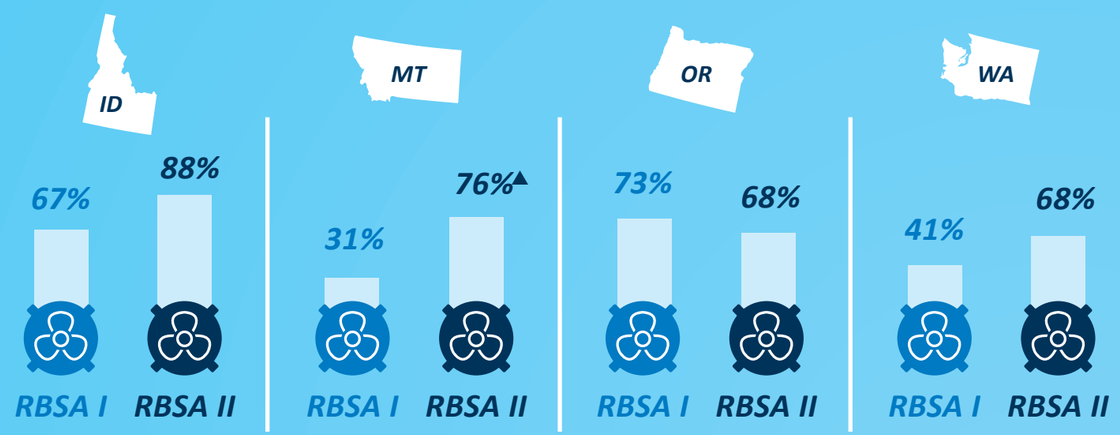
Primary heating fuel ***remained largely the same*** *except for wood fuel usage, which decreased from 14% to 9%.*

	ID	MT	OR	WA	
Electric	59%	13%	77%	82%	71%
Gas	24%	52%	11%	7%	14%
Oil/Kerosene	3%	0%	1%	0%	1%
Propane	5%	16%	0%	2%	3%
Wood	7%▼	15%	9%	7%▼	9%▼
Pellets	2%	4%	2%	2%	2%
Total	100%	100%	100%	100%	100%

SEE THE DATA

Percent of Homes with Cooling Equipment (All Systems and Cooling Zones)

More homeowners *are mechanically cooling their homes.*

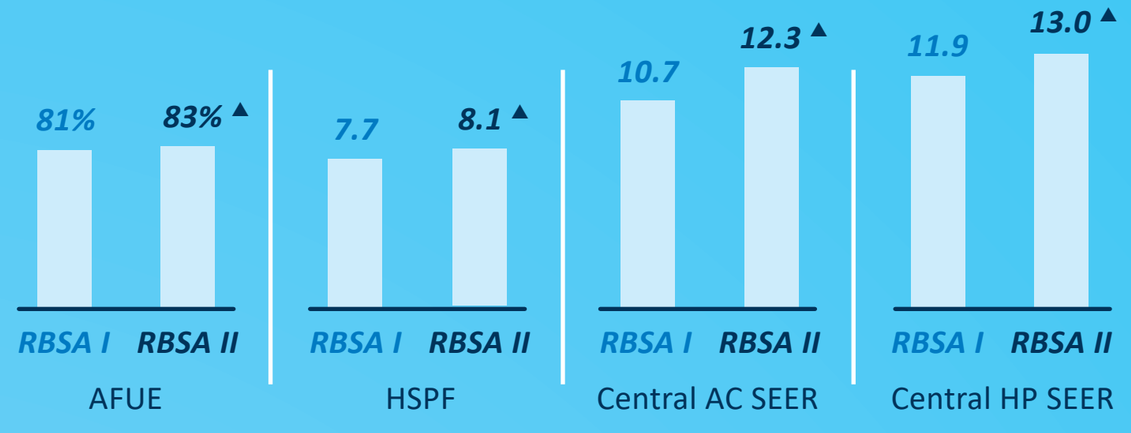


SEE THE DATA

▲▼ *Statistically different from 2011 RBSA*

Average Heating and Cooling Equipment Efficiency Ratings

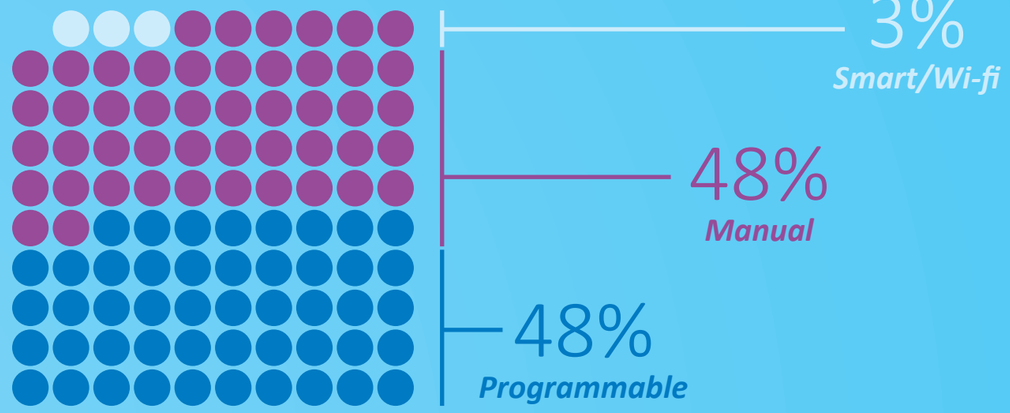
Heating and cooling equipment are ***trending toward greater efficiency.***



SEE THE DATA

Distribution of Thermostats by Type

Connected thermostats represent only ***3% of installed thermostats.***



Numbers do not total to 100% due to rounding.

SEE THE DATA

▲▼ *Statistically different from 2011 RBSA*

Description

Code Updates

Key Findings

Lighting

Lighting data collection is a highly involved process, encompassing lighting inside and outside the residence as well as equipment kept in storage. Cadmus conducted a comprehensive lighting walk-through that captured details about lighting in every room accessible to the field technician. These details include lamp type, style, wattage, quantity, control, and location. In addition to bulbs currently installed, field technicians identified and recorded bulbs in storage.

To ensure all relevant data were collected, field technicians performed a systematic walk-through of the home, documenting control types, fixtures, lamp attributes, and quantities. They began the process by asking the resident about spare bulbs and recording bulb type and quantities. Identifying the type of bulb can be difficult due to accessibility or safety issues and the fact that many bulbs today look like incandescent but are in fact something different, such as a halogen. Where field technicians could not accurately assess the bulb type, they noted it as unknown.

Collecting information about LEDs and connected lighting, or lighting with an element of connectivity or intelligence, was new to this RBSA.

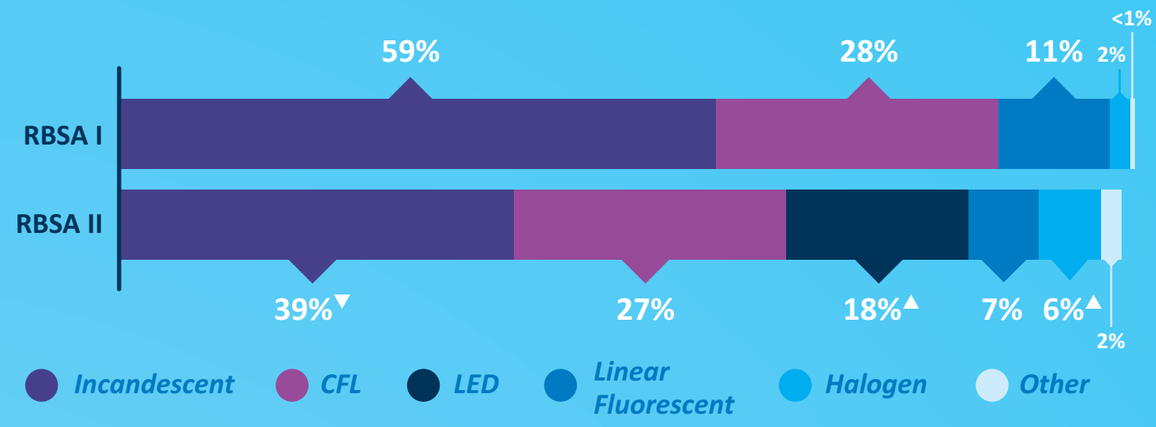
The Energy Independence and Security Act of 2007 was phased in beginning in 2012. This standard impacted many lamps that would have been targets of utility lighting programs and likely accelerated the adoption of energy efficient light bulbs.

Key findings for homes lighting include:

- Regional lighting stock changed dramatically since the RBSA I. Most notably, LEDs represent a significant share of installed bulbs in manufactured homes (18% regionally). This is a substantial increase from the RBSA I, where LEDs were not found in sufficient quantities to be included in report tables.
- The percentage of incandescent lamps in use across the region decreased from 59% to 39%. Other bulb types such as CFLs and halogens remained about the same, with insignificant changes in proportional share.
- Connected lighting, bulbs that connect to the home Wi-Fi, were found in 2% of homes.

Average Distribution of Lamp Type by RBSA Study

***Almost half** (45%) of all light bulbs are now either a CFL or LED compared to just 28% (all CFLs) in the RBSA I study.*



SEE THE DATA

Distribution of Lamp Type by State

*The proportion of installed LED lamps ranged from **6% in Montana to 21% in Oregon.***

	ID	MT	OR	WA	
Compact Fluorescent	31%	29%	24%	28%	27%
Halogen	6%	6%	6%	7%	6%▲
Incandescent	43%▼	46%▼	39%▼	37%▼	39%▼
Incandescent/ Halogen[1]	1%	0%	1%	0%	0%
Light Emitting Diode	12%▲	6%	21%▲	20%▲	18%▲
Linear Fluorescent	6%	12%	7%	7%	7%
Other	1%	1%	2%	2%	2%
Total	100%	100%	100%	100%	100%

[1]*In some instances, field technicians could not differentiate between incandescent or halogen.*

SEE THE DATA

▲▼ *Statistically different from 2011 RBSA*

LEDs are installed ***throughout the home.***

The ***highest concentration*** *of LEDs can be found in* ***family rooms****.*

BEDROOM
CFL **31%**
Halogen **6%**▲
Incandescent **43%**▼
LED **16%**▲
Linear Fluorescent **1%**

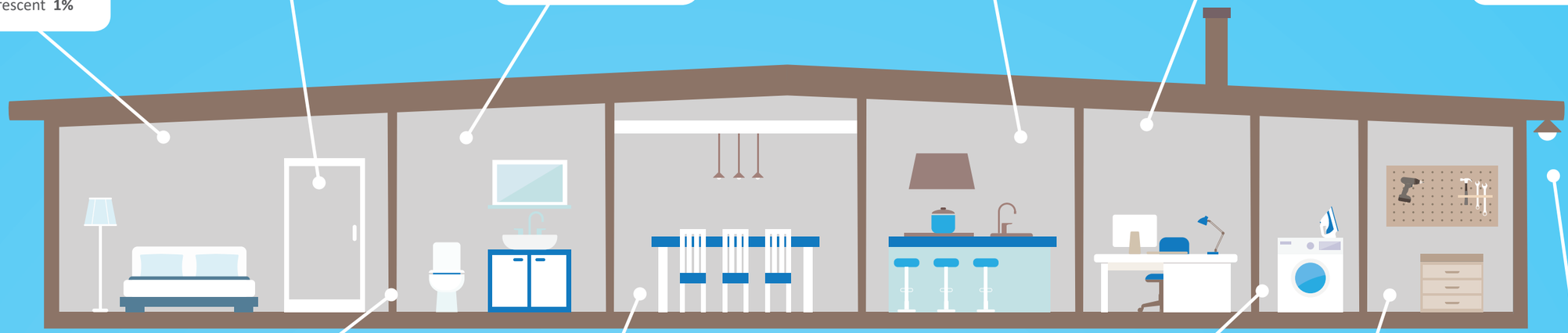
CLOSET
CFL **34%**▲
Halogen **4%**▲
Incandescent **47%**▼
LED **11%**▲
Linear Fluorescent **3%**▼

BATHROOM
CFL **26%**
Halogen **6%**▲
Incandescent **47%**▼
LED **14%**▲
Linear Fluorescent **2%**

KITCHEN
CFL **21%**▼
Halogen **7%**
Incandescent **25%**▼
LED **19%**▲
Linear Fluorescent **26%**

OFFICE
CFL **26%**▼
Halogen **8%**▲
Incandescent **36%**▼
LED **22%**▲
Linear Fluorescent **8%**▼

OTHER
CFL **21%**
Halogen **6%**
Incandescent **29%**▼
LED **9%**▲
Linear Fluorescent **34%**▼



HALL
CFL **38%**
Halogen **6%**▲
Incandescent **37%**▼
LED **14%**▲
Linear Fluorescent **3%**

FAMILY/LIVING/ DINING ROOM
CFL **28%**▼
Halogen **6%**▲
Incandescent **43%**▼
LED **18%**▲
Linear Fluorescent **2%**▼

LAUNDRY
CFL **32%**
Halogen **2%**
Incandescent **33%**▼
LED **18%**▲
Linear Fluorescent **14%**

GARAGE
CFL **10%**
Halogen **2%**
Incandescent **12%**▼
LED **14%**▲
Linear Fluorescent **60%**

OUTSIDE
CFL **24%**
Halogen **10%**
Incandescent **35%**▼
LED **25%**▲
Linear Fluorescent **2%**▼

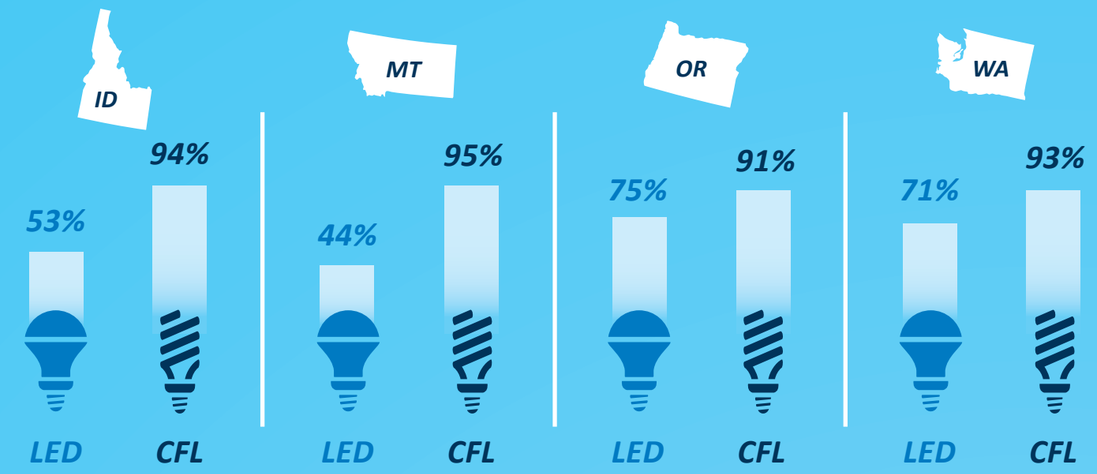
SEE THE DATA ›

▲▼ *Statistically different from 2011 RBSA*

▲▼ *Statistically different from 2011 RBSA*

Percent of Homes with CFLs and LEDs by State

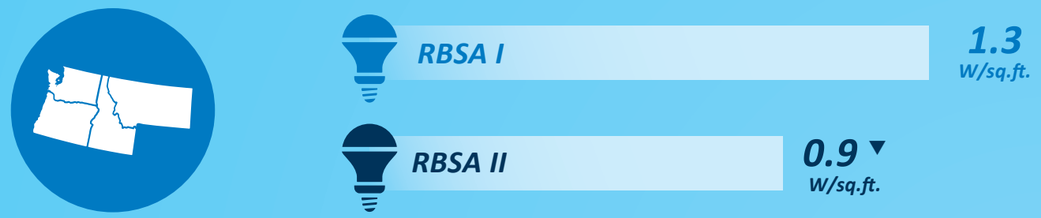
Almost every home has at least one CFL; more than 67% of Northwest homes have one or more LEDs.



SEE THE DATA

Home Lighting Power Density by Study

Due to the shift from inefficient incandescent bulbs to LEDs, the lighting power density (watt per sq. ft.) ***decreased from 1.3 to 0.9.***▼

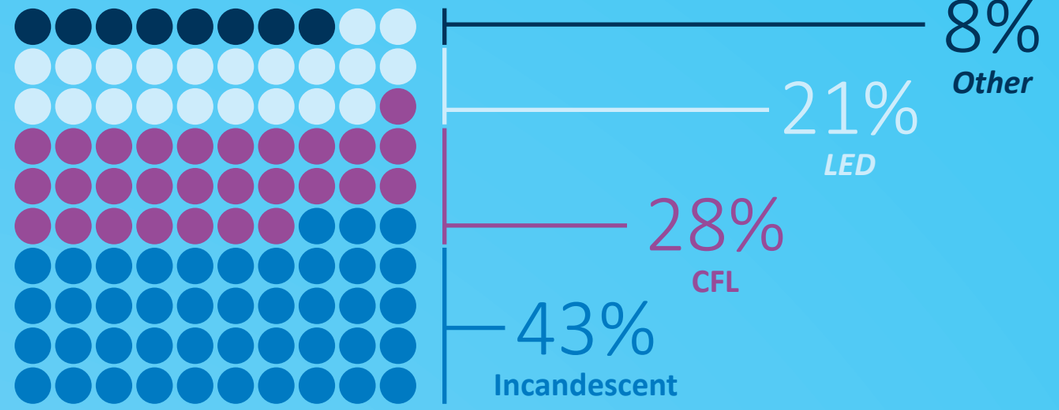


SEE THE DATA

▲▼ *Statistically different from 2011 RBSA*

Distribution of Stored Bulbs

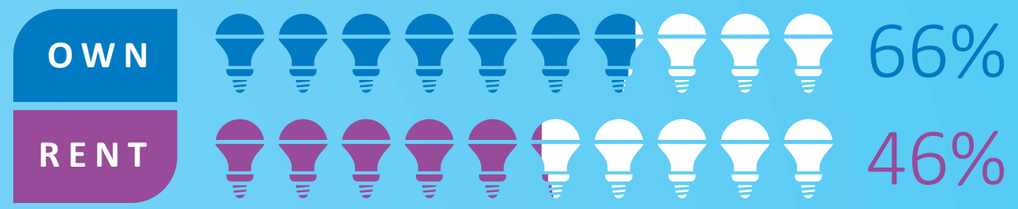
Of bulbs not in use (in storage), incandescent bulbs represent the ***highest quantity****, followed by CFLs.*



SEE THE DATA

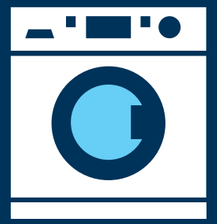
LED Installed by Owner Versus Renter

Homeowners are more likely than renters to have ***at least one LED installed.***



SEE THE DATA

▲▼ *Statistically different from 2011 RBSA*



Description

Code Updates

Key Findings

Appliances

The appliance data collection identified and characterized appliances in each manufactured home, including kitchen and laundry appliances. This section includes distribution of appliances by state and region, specific characteristics such as age and size, and appliance configurations such as door position for refrigerators. In many instances, Cadmus identified characteristic data such as age, efficiency, and size after the site visit through a combination of databases and other secondary sources.

For the first time, the RBSA II collected information about connected appliances (that is, appliances that are connected to the homes' Wi-Fi). In addition to identifying the presence of clothes dryers and fuel type, the RBSA II captured more information regarding clothes dryer configurations and other details (included in Appendix A).

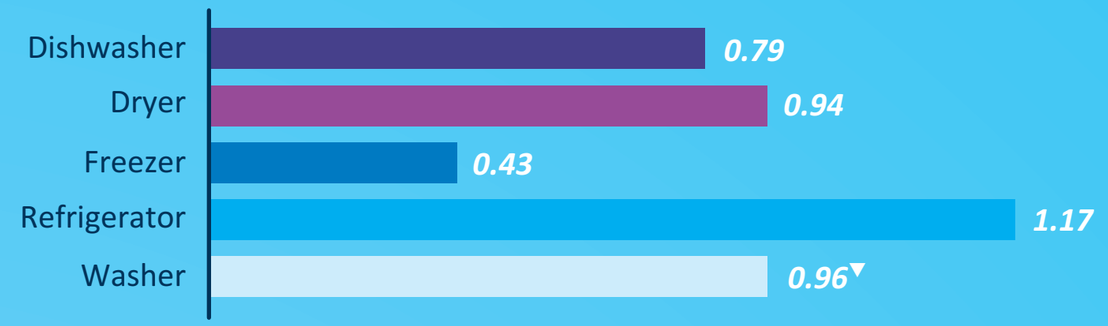
Federal energy efficiency standards can have a significant impact on appliance stock and efficiencies in particular. There have been a few federal efficiency standard changes since the previous RBSA. Appliances impacted by federal efficiency changes include the following equipment:

- Refrigerators and freezers (effective 2014)
- Dehumidifiers (effective 2012)
- Clothes washers and dryers (effective 2015)
- Dishwashers (effective 2013)

Key findings for appliances include:

- Appliance distributions, types, and efficiencies show some shift since the last RBSA. For instance, the distribution of clothes washer and refrigerator efficiencies and configurations changed.
- The average appliance age was approximately 10 years, with 34% of dishwashers and 21% of clothes washers beyond their expected useful life. Expected useful life is based on Regional Technical Forum assumptions and ranges from 12 to 22 years, depending on the appliance.
- There were significant shifts in refrigerator configuration types: refrigerators with top freezers declined the most since the previous RBSA, and side-by-side refrigerators with bottom freezers increased the most. In general, side-by-side configuration refrigerators have been shown to consume more energy than single-door units when all else is equal.

Average Number of Appliances per Home



SEE THE DATA

Distribution of Clothes Washer Types

*Horizontal and vertical axis (without agitator) washers increased from a combined share of **24% to 38%** across the region.*

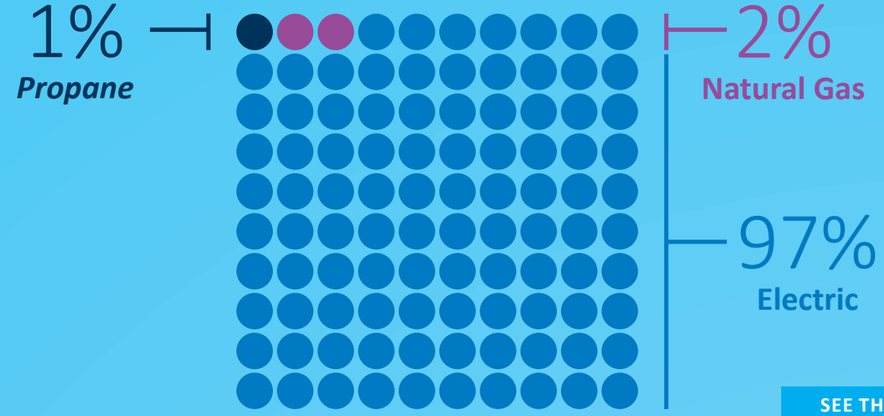
	ID	MT	OR	WA	
Horizontal Axis	24%	16%	25%	31%	27%▲
Vertical Axis (with agitator)	67%	67%	59%▼	59%	61%▲
Vertical Axis (without agitator)	9%	16%▲	13%	10%	11%▲

SEE THE DATA

▲▼ *Statistically different from 2011 RBSA*

Distribution of Clothes Dryer Fuel Types

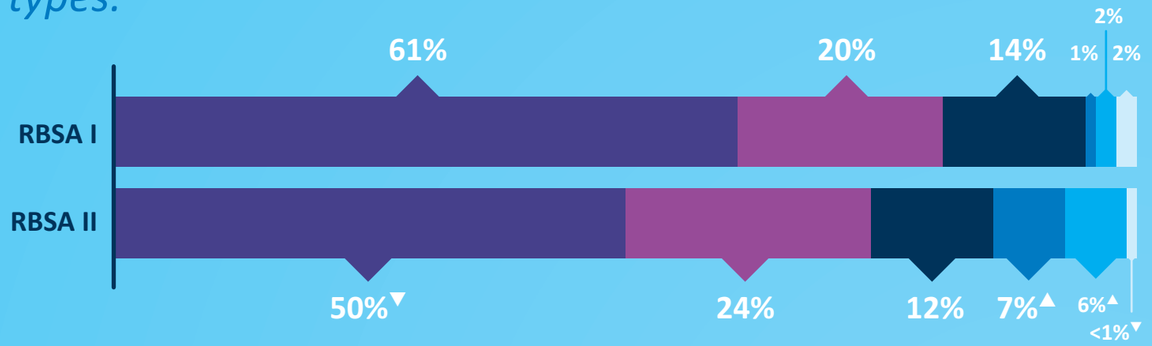
*The RBSA II found **97%** of dryers are electric, followed by natural gas (**2%**) and propane (**1%**).*



SEE THE DATA

Distribution of Refrigerators by Type

*There were **significant shifts** in refrigerator configuration types.*

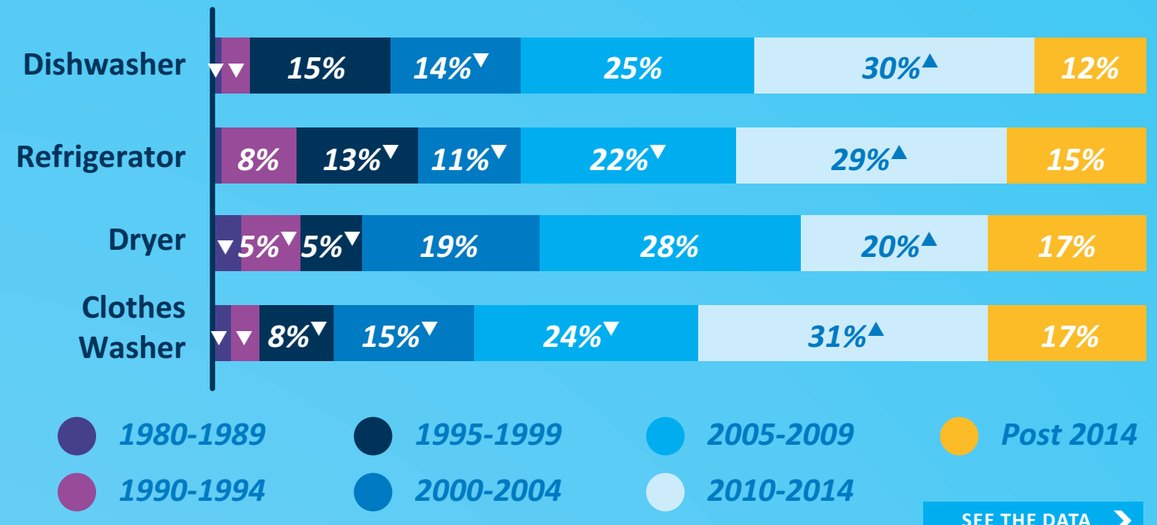


SEE THE DATA

▲▼ *Statistically different from 2011 RBSA*

Appliance Age

*Roughly **37% to 48%** of appliances were manufactured in 2010 or later.*



SEE THE DATA

Proportion of Equipment Past Effective Useful Life

*A **substantial proportion of appliances** are past their expected useful life.*

21%
Clothes Washer

25%
Refrigerator

33%
Dryer

34%
Dishwasher

SEE THE DATA

▲▼ *Statistically different from 2011 RBSA*

Description

Code Updates

Key Findings

Water End-Uses

Field technicians identified and characterized water heaters in each home. Specifically, they collected information regarding the water heater type, size, fuel, make, model, input capacity, and location. Location is especially important for heat pump water heaters (HPWHs) because the location may affect not only how much energy is required to heat water, but also how much energy is required to heat and cool the home. For example, the HPWH will have less impact on heating and cooling the farther it is from the thermostat and the more thermal buffers that exist between it and the thermostat. However, HPWH efficiency will decline in winter if the water heater is located outside of the thermal boundary. The RBSA II did not directly capture the distances and thermal buffers, but field technicians noted where electric water heaters were located by room type. Collected data also included additional information such as ceiling height near the water heater and proximity to exterior walls for running vent ducts. This may help programs identify how many electric water heaters can be easily replaced with HPWHs.

Field technicians also conducted a thorough walk-through for showerheads and faucet aerators. For these end uses, technicians captured the rated flowrate (if available) and measured flowrate using documented procedures and equipment. The end uses were classified as primary, secondary, or used about the same.

Federal energy efficiency standards can have a significant impact on water heater efficiencies. New federal efficiency changes for water heaters went into effect in 2015.

Key findings for water end-uses include:

- Water heater fuel and type remained relatively the same as the previous RBSA.
- Though not statistically significant, the share of instantaneous water heaters increased from 1% to 2%. HPWHs represent less than 1% of water heaters.
- 76% of water heaters are located in the main part of the home.

Distribution of Water Heater Fuel Type by State

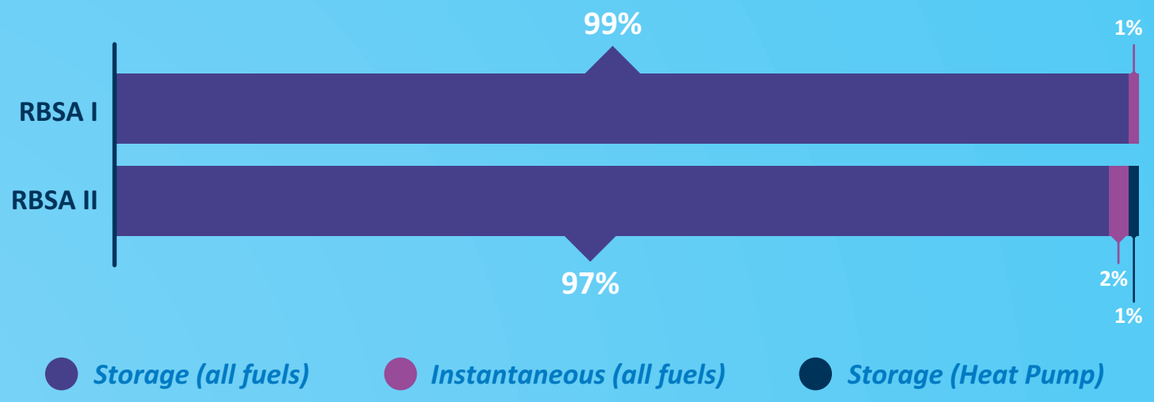
*Water heater fuel type remained relatively **unchanged** from RBSA I.*

	ID	MT	OR	WA	
Electric	73%	53%	90%	91%	85%
Natural Gas	18%	34%	10%	7%	12%
Propane	9%	12%	0%	2%	3%

SEE THE DATA

Distribution of Water Heater Type

*Heat pump water heaters account for less than **1% of water heaters in manufactured homes.***



SEE THE DATA

▲▼ *Statistically different from 2011 RBSA*

Distribution of Shower and Faucet Flow Rates (GPM)*

Showerhead

52%

are 2.0 GPM or below

Kitchen

42%

are 1.5 GPM or below

Bath

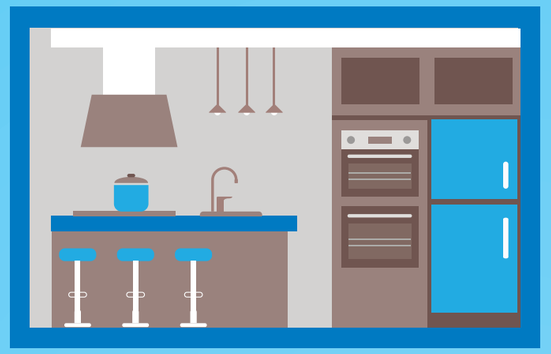
36%

are 1.5 GPM or below

SEE THE DATA

Average Number of Showerheads and Faucets Per Home

*Manufactured homes have **2.1** bathroom sinks, **0.6** standalone showers, and **1.1** shower and bath combo units*



*On average, homes have **1.0** kitchen sinks*

SEE THE DATA

** Measured GPM data were calibrated to adjust for systematic bias in the data collection approach. Results are not comparable to RBSA I.*

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▲▼ *Statistically different from 2011 RBSA*

Description

Key Findings

Electronics

The electronics walk-through identified and characterized electronics in each home. Equipment captured included a range of electronic devices from televisions to computers. Field technicians did not include portable devices such as iPads and phones because of their general mobility. This section includes distribution of electronics by state and region, along with specific characteristics such as size, type, and usage. In some instances, Cadmus identified characteristic data such as efficiency and size after the site visit by searching a third-party database, manufacturer data sheets, or other online resources.

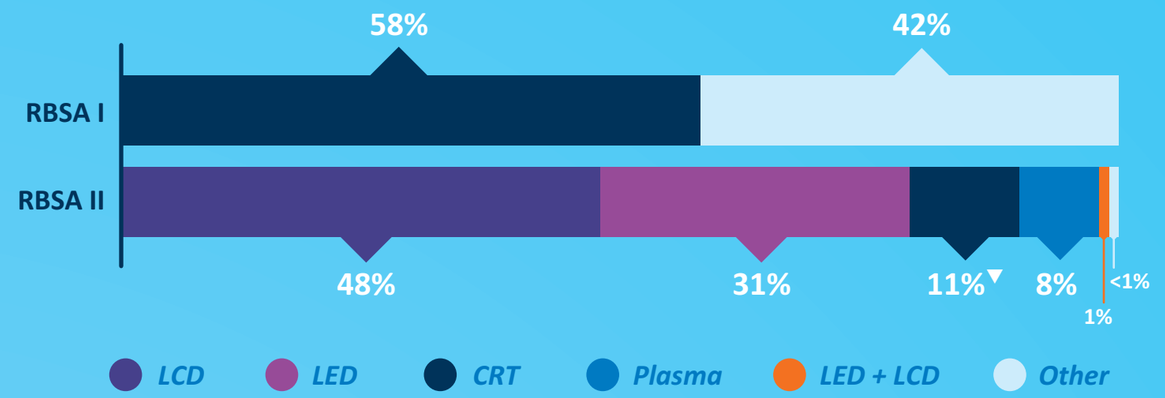
The walk-through also included capturing information regarding power strips and auxiliary items that may be plugged into them. Field technicians measured the television wattage whenever possible, using a plug-through power meter, and recorded the presence of television peripherals such as Roku, Fire Stick, and Apple TV devices. Technicians asked participants about usage patterns (e.g., how many hours per day each television is typically on).

Key electronic findings include:

- There have been many advancements in television technology since the last RBSA. Cathode ray tube televisions represented over half of all televisions found in manufactured homes since the last RBSA, whereas currently they represent only 11% of televisions, with LED and LCD televisions representing over three-quarters of what is currently installed in homes.
- Set-top boxes and audio systems are declining in numbers. The number of homes with set-top boxes declined from 79% in RBSA I to 67% in RBSA II. Audio systems per home saw a significant decline from 1.3 per home to fewer than one per home (0.5) on average. These changes are likely due to the popularity of web-enabled televisions and streaming services such as Netflix and Spotify.

Distribution of Television Screen Types

*Over **three-quarters of televisions** now use LED or LCD technology.*



SEE THE DATA

Television Power Draw

The average television power

dropped by 23W

from 103W to 80W over the past 6 years

SEE THE DATA

▲▼ *Statistically different from 2011 RBSA*

Percent of Homes with Game Consoles

The percentage of homes with gaming systems ***remained about the same.***

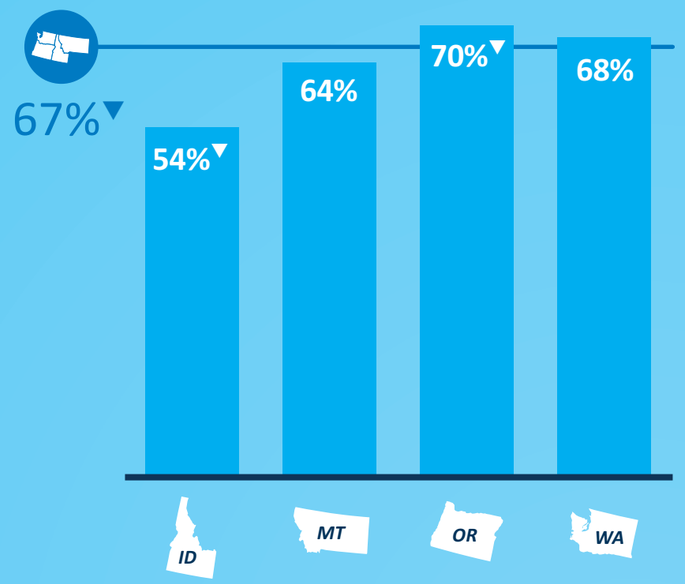
RBSA I 27%

RBSA II 26%

SEE THE DATA

Percent of Homes with Set-Top Boxes

The average number of set-top boxes per home is ***1.1▼ - down from 1.5 in the previous study.***



SEE THE DATA

▲▼ *Statistically different from 2011 RBSA*

2% of homes have at least one smart power strip

SEE THE DATA

OTHER

What are power strips being used for?

SEE THE DATA

- ***Entertainment system*** 49%
- ***Office/ computer*** 29%
- ***Other devices*** 22%

▲▼ *Statistically different from 2011 RBSA*

Description

Energy Benchmarking

Similar to the previous RBSA, the RBSA II provides an opportunity to calculate energy-use intensity (EUI) profiles. Cadmus conducted the RBSA II billing analysis using procedures and methods similar to those used for the previous study to allow for direct comparison of the results. Cadmus requested 24 months of electric and gas billing data for all 411 manufactured home participants. However, Cadmus ultimately removed 46 sites for several reasons: the utilities did not provide billing information (most common), inconsistencies in data collection such as multiple readings on the same date or missing reads, or anomalies in the data such as lengthy vacancies or apparently erroneous readings. In the end, the analysis included billing data for 365 electric and 69 gas participants.

Key Findings

Key energy usage findings include:

- Average electric usage per home decreased for the region as well as in Idaho and Washington. Montana and Oregon remained relatively unchanged.
- Gas usage per home remained unchanged except for Montana, which had a decrease in gas usage.
- Annual electric usage per square foot declined for all states except Montana.
- Gas EUI decreased in all states except Idaho.
- Higher electric EUIs were largely driven by whether a home had electric heating and electric water heating. Homes with large conditioned areas had lower EUIs. Variables such as efficient lighting and percentage of mechanical cooling did not vary much across quartiles.

Average EUI by State and Fuel Type

	ID	MT	OR	WA	
Electric EUI per Home (kWh/sq.ft)	11.6▼	10.1	9.8▼	10.7▼	10.5▼
Gas EUI per Home (therm/sq.ft)	0.4	0.5▼	0.3▼	0.4▼	0.4▼
Other Fuel EUI per Home (kBtu/sq.ft)	9.9	21.0	10.2	5.5▼	8.9

SEE THE DATA

Electric EUI Quartiles and Corresponding Housing Characteristics

	Conditioned Area	Electric Heat	Efficient Lighting	Air Conditioning	Electric Hot Water
EUI Quartile 1 (<6.33)	1,666	40%	40%	60%	51%
EUI Quartile 2 (6.33-10.07)	1,433	71%	42%	79%	78%
EUI Quartile 3 (10.07-13.73)	1,301	79%	47%	80%	89%
EUI Quartile 4 (>13.73)	1,154	84%	43%	60%	85%

SEE THE DATA

▲▼ *Statistically different from 2011 RBSA*

Conservation, Purchases, and Miscellaneous Loads

Description

As part of the recruitment process, recruitment specialists asked a series of questions related to household purchases and energy efficiency awareness. Specifically, specialists inquired if households had participated in rebate programs and, if so, which ones and what the participant purchased. The recruitment specialists also asked if participants received any federal, state, or local tax credits, or if they completed a home energy assessment in the past two years. Finally, specialists asked participants whether they or a landlord pay their gas and electrical bills and whether they receive financial assistance for their utility bills (and if so, what portion of the bill is covered by financial assistance).

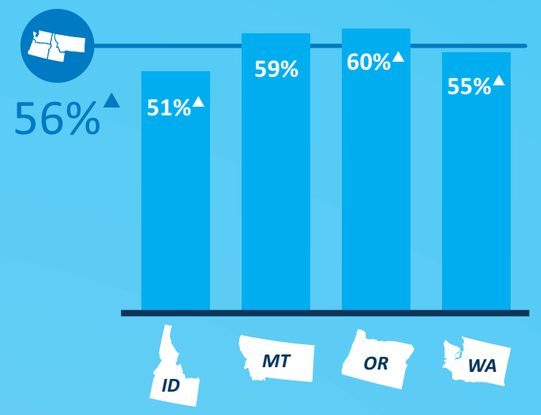
Data collection also captured information about miscellaneous and uncommon loads such as electric vehicle chargers, solar panels, smart home devices, well pumps, and pool and sauna equipment.

Key Findings

Key conservation, awareness, and miscellaneous findings include:

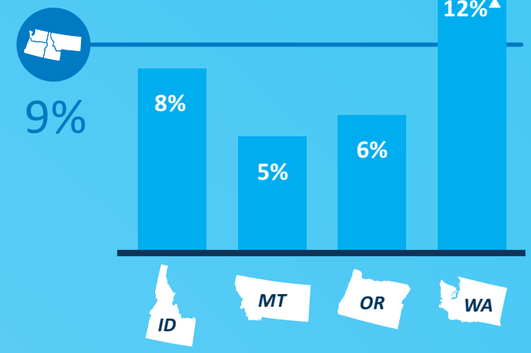
- A higher percentage of participants reported implementing conservation improvements without utility incentives in the past two years in this study compared to the previous RBSA (56% and 33%, respectively). This upward trend was true for all states except for Montana, which remained about the same. Out of the participants reporting some sort of energy efficient home improvement, fewer reported receiving an incentive from their utility (approximately 11% for the region) than in the last RBSA.
- Less than 1% of manufactured homes have solar panels. Field technicians identified a small number of homes, two in total, with electric vehicles present.
- Technicians also asked homeowners if they use or access any type of smart home device (such as a smart speaker like Google Home). Approximately 3% of homeowners responded to having such devices, with Idaho having the highest percentage of smart device users (4%).

Percent of Participants Reporting They Implemented Some Kind of Self-Funded Conservation Improvement



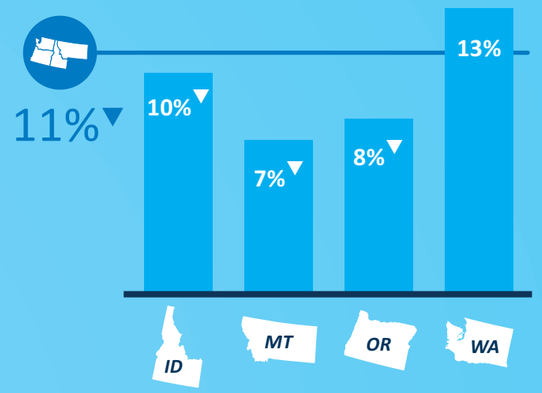
SEE THE DATA

Percent of Participants Reporting They Received State or Federal Tax Credit for an Energy Efficient Upgrade



SEE THE DATA

Percent of Participants Reporting Use of Utility Incentives



SEE THE DATA

▲▼ *Statistically different from 2011 RBSA*

Less than 1% of manufactured homes have solar panels.

SEE THE DATA

Less than 1% of households have electric vehicles

SEE THE DATA

3% of participants indicated they use any type of smart home device (such as a smart speaker)

SEE THE DATA

4.5% of participants reported completing a home energy audit in the past 2 years

SEE THE DATA

▲▼ *Statistically different from 2011 RBSA*

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RESIDENTIAL BUILDING STOCK ASSESSMENT

Appendix A: Report Tables

Introduction

This appendix presents findings for manufactured homes based on data collected for the core RBSA II study (funded by NEEA) and on data collected for an oversample funded by the Bonneville Power Administration. Cadmus developed and applied sampling weights to ensure that all manufactured home observations were weighted proportionally to the segment of the population represented by the sample; see the Database User Manual for a description of the weighting methods and procedures.

Where possible, Cadmus benchmarked the findings of the RBSA II against the findings presented in the RBSA I. Statistically significant differences between the two reports are denoted by either a ▲ or ▼ symbol, to indicate whether the RBSA II value is higher or lower than the value in the RBSA I study. This appendix identifies which table in the previous study was used to draw conclusions about each statistically significant difference.

New tables presented in this document that do not have a corollary in the RBSA I study do not have symbols indicating statistically significant increases or decreases from RBSA I, though statistically significant differences may exist. Without a comparable table in the RBSA I report, statistical testing could not be performed.

Unless otherwise noted, the following are true for all tables:

- Unknown, not applicable (N/A), and missing data are excluded from the analysis
- The presented sample size (n) represents the number of homes.
- Within a table, summing the sample size (n) across bins may result in a larger sample size than is shown in the 'Total' or summary row. This is intended and is possible because a home's equipment may fall into multiple bins within the same table. In these instances, the home will be counted towards the sample size for each bin it falls into.

Table A1 shows the complete sample and population sizes for each stratum and the case weight for each. The sample size is the number of homes that were observed in this study, the population size is the total number of homes in the stratum, and the case weight is the total number of homes that each sampled home represents.

Table A1. Manufactured Home Sample Sizes, Population Sizes, and Weights by Strata

State	Region	Territory	Sample Size – Number of Homes (n)	Population Size – Number of Homes (N)	Case Weight (N/n)
ID	-	BPA	13	14,271	1,098
ID	-	Non-BPA	72	45,077	626
MT	W	BPA	19	14,551	766
MT	W	Non-BPA	65	21,557	332
OR	E	BPA	15	17,031	1,135
OR	E	Non-BPA	12	15,881	1,323
OR	W	BPA	41	36,688	895
OR	W	Non-BPA	40	69,806	1,745
WA	E	BPA	16	29,194	1,825
WA	E	Non-BPA, Non-PSE	26	42,352	1,629
WA	E	PSE	1	975	975
WA	PS	BPA	12	11,058	922
WA	PS	PSE	26	51,539	1,982
WA	PS	SCL	1	2,052	2,052
WA	PS	Snohomish	17	16,959	998
WA	W	BPA	31	40,733	1,314
WA	W	PSE	4	10,632	2,658

For the RBSA II analysis, it is assumed that the sampled homes are representative of the total population within each stratum. For example, in Table A1 there are 13 sampled homes in the Idaho-BPA service territory that are representative of the 14,271 homes in the population. This means that each of the 13 sampled homes represent 1,098 homes in the population, which is the case weight for the stratum. All analyses are weighted using this methodology.

Many tables in the appendix use a subset of the data due to missing and unknown data, which are assumed to be missing completely at random. When performing the RBSA II analysis or working the RBSA II database, the case weight needs to be re-calculated after sub-setting to remove missing or unknown data. The case weight needs to be recalculated because when sites are removed from the analysis, the sample size decreases, and each remaining sample point represents a larger proportion of the population. As an example, if only 10 out of the 13 sampled homes in the Idaho-BPA service territory have known data in the variable of interest, the case weight for this stratum would be recalculated as 14,271 divided by 10, such that each sampled home with known data would represent 1.427 total homes.

Contents

Table 1. DISTRIBUTION OF HOMES BY TYPE AND STATE
(Compare to Table 7 in 2011 RBSA)

Home Type	Percentage of Homes										n
	ID		MT		OR		WA		Region		
	%	EB	%	EB	%	EB	%	EB	%	EB	
Single Wide	31.1%	8.4%	41.5%▼	9.8%	14.3%	6.1%	20.5%▼	5.8%	21.7%▼	3.5%	108
Double Wide	63.6%	8.4%	51.8%▲	9.9%	77.1%▲	6.8%	73.0%	6.2%	71.3%▲	3.8%	272
Triple Wide	4.2%	4.4%	2.8%	3.7%	3.2%	3.3%	5.2%	3.7%	4.3%	1.9%	18
Modular / Prefab	1.1%	6.6%	4.0%	5.7%	5.4%	3.9%	1.3%	2.6%	2.8%	1.4%	13
Total	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	411

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Table 2. DISTRIBUTION OF HOMES BY VINTAGE AND STATE
(Compare to Table 8 in 2011 RBSA)

Vintage	Percentage of Homes										n
	ID		MT		OR		WA		Region		
	%	EB	%	EB	%	EB	%	EB	%	EB	
Pre 1951	1.1%	6.6%	0.9%	5.7%	0.0%	0.0%	0.5%	0.0%	0.4%▲	0.4%	3
1951-1960	0.0%	0.0%	1.8%	3.7%	0.0%	0.0%	0.8%	4.9%	0.5%	0.9%	3
1961-1970	4.2%	4.4%	10.7%	6.7%	6.0%	4.7%	9.6%	4.4%	7.8%	2.5%	31
1971-1980	24.0%	7.6%	27.5%	8.3%	22.8%	7.2%	29.2%	6.8%	26.3%	4.0%	111
1981-1990	14.5%	6.7%	10.3%	7.7%	18.3%	6.2%	19.3%▼	6.0%	17.6%▼	3.5%	66
1991-2000	45.7%▲	8.2%	35.7%▲	9.5%	38.5%	8.2%	27.2%	6.7%	33.9%▲	4.2%	143
2001-2010	7.4%	5.0%	13.1%	7.8%	12.4%	5.7%	11.2%	4.8%	11.2%	2.9%	44
Post 2010	3.2%	4.2%	0.0%	0.0%	2.1%	4.3%	2.2%	3.0%	2.1%	1.5%	8
Total	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	409

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Table 3. DISTRIBUTION OF HOMES BY AGE, CONSTRUCTION STANDARD, AND STATE
(Compare to Table 9 in 2011 RBSA)

Age/Standard	Percentage of Homes										n
	ID		MT		OR		WA		Region		
	%	EB	%	EB	%	EB	%	EB	%	EB	
Pre-1976, pre-HUD	15.8%	6.9%	31.5%	9.2%	22.4%	7.3%	22.9%	6.2%	22.5%	3.8%	93
1976-1994, HUD	39.8%	8.9%	24.8%	8.9%	36.7%	8.1%	45.9%	7.5%	40.4%	4.5%	153
1990-1994, SGC or Natural Choice	1.8%▼	11.2%	0.9%▼	5.9%	3.5%▼	3.8%	2.4%▼	3.3%	2.6%▼	1.7%	9
Post-1994, HUD	38.3%▲	9.0%	39.7%▲	9.9%	29.2%▲	7.8%	26.3%▲	6.5%	30.0%▲	4.1%	124
Post-1994, NEEM	1.1%	6.7%	3.1%	6.6%	4.1%	4.0%	1.7%	2.2%	2.5%	1.4%	10
Post-1999, ENERGY STAR	3.2%	4.3%	0.0%	0.0%	4.1%	4.3%	0.8%▼	5.1%	2.1%▼	1.5%	8
Total	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	397

Table 4. AVERAGE CONDITIONED FLOOR AREA BY STATE
(Compare to Table 10 in 2011 RBSA)

State	Conditioned Floor Area (sq. ft.)		
	Mean	EB	n
ID	1,287.0	80.1	85
MT	1,481.1	160.8	84
OR	1,361.0	60.0	108
WA	1,339.8	59.5	134
Region	1,351.0▲	37.5	411

Table 5. AVERAGE CONDITIONED FLOOR AREA BY VINTAGE AND STATE
(Compare to Table 11 in 2011 RBSA)

Vintage	Conditioned Floor Area (sq. ft.)										
	ID		MT		OR		WA		Region		n
	Mean	EB	Mean	EB	Mean	EB	Mean	EB	Mean	EB	
Pre 1951	1,966.3	NA	572.0	NA	0.0	0.0	1,072.0	NA	1,508.8	NA	3
1951-1960	0.0	0.0	988.9	122.9	0.0	0.0	750.0	NA	830.6▼	41.4	3
1961-1970	903.2	129.3	1,028.5	65.3	994.6▼	32.7	1,128.1▲	87.5	1,040.6▼	36.3	31
1971-1980	1,279.6▲	39.1	1,255.0▲	81.8	1,107.3	54.6	1,176.1	47.1	1,174.7▲	28.4	111
1981-1990	1,291.2	56.3	1,395.3▲	64.9	1,466.8▲	50.8	1,522.0▲	49.5	1,462.7▲	28.3	66
1991-2000	1,434.4▼	74.8	1,898.8▼	167.8	1,467.2	58.6	1,403.5	56.8	1,468.9	35.7	143
2001-2010	1,567.7	88.1	1,598.0	219.5	1,432.0▼	32.4	1,782.6	69.9	1,622.0▼	36.8	44
Post 2010	1,141.8	32.0	0.0	0.0	1,571.9	NA	1,365.3	164.2	1,401.8	24.3	8
All Vintages	1,365.1▲	22.1	1,308.9	44.8	1,331.2▲	17.9	1,383.2▲	22.6	1,357.0▲	12.5	409

Table 6. AVERAGE NUMBER OF BEDROOMS PER HOME BY STATE
(Compare to Table 12 in 2011 RBSA)

State	Bedrooms per Home		
	Mean	EB	n
ID	2.65▼	0.14	85
MT	2.75	0.15	84
OR	2.77	0.11	108
WA	2.60	0.11	134
Region	2.67	0.06	411

Table 7. AVERAGE NUMBER OF BATHROOMS PER HOME BY STATE
(Compare to Table 13 in 2011 RBSA)

State	Bathrooms per Home		
	Mean	EB	n
ID	1.85	0.10	85
MT	1.80	0.11	84
OR	1.88	0.08	108
WA	1.82	0.07	134
Region	1.84	0.04	411

Table 8. AVERAGE ROOM AREAS BY ROOM TYPE
(Compare to Table 14 in 2011 RBSA)

Room Type	Room Areas (sq. ft.)		
	Mean	EB	n
Bathroom	63.6	2.7	410
Bedroom	143.2	8.1	411
Closet	34.0▼	0.6	133
Dining Room	134.5▲	1.4	181
Family Room	241.2▼	1.5	127
Garage	584.2▼	4.8	35
Hall	47.4▼	0.9	336
Kitchen	173.1	1.2	393
Laundry	62.7▼	0.4	284
Living Room	269.8▲	2.8	360
Office	126.2▼	0.7	83
Other	209.5	7.3	45
All Room Types	150.3▲	1.6	411

Table 9. BASELINE COMPONENT ASSUMPTIONS BY AGE/STANDARD
(Compare to Table 15 in 2011 RBSA)

Component	Age and Construction Standard					
	Pre-1976, pre-HUD	1976–1994, HUD	1990–1994, SGC	Post-1994, HUD	Post-1994, NEEM	Post-1999, ENERGY STAR
Ceiling	R7	R11	R38	R22	R 38	R 40
Floor	R7	R11	R 33	R22	R 33	R 33
Wall	R7	R11	R21	R11	R 21	R 21

Table 10. DISTRIBUTION OF WALL INSULATION LEVELS BY HOME VINTAGE
(Compare to Table 16 in 2011 RBSA)

Vintage	Wall Insulation Levels										
	R0–R8		R9–R14		R15–R21		R22–R30		All Walls		n
	%	EB	%	EB	%	EB	%	EB	%	EB	
Pre 1951	33.3%	0.0%	66.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.5%	0.4%	3
1951-1960	16.9%	14.0%	83.1%	6.5%	0.0%	0.0%	0.0%	0.0%	0.6%	1.0%	3
1961-1970	56.9%	5.1%	43.1%	5.0%	0.0%	0.0%	0.0%	0.0%	7.4%	2.8%	25
1971-1980	34.9%	4.4%	61.7%	4.4%	3.2%	3.3%	0.2%	0.9%	27.7%	4.4%	103
1981-1990	19.3%	3.6%	56.0%	4.0%	24.8%	2.9%	0.0%	0.0%	16.9%	3.7%	58
1991-2000	2.2%	1.7%	58.1%	4.5%	39.6%	4.5%	0.0%	0.0%	35.5%	4.6%	134
2001-2010	0.0%	0.0%	45.2%	4.1%	52.3%	4.1%	2.5%	3.9%	9.7%	2.9%	34
Post 2010	0.0%	0.0%	39.9%	0.0%	60.1%	0.0%	0.0%	0.0%	1.6%	1.5%	5
All Housing Vintages	18.0%	3.9%	57.0%	4.9%	24.8%	4.2%	0.2%	0.5%	100.0%	0.0%	365

* Due to differences in analysis methodology, no statistical testing was performed for this table.
* Walls with either unknown cavity insulation R-value or unknown continuous insulation R-value are excluded.
* Does not account for insulation condition.

Table 11. DISTRIBUTION OF WALL U-VALUE BY STATE
(Compare to Table 17 in 2011 RBSA)

State	Wall U-Value		
	Mean	EB	n
ID	0.095	0.006	85
MT	0.100▲	0.006	84
OR	0.096	0.004	108
WA	0.104▲	0.005	133
Region	0.100▲	0.003	410

* Thermal conductance (U) accounts for framing and building materials

Table 12. DISTRIBUTION OF WALL INSULATION LEVELS BY STATE

Insulation Levels	Distribution of Wall Insulation Levels										
	ID		MT		OR		WA		Region		n
	%	EB	%	EB	%	EB	%	EB	%	EB	
R0-R8	12.5%	6.8%	12.4%	5.7%	14.0%	6.4%	24.6%	7.1%	18.6%	3.9%	63
R9-R14	55.0%	9.7%	70.9%	9.1%	60.2%	8.7%	51.9%	8.1%	56.5%	4.8%	217
R15-R21	31.3%	9.2%	15.8%	8.4%	25.8%	7.9%	23.5%	6.9%	24.6%	4.2%	85
R22-R30	1.2%	7.4%	1.0%	6.4%	0.0%	0.0%	0.0%	0.0%	0.2%	0.5%	2
Total	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	367

* Due to differences in analysis methodology, no statistical testing was performed for this table.

* Walls with either unknown cavity insulation R-value or unknown continuous insulation R-value are excluded.

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Table 13. DISTRIBUTION OF FLOOR INSULATION BY HOME VINTAGE
(Compare to Table 18 in 2011 RBSA)

Vintage	Floor Insulation Levels												
	R0–R8		R9–R14		R15–R21		R22–R30		R31–R40		All Floors		n
	%	EB	%	EB	%	EB	%	EB	%	EB	%	EB	
Pre 1951	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.4%	0.4%	3
1951-1960	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.5%	0.9%	3
1961-1970	91.3%	1.9%	4.6%	2.4%	4.2%	2.1%	0.0%	0.0%	0.0%	0.0%	7.9%	2.5%	31
1971-1980	43.0%	4.3%	25.9%	3.7%	18.5%	3.3%	5.7%	2.1%	6.9%	2.4%	26.6%	4.0%	111
1981-1990	0.6%	2.2%	81.6%	3.2%	11.1%	2.8%	3.5%	2.9%	3.2%	1.3%	17.8%	3.5%	66
1991-2000	0.6%	1.8%	18.3%	3.4%	19.2%	3.4%	47.5%	4.4%	14.4%	3.1%	33.6%	4.2%	140
2001-2010	0.0%	0.0%	0.0%	0.0%	15.3%	1.8%	35.2%	3.7%	49.4%	3.8%	11.1%	2.9%	42
Post 2010	0.0%	0.0%	0.0%	0.0%	42.3%	5.6%	43.7%	4.8%	14.0%	3.4%	2.2%	1.5%	8
All Housing Vintages	19.5%	3.6%	28.0%	4.1%	15.5%	3.3%	24.2%	3.8%	12.7%	3.1%	100.0%	0.0%	404

* Due to differences in analysis methodology, no statistical testing was performed for this table.

Table 14. DISTRIBUTION OF FLOOR U-VALUE BY STATE
(Compare to Table 19 in 2011 RBSA)

State	Floor U-Value		
	Mean	EB	n
ID	0.060▼	0.005	85
MT	0.069	0.007	83
OR	0.063▼	0.005	108
WA	0.067▼	0.004	134
Region	0.065▼	0.003	410

* Thermal conductance (U) accounts for framing and building materials

Table 15. DISTRIBUTION OF CEILING INSULATION
(Compare to Table 20 in 2011 RBSA)

Insulation Level	Ceiling Insulation Level												
	R0–R8		R9–R14		R15–R21		R22–R30		R31–R40		All Ceilings		n
	%	EB	%	EB	%	EB	%	EB	%	EB	%	EB	
Pre 1951	68.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	31.9%	0.0%	0.4%	0.4%	3
1951-1960	83.1%	6.1%	16.9%	13.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.5%	0.9%	3
1961-1970	79.2%	3.5%	17.1%	3.8%	3.7%	8.2%	0.0%	0.0%	0.0%	0.0%	7.9%	2.5%	30
1971-1980	46.6%	4.4%	39.8%	4.1%	5.0%	2.5%	6.5%	2.3%	2.1%	2.3%	26.9%	4.1%	108
1981-1990	1.0%	2.4%	94.4%	1.8%	1.6%	1.5%	2.3%	2.5%	0.6%	2.2%	18.0%	3.6%	64
1991-2000	0.0%	0.0%	22.5%	3.8%	0.0%	0.0%	59.3%	4.4%	18.3%	3.6%	33.3%	4.2%	137
2001-2010	0.0%	0.0%	0.0%	0.0%	3.6%	1.8%	59.8%	4.2%	36.6%	4.3%	10.7%	2.9%	39
Post 2010	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	86.0%	2.3%	14.0%	3.5%	2.2%	1.5%	8
All Housing Vintages	18.7%	3.5%	37.1%	4.4%	2.8%	1.7%	30.7%	4.1%	10.6%	2.9%	100.0%	0.0%	392

* Due to differences in analysis methodology, no statistical testing was performed for this table.

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Table 16. DISTRIBUTION OF CEILING U-VALUE BY STATE (Compare to Table 21 in 2011 RBSA)

State	Ceiling U-Value		
	Mean	EB	n
ID	0.072	0.006	85
MT	0.077	0.006	84
OR	0.073	0.005	108
WA	0.077▼	0.005	134
Region	0.075▼	0.003	411

* Thermal conductance (U) accounts for framing and building materials

Table 17. DISTRIBUTION OF WINDOW U-VALUE BY STATE (Compare to Table 23 in 2011 RBSA)

State	Window U-Value		
	Mean	EB	n
ID	0.54▼	0.02	85
MT	0.60▼	0.04	84
OR	0.56▼	0.03	108
WA	0.60▼	0.03	134
Region	0.58▼	0.02	411

* Storm windows are not factored into the thermal conductance (U).

Table 18. AVERAGE NORMALIZED HEAT-LOSS RATE BY VINTAGE AND STATE
(Compare to Table 24 in 2011 RBSA)

Vintage	Heat-Loss Rate (UA/sq. ft.) per Home										
	ID		MT		OR		WA		Region		n
	Mean	EB	Mean	EB	Mean	EB	Mean	EB	Mean	EB	
Pre 1981	0.40▼	0.02	0.42▼	0.02	0.41▼	0.01	0.41▼	0.01	0.41▼	0.01	146
1981-1990	0.38	0.02	0.33▼	0.01	0.33▼	0.01	0.36	0.01	0.35▼	0.01	66
1991-2000	0.25▼	0.01	0.23	0.01	0.26▼	0.01	0.25▼	0.01	0.25▼	0.00	142
2001-2010	0.21▲	0.01	0.23▲	0.01	0.21▲	0.00	0.22▲	0.00	0.22▲	0.00	42
Post 2010	0.23	0.01	0.00	0.00	0.25	NA	0.24	0.00	0.24	0.00	8
All Vintages	0.30▼	0.01	0.30▼	0.01	0.30▼	0.00	0.31▼	0.00	0.30▼	0.00	404

* Heat loss rates (UA) account for framing and building materials
* Storm windows are not accounted for in heat loss rate (UA)
* Heat loss rates (UA) account for buffer space heat loss reductions for unconditioned basements, floors over garages, and unvented crawlspaces

Table 19. AVERAGE HEAT-LOSS RATE BY AGE/STANDARD AND STATE
(Compare to Table 25 in 2011 RBSA)

Age/Standard	Heat-Loss Rate (UA/sq. ft.) per Home										n
	ID		MT		OR		WA		Region		
	Mean	EB	Mean	EB	Mean	EB	Mean	EB	Mean	EB	
Pre-1976, pre-HUD	0.43▼	0.01	0.44▼	0.02	0.43▼	0.01	0.45▼	0.01	0.44▼	0.01	92
1976-1994, HUD	0.35▼	0.02	0.36▼	0.01	0.33▼	0.01	0.35▼	0.01	0.34▼	0.01	151
1990-1994, SGC or Natural Choice	0.26	NA	0.17	NA	0.24▲	0.00	0.23	NA	0.23▲	0.00	9
Post-1994, HUD	0.24▼	0.01	0.24▼	0.01	0.24▼	0.00	0.24▼	0.00	0.24▼	0.00	123
Post-1994, NEEM	0.16	NA	0.22	NA	0.19▲	0.00	0.19▼	0.02	0.19▼	0.00	10
Post-1999, ENERGY STAR	0.20▲	0.01	0.00	0.00	0.21▲	0.02	0.18	NA	0.20▲	0.00	8
All Age/Standards	0.28▼	0.00	0.30▼	0.01	0.28▼	0.00	0.31▼	0.00	0.29▼	0.00	393

* Heat loss rates (UA) account for framing and building materials
* Storm windows are not accounted for in heat loss rate (UA)
* Heat loss rates (UA) account for buffer space heat loss reductions for unconditioned basements, floors over garages, and unvented crawlspaces

Table 20. AVERAGE HEAT-LOSS RATE BY VINTAGE AND STATE
(Compare to Table 26 in 2011 RBSA)

Vintage	Heat-Loss Rate (UA) per Home										
	ID		MT		OR		WA		Region		n
	Mean	EB	Mean	EB	Mean	EB	Mean	EB	Mean	EB	
Pre 1981	500.9	16.1	478.2	25.9	438.3	17.4	459.4	17.0	459.9	9.9	146
1981-1990	452.6	16.7	445.8▼	17.6	474.0	13.4	532.1▲	22.1	495.6▲	11.0	66
1991-2000	355.9▼	17.6	398.8▲	29.8	379.7	16.4	351.8▼	14.3	365.1▼	8.9	142
2001-2010	323.6▲	20.8	418.3	72.4	302.9▼	6.5	389.3▲	15.1	354.9▲	9.0	42
Post 2010	260.9	7.5	0.0	0.0	385.7	NA	335.3	45.4	340.1	6.7	8
All Vintages	388.0▼	6.9	435.3	18.6	397.0▼	5.9	424.8	7.7	411.2▼	4.3	404

* Heat loss rates (UA) account for framing and building materials
* Storm windows are not accounted for in heat loss rate (UA)
* Heat loss rates (UA) account for buffer space heat loss reductions for unconditioned basements, floors over garages, and unvented crawlspaces

Table 21. AVERAGE BLOWER DOOR AIR FLOW BY STATE
(Compare to Table 27 in 2011 RBSA)

State	Blower Door Air Flow (CFM @ 50 Pa)		
	Mean	EB	n
ID	1,462.2▼	124.2	60
MT	1,700.3▼	130.6	61
OR	1,365.4▼	116.3	66
WA	1,580.7	129.8	77
Region	1,506.2▼	72.8	264

Table 22. AVERAGE BLOWER DOOR AIR TIGHTNESS BY STATE
(Compare to Table 28 in 2011 RBSA)

State	Blower Door Air Tightness (ACH50)		
	Mean	EB	n
ID	8.6▼	0.9	60
MT	10.8	1.5	61
OR	7.2▼	0.6	66
WA	9.8▼	1.0	77
Region	8.9▼	0.5	264

* RBSA II calculated home volume using ceiling heights measured on-site.

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Table 23. AVERAGE BLOWER DOOR AIR TIGHTNESS BY HOME VINTAGE (Compare to Table 29 in 2011 RBSA)

Vintage	Blower Door Air Tightness (ACH50)		
	Mean	EB	n
Pre 1951	6.1	0.1	2
1951-1960	14.3	0.0	1
1961-1970	16.2▼	0.4	17
1971-1980	11.7▼	0.2	61
1981-1990	8.9▼	0.1	45
1991-2000	7.0▼	0.1	104
2001-2010	5.3	0.1	29
Post 2010	5.0	0.1	5
All Vintages	8.9▼	0.1	264

* RBSA II calculated home volume using ceiling heights measured on-site.

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Table 24. AVERAGE INFILTRATION RATE BY STATE, ACH50 DIVIDED BY 20 (Compare to Table 30 in 2011 RBSA)

State	Infiltration Rate (ACH50/20)		
	Mean	EB	n
ID	0.43▼	0.05	60
MT	0.54	0.07	61
OR	0.36▼	0.03	66
WA	0.49▼	0.05	77
Region	0.44▼	0.03	264

* RBSA II calculated home volume using ceiling heights measured on-site.

Table 25. DISTRIBUTION OF PRIMARY HEATING SYSTEM (Compare to Table 32 in 2011 RBSA)

Heating System Type	Primary Heating Systems		
	%	EB	n
Air Source Heat Pump	24.0%▲	3.8%	87
Boiler	0.2%	0.3%	2
Electric Baseboard and Wall Heaters	1.0%	1.0%	4
Furnace	57.4%	4.4%	254
Mini-split HP	2.3%	1.3%	8
Other Zonal Heat	0.5%	0.9%	2
Plug-In Heaters	2.8%	1.6%	10
Stove/Fireplace	11.9%▼	3.0%	45
Total	100.0%	0.0%	411

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Table 26. DISTRIBUTION OF FUEL CHOICE FOR PRIMARY HEATING SYSTEM (Compare to Table 33 in 2011 RBSA)

Fuel Type	Fuel Choice (Primary System)										
	ID		MT		OR		WA		Region		n
	%	EB	%	EB	%	EB	%	EB	%	EB	
Electric	58.9%	9.2%	12.8%	7.4%	76.9%	6.8%	81.7%	5.6%	71.5%	3.6%	257
Gas	24.0%	8.0%	51.7%	8.4%	10.8%	5.7%	7.3%	4.3%	14.3%	2.8%	91
Oil/Kerosene	2.9%	6.0%	0.0%	0.0%	0.8%	5.0%	0.0%	0.0%	0.7%	0.9%	3
Propane	5.1%	5.4%	15.8%	8.0%	0.0%	0.0%	2.1%	2.8%	2.9%	1.3%	19
Wood	6.9%▼	6.1%	15.5%	8.4%	9.5%	5.6%	7.2%▼	4.2%	8.6%▼	2.6%	32
Pellets	2.1%	4.4%	4.2%	8.3%	2.1%	4.3%	1.7%	3.4%	2.1%	1.4%	8
Total	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	410

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Table 27. DISTRIBUTION OF SECONDARY HEATING SYSTEMS
(Compare to Table 34 in 2011 RBSA)

Heating System Type	Secondary Heating Systems		
	%	EB	n
Air Source Heat Pump	5.2%	3.1%	12
Electric Baseboard and Wall Heaters	1.2%	1.6%	4
Furnace	22.1%▼	5.3%	57
Mini-split HP	1.1%	1.3%	4
Other Zonal Heat	36.4%	6.0%	91
Packaged AC	0.6%	1.4%	2
Packaged HP	0.5%	0.8%	3
Stove/Fireplace	32.8%▲	5.7%	94
Total	100.0%	0.0%	210

Table 28. DISTRIBUTION OF FUEL CHOICE BY SECONDARY HEATING SYSTEM AND STATE
(Compare to Table 35 in 2011 RBSA)

Fuel Type	Fuel Choice (Secondary Systems)										
	ID		MT		OR		WA		Region		n
	%	EB	%	EB	%	EB	%	EB	%	EB	
Electric	67.6%	13.9%	41.6%	15.3%	71.0%	9.9%	66.2%	9.5%	65.9%	5.8%	144
Gas	6.5%	9.5%	6.6%	9.2%	7.0%	7.5%	2.2%	5.8%	4.7%	2.8%	12
Oil/Kerosene	0.0%	0.0%	2.5%	19.5%	0.0%	0.0%	0.0%	0.0%	0.2%	1.6%	1
Propane	2.2%	15.1%	22.1%	13.5%	3.7%	8.0%	7.4%	6.6%	6.7%	3.4%	16
Wood (cord)	18.9%	12.7%	24.9%	13.0%	15.8%	8.0%	19.0%	7.7%	18.5%	4.6%	56
Wood (pellets)	4.8%	11.4%	2.2%	14.8%	2.5%	3.6%	5.2%	5.7%	4.1%▲	2.7%	11
Total	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	209

Table 29. DISTRIBUTION OF FUEL CHOICE, FORCED AIR FURNACES
(Compare to Table 36 in 2011 RBSA)

Fuel Type	Fuel Choice (Forced Air Furnaces)		
	%	EB	n
Electric	75.3%	4.0%	195
Gas	19.5%	3.8%	92
Oil/Kerosene	0.6%	1.2%	2
Propane	4.6%	1.8%	23
Total	100.0%	0.0%	312

Table 30. DISTRIBUTION OF FUEL CHOICE, COMBUSTION HEATING STOVES
(Compare to Table 37 in 2011 RBSA)

Fuel Type	Fuel Choice (Heating Stove)		
	%	EB	n
Gas	2.6%▼	5.6%	2
Pellets	17.7%	8.2%	12
Propane	6.3%	7.2%	4
Wood	73.4%	7.6%	55
Total	100.0%	0.0%	72

Table 31. AVERAGE GAS FURNACE EFFICIENCY (AFUE) FOR PRIMARY SYSTEMS BY EQUIPMENT VINTAGE AND STATE (Compare to Table 38 in 2011 RBSA)

Vintage	Efficiency (AFUE)										
	ID		MT		OR		WA		Region		n
	%	EB	%	EB	%	EB	%	EB	%	EB	
Pre 1990	80.0%	NA	80.0%	NA	80.0%	0.0%	0.0%	0.0%	80.0%▲	0.0%	4
1990-1999	81.7%▼	0.1%	80.8%	0.1%	80.6%	0.4%	81.4%	0.2%	81.1%▲	0.0%	40
2000-2005	80.0%	NA	82.0%	0.2%	86.8%	7.2%	0.0%	0.0%	81.9%	0.4%	12
2006-2014	86.5%▲	0.3%	81.8%▲	0.0%	80.4%	NA	96.7%	NA	84.2%▲	0.1%	20
Post 2014	96.3%	0.3%	81.0%	0.0%	0.0%	0.0%	87.6%	24.9%	89.3%	4.4%	6
Vintage Unknown	86.0%	1.5%	80.4%	0.0%	80.0%	NA	83.0%	1.1%	82.7%	0.5%	23
All Vintages	84.9%▲	0.3%	81.1%▲	0.0%	80.6%▲	0.1%	84.8%▲	2.2%	83.0%▲	0.5%	105

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Table 32. AVERAGE AIR SOURCE HEAT PUMP EFFICIENCY (HSPF) FOR PRIMARY SYSTEMS BY EQUIPMENT VINTAGE (Compare to Table 39 in 2011 RBSA)

Vintage	Efficiency (HSPF)		
	Mean	EB	n
1990-1999	7.7▲	0.1	7
2000-2005	7.5▲	0.1	16
2006-2014	8.2▼	0.1	29
Post 2014	8.5	0.1	16
All Vintages	8.1▲	0.0	68

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Table 33. DISTRIBUTION OF AIR SOURCE HEAT PUMP EFFICIENCY (HSPF) FOR PRIMARY SYSTEMS BY STATE (Compare to Table 40 in 2011 RBSA)

HSPF	Percentage of Homes								
	ID		OR		WA		Region		n
	%	EB	%	EB	%	EB	%	EB	
6.8-7.6	12.7%▼	15.7%	34.0%▼	16.0%	5.3%	0.0%	16.3%▼	5.7%	14
7.7-8.2	42.2%	16.1%	39.4%	13.8%	77.5%▲	12.2%	59.0%▲	7.8%	36
8.3-8.9	36.7%▲	14.2%	11.7%	10.7%	4.8%	24.8%	11.9%▲	5.2%	9
9.0+	8.4%	16.4%	14.9%	13.8%	12.4%	13.4%	12.7%	6.9%	9
Total	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	68

Table 34. PERCENTAGE OF HOMES WITH ANY MECHANICAL COOLING EQUIPMENT BY COOLING ZONE AND STATE (Compare to Table 41 in 2011 RBSA)

Cooling Zone	Cooling Equipment per Home (All Systems)										
	ID		MT		OR		WA		Region		n
	%	EB	%	EB	%	EB	%	EB	%	EB	
1	80.0%▲	7.8%	71.0%▲	9.0%	59.5%	8.2%	54.8%▲	7.2%	61.0%▲	4.4%	257
2	86.7%▲	6.4%	80.0%▲	8.3%	66.8%	7.2%	72.7%	11.7%	73.6%	4.4%	88
3	97.5%▲	2.9%	0.0%	0.0%	76.9%▼	7.7%	100.0%	0.0%	87.6%	3.6%	66
All Cooling Zones	88.1%	16.6%	75.5%▲	16.8%	67.7%	22.0%	67.9%	18.4%	71.9%	12.3%	411

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Table 35. DISTRIBUTION OF PRIMARY COOLING SYSTEMS IN COOLING ZONES BY TYPE
(Compare to Table 42 in 2011 RBSA)

Cooling System Type	Percentage of Primary Cooling Systems								
	Cooling Zone 1		Cooling Zone 2		Cooling Zone 3		All Cooling Zones		n
	%	EB	%	EB	%	EB	%	EB	
Packaged AC	59.5%	3.0%	35.3%	3.1%	5.2%	1.3%	28.9%	5.1%	86
Packaged HP	97.4%	0.0%	2.6%	0.0%	0.0%	0.0%	0.6%▼	0.6%	3
Central AC	44.4%▲	4.4%	21.7%▼	3.9%	33.9%▼	5.6%	21.0%	3.9%	69
Air Source Heat Pump	61.7%	3.4%	14.9%▼	4.1%	23.4%▲	3.5%	44.6%▲	5.6%	98
Mini-split HP	70.2%	3.4%	29.8%	4.2%	0.0%	0.0%	4.4%	2.6%	10
Mini-split AC	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.5%	3.2%	1
All Types	61.8%▲	3.4%	19.9%▼	3.8%	18.3%	3.3%	100.0%	0.0%	267

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Table 36. AVERAGE COOLING EFFICIENCY (SEER) FOR PRIMARY CENTRAL AC SYSTEMS BY VINTAGE (Compare to Table 43 in 2011 RBSA)

Vintage	Efficiency (SEER)		
	Mean	EB	n
Pre 1990	NA	NA	0
1990-1999	10.0	0.0	3
2000-2005	11.0▲	0.3	7
2006-2014	13.5	0.4	9
Post 2014	13.1	0.1	2
Vintage Unknown	13.0	0.0	1
All Vintages	12.3▲	0.1	22

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Table 37. AVERAGE COOLING EFFICIENCY (SEER) FOR PRIMARY CENTRAL AIR SOURCE HEAT PUMP SYSTEMS BY VINTAGE
(Compare to Table 44 in 2011 RBSA)

Vintage	Efficiency (SEER)		
	Mean	EB	n
Pre 1990	NA	NA	0
1990-1999	11.5▲	0.1	11
2000-2005	11.7▲	0.2	18
2006-2014	13.6	0.1	34
Post 2014	14.5	0.1	18
Vintage Unknown	14.0	0.0	1
All Vintages	13.0▲	0.1	82

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Table 38. AVERAGE NUMBER OF PORTABLE COOLING DEVICES PER HOME BY STATE
(Compare to Table 45 in 2011 RBSA)

State	Number of Portable Cooling Devices per Home		
	Mean	EB	n
ID	0.12	0.06	85
MT	0.14	0.07	84
OR	0.30▲	0.08	108
WA	0.30▲	0.07	134
Region	0.26▲	0.04	411

Table 39. CROSSOVER DUCT CONDITION IN MULTI-SECTION HOMES (Compare to Table 46 in 2011 RBSA)

Unit Type	Crossover Duct Condition						
	Connected		Partially Connected		Disconnected		n
	%	EB	%	EB	%	EB	
Double Wide	98.2%▲	2.1%	0.0%	0.0%	1.8%	3.6%	57
Triple Wide	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	5
Modular / Prefab	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	3
All Types	98.4%▲	2.0%	0.0%	0.0%	1.6%	3.4%	65

Table 40. AVERAGE TRUEFLOW® AIR HANDLER AIR FLOW (CFM) BY STATE

State	Average TrueFlow® Rate (CFM) by State		
	Mean	EB	n
ID	532.3	125.0	26
MT	888.5	NA	1
OR	682.0	111.4	30
WA	877.5	69.2	26
Region	765.2	51.0	83

Table 41. AVERAGE TRUEFLOW® AIR HANDLER AIR FLOW (CFM) BY STATE (NORMALIZED BY HOUSE AREA)

State	Average TrueFlow® Rate (CFM) Normalized by Home Area (sq. ft.)		
	Mean	EB	n
ID	0.46	0.11	26
MT	0.50	NA	1
OR	0.50	0.08	30
WA	0.67	0.12	26
Region	0.57	0.06	83

Table 42. AVERAGE TRUEFLOW® AIR HANDLER AIR FLOW (CFM) PER TON BY SYSTEM TYPE

System Type	Average TrueFlow® Rate (CFM) per Ton by System Type		
	Mean	EB	n
Air Source Heat Pump	344.1	42.6	33
Furnace	188.6	39.2	46
All Systems	250.5	28.7	73

Table 43. AVERAGE NUMBER OF LAMPS PER HOME BY STATE
(Compare to Table 52 in 2011 RBSA)

State	Lamps per Home		
	Mean	EB	n
ID	34.8	2.8	85
MT	40.9▲	4.4	84
OR	41.5	3.3	108
WA	37.0	2.4	134
Region	38.5▲	1.6	411

Table 44. AVERAGE NUMBER OF FIXTURES PER HOME
(Compare to Table 53 in 2011 RBSA)

State	Fixtures per Home		
	Mean	EB	n
ID	22.0	1.5	85
MT	26.2▲	2.5	84
OR	26.4▲	1.7	108
WA	23.7▲	1.6	134
Region	24.5▲	1.0	411

Table 45. DISTRIBUTION OF LAMPS BY EISA CATEGORY AND STATE
(Compare to Table 54 in 2011 RBSA)

EISA Category	Percentage of Lamps										n
	ID		MT		OR		WA		Region		
	%	EB	%	EB	%	EB	%	EB	%	EB	
Exempt	22.7%	7.8%	27.7%▲	8.8%	32.6%▲	7.7%	30.5%▲	6.8%	29.9%▲	4.2%	376
Noncompliant	26.6%▼	8.1%	27.0%▼	8.7%	20.7%▼	6.8%	19.4%▼	5.8%	21.4%▼	3.7%	358
Compliant	50.7%▲	9.2%	45.3%	9.8%	46.7%	8.3%	50.1%	7.3%	48.7%▲	4.5%	409
Total	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	411

Table 46. DISTRIBUTION OF LAMPS BY TYPE AND STATE
(Compare to Table 55 in 2011 RBSA)

Lamp Type	Percent of Lamps										n
	ID		MT		OR		WA		Region		
	%	EB	%	EB	%	EB	%	EB	%	EB	
Compact Fluorescent	31.2%	8.6%	28.9%	8.4%	24.1%	7.1%	27.6%	6.5%	27.1%	4.0%	388
Halogen	6.5%	4.7%	5.9%	4.8%	6.0%	3.9%	6.9%	3.7%	6.5%▲	2.2%	245
Incandescent	42.5%▼	9.1%	46.0%▼	9.8%	39.0%▼	8.1%	36.8%▼	7.0%	39.0%▼	4.4%	381
Incandescent / Halogen	0.5%	1.8%	0.0%	0.0%	0.6%	1.5%	0.0%	0.5%	0.3%	0.5%	20
Light Emitting Diode	12.0%▲	6.1%	6.2%	5.0%	21.1%▲	6.7%	19.8%▲	5.9%	18.1%▲	3.6%	254
Linear Fluorescent	5.7%	4.4%	11.5%	6.9%	7.1%	4.3%	7.0%	3.9%	7.2%	2.4%	201
Other	1.5%	2.4%	1.3%	2.4%	2.0%	2.3%	1.9%	2.0%	1.8%	1.2%	126
Total	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	411

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Table 47. DISTRIBUTION OF LAMPS BY TYPE AND ROOM
(Compare to Table 56 in 2011 RBSA)

Lamp Type	Percent of Lamps														n
	Compact Fluorescent		Halogen		Incandescent		Incandescent/ Halogen		LED		Linear Fluorescent		Other		
	%	EB	%	EB	%	EB	%	EB	%	EB	%	EB	%	EB	
Bathroom	26.2%	4.0%	6.3%▲	2.2%	47.5%▼	4.4%	0.5%	0.8%	14.3%▲	3.2%	2.3%	1.5%	2.9%▼	1.6%	407
Bedroom	31.3%	4.1%	5.9%▲	2.2%	42.7%▼	4.4%	0.2%	0.6%	16.4%▲	3.4%	1.5%	1.1%	2.1%	1.4%	408
Closet	33.8%▲	4.1%	4.3%▲	2.0%	47.4%▼	4.0%	0.0%	0.0%	10.6%▲	3.0%	3.4%▼	2.4%	0.5%	0.8%	117
Dining Room	22.0%	3.4%	4.9%	2.0%	57.6%▼	4.4%	0.0%	0.0%	12.5%▲	3.2%	1.3%▼	1.3%	1.6%▲	1.2%	177
Family Room	24.6%▼	3.9%	6.1%	2.2%	38.0%▼	4.0%	0.5%	1.1%	27.7%▲	3.9%	1.0%	0.9%	2.2%▼	1.2%	118
Garage	10.2%	2.7%	2.4%	1.9%	12.3%▼	2.9%	1.0%	1.5%	13.6%▲	3.5%	59.7%	4.0%	0.7%▼	0.7%	64
Hall	38.2%	4.3%	6.0%▲	2.2%	36.6%▼	4.2%	0.0%	0.0%	13.9%▲	3.1%	3.3%	1.6%	2.0%▼	1.4%	307
Kitchen	21.3%▼	3.5%	6.9%	2.3%	25.4%▼	3.9%	0.1%	0.6%	18.7%▲	3.5%	25.7%	4.0%	1.9%▼	1.4%	392
Laundry	32.3%	4.1%	2.3%	1.1%	32.6%▼	4.2%	0.0%	0.0%	17.7%▲	3.3%	13.6%	3.1%	1.4%	1.1%	278
Living Room	32.9%	4.3%	6.9%▲	2.3%	37.2%▼	4.2%	0.4%	0.7%	17.6%▲	3.5%	2.6%	1.4%	2.4%▼	1.4%	355
Office	25.8%▼	3.4%	7.9%▲	2.1%	36.0%▼	3.7%	0.0%	0.0%	22.3%▲	3.3%	7.6%▼	2.6%	0.4%	2.1%	80
Other	20.7%	3.7%	5.6%	2.2%	28.8%▼	2.8%	0.0%	0.0%	8.8%▲	2.5%	33.6%▼	4.3%	2.6%▼	6.4%	54
Outside	23.8%	3.9%	9.9%	2.6%	35.3%▼	4.1%	1.0%	1.1%	25.5%▲	3.8%	2.1%▼	1.5%	2.3%▼	1.4%	333
All Room Types	26.8%	4.0%	6.5%▲	2.2%	38.3%▼	4.4%	0.3%	0.6%	17.6%▲	3.5%	8.3%	2.5%	2.2%▼	1.3%	411

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Table 48. AVERAGE NUMBER OF CFLS INSTALLED PER HOME BY STATE (Compare to Table 57 in 2011 RBSA)

State	Number of Lamps		
	Mean	EB	n
ID	11.0	2.1	85
MT	11.0▲	1.8	84
OR	9.7	1.2	108
WA	9.6	1.0	134
Region	10.0	0.7	411

Table 49. AVERAGE NUMBER OF LEDS INSTALLED PER HOME BY STATE

WEIGHTED	Average Number of Installed LEDs per Home		
	Mean	EB	n
ID	3.5	1.0	85
MT	2.6	1.3	84
OR	8.2	2.0	108
WA	7.0	1.7	134
Region	6.6	1.0	411

Table 50. AVERAGE NUMBER OF HALOGEN LAMPS INSTALLED PER HOME BY STATE
(Compare to Table 58 in 2011 RBSA)

State	Number of Lamps		
	Mean	EB	n
ID	2.3▲	0.8	85
MT	2.2▲	0.6	84
OR	2.5▲	0.6	108
WA	2.6▲	0.6	134
Region	2.5▲	0.4	411

Table 51. AVERAGE NUMBER OF INCANDESCENT LAMPS INSTALLED PER HOME BY STATE
(Compare to Table 59 in 2011 RBSA)

State	Number of Lamps		
	Mean	EB	n
ID	14.3▼	2.1	85
MT	17.6	2.9	84
OR	15.4▼	2.1	108
WA	13.6▼	1.7	134
Region	14.6▼	1.1	411

Table 52. AVERAGE NUMBER OF LINEAR FLUORESCENT LAMPS INSTALLED PER HOME BY STATE (Compare to Table 60 in 2011 RBSA)

State	Number of Lamps		
	Mean	EB	n
ID	2.2	0.7	85
MT	5.6	2.8	84
OR	3.5	0.8	108
WA	2.9	0.8	134
Region	3.2	0.5	411

Table 53. AVERAGE NUMBER OF OTHER LAMPS INSTALLED PER HOME BY STATE (Compare to Table 61 in 2011 RBSA)

State	Number of Lamps		
	Mean	EB	n
ID	0.6▲	0.3	85
MT	0.7▲	0.3	84
OR	1.0▲	0.3	108
WA	0.8▲	0.2	134
Region	0.8▲	0.2	411

Table 54. PERCENT OF HOMES WITH CFLS BY STATE

State	Homes with CFLs		
	%	EB	n
ID	93.9%	4.5%	85
MT	95.1%	4.3%	84
OR	91.4%	4.7%	108
WA	92.5%	4.0%	134
Region	92.6%	2.5%	411

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Table 55. PERCENT OF HOMES WITH LEDS BY STATE

State	Homes with LEDs		
	%	EB	n
ID	48.0%	9.3%	85
MT	40.8%	9.7%	84
OR	73.6%	7.1%	108
WA	65.7%	6.8%	134
Region	63.8%	4.1%	411

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Table 56. PERCENT OF HOMES WITH LEDS BY STATE AND OWNERSHIP TYPE

Ownership Type	Percent of Homes with LEDs										
	ID		MT		OR		WA		Region		n
	%	EB	%	EB	%	EB	%	EB	%	EB	
Own / buying	46.1%	9.3%	46.2%	9.8%	75.0%	6.9%	68.4%	6.8%	65.5%	4.1%	370
Rent	62.5%	10.7%	13.3%	5.5%	43.0%	0.0%	66.6%	5.4%	46.0%	2.3%	34
Occupy without rent	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	8.3%	0.0%	3
All Types	47.5%	9.3%	40.8%	9.7%	73.6%	7.1%	66.5%	6.8%	64.1%	4.2%	407

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Table 57. PERCENT OF HOMES WITH CONNECTED LIGHTING BY STATE

State	Homes with Connected Lighting		
	%	EB	n
ID	1.1%	1.7%	85
MT	0.0%	0.0%	84
OR	1.3%	2.1%	108
WA	2.2%	2.1%	134
Region	1.6%	1.2%	411

Table 58. PERCENT OF HOMES WITH GROW LIGHTS BY STATE

State	Percent of Homes with Grow Lights		
	%	EB	n
ID	0.0%	0.0%	85
MT	0.9%	1.5%	84
OR	1.3%	2.1%	108
WA	0.0%	0.0%	134
Region	0.5%	0.7%	411

Table 59. AVERAGE NUMBER OF STORED COMPACT FLUORESCENT LAMPS BY STATE (Compare to Table 62 in 2011 RBSA)

State	Stored Compact Fluorescent Lamps		
	Mean	EB	n
ID	1.5▼	0.5	85
MT	2.4	0.8	84
OR	1.9▼	0.5	108
WA	2.4	0.7	134
Region	2.1▼	0.4	411

Table 60. PERCENTAGE OF ALL CFLS THAT ARE STORED (Compare to Table 63 in 2011 RBSA)

State	Compact Fluorescent Lamps		
	%	EB	n
ID	11.4%	6.2%	81
MT	17.4%	7.5%	81
OR	16.4%▼	6.2%	101
WA	18.9%	5.9%	125
Region	17.0%	3.5%	388

Table 61. AVERAGE NUMBER OF STORED LED LAMPS BY STATE

State	Average Number of Stored LEDs		
	Mean	EB	n
ID	1.3	0.6	85
MT	0.5	0.3	84
OR	2.1	0.6	108
WA	1.5	0.6	134
Region	1.6	0.3	411

Table 62. PERCENTAGE OF ALL LEDS THAT ARE STORED

State	Percent of LEDs in Storage		
	%	EB	n
ID	25.4%	11.0%	45
MT	14.3%	10.8%	36
OR	20.7%	7.8%	80
WA	17.9%	6.6%	93
Region	19.5%	4.3%	254

Table 63. AVERAGE NUMBER OF STORAGE BULBS BY BULB TYPE AND STATE

Lamp Category	Average Number of Storage Bulbs										
	ID		MT		OR		WA		Region		n
	Mean	EB	Mean	EB	Mean	EB	Mean	EB	Mean	EB	
Compact Fluorescent	1.5	0.5	2.4	0.8	1.9	0.5	2.4	0.7	2.1	0.4	411
Halogen	0.3	0.2	0.7	0.5	0.4	0.2	0.6	0.2	0.5	0.1	411
Incandescent	2.3	0.7	4.6	1.4	3.4	1.0	2.8	0.6	3.1	0.4	411
Incandescent / Halogen	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	411
Light Emitting Diode	1.3	0.6	0.5	0.3	2.1	0.6	1.5	0.6	1.6	0.3	411
Linear Fluorescent	0.0	0.1	0.4	0.7	0.0	0.0	0.1	0.2	0.1	0.1	411
All Categories	5.4	1.1	8.5	1.8	7.9	1.3	7.4	1.1	7.4	0.7	411

Table 64. DISTRIBUTION OF STORAGE BULBS BY BULB TYPE AND STATE

Lamp Category	Distribution of Storage Bulbs										
	ID		MT		OR		WA		Region		n
	%	EB	%	EB	%	EB	%	EB	%	EB	
Compact Fluorescent	26.3%	8.2%	28.1%	8.3%	23.8%	6.9%	31.8%	6.6%	28.2%	4.0%	411
Halogen	5.6%	4.3%	7.4%	5.7%	5.6%	3.8%	7.2%	3.6%	6.5%	2.2%	411
Incandescent	45.3%	8.2%	53.8%	9.8%	43.3%	8.1%	39.6%	7.0%	42.7%	4.4%	411
Incandescent / Halogen	0.4%	1.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.1%	411
Light Emitting Diode	21.8%	7.7%	5.6%	4.9%	26.8%	7.3%	19.1%	5.6%	20.8%	3.6%	411
Linear Fluorescent	0.5%	1.7%	4.9%	5.0%	0.0%	0.0%	2.2%	2.3%	1.5%	1.2%	411
Other	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	411
Unknown	0.0%	0.0%	0.2%	0.8%	0.5%	1.3%	0.0%	0.0%	0.2%	0.4%	411
Total	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	411

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Table 65. AVERAGE HOUSEHOLD WATTS PER BULB BY STATE

State	Average Lamp Wattage per Home		
	Mean	EB	n
ID	37.4	2.9	85
MT	39.4	2.9	84
OR	36.5	2.4	108
WA	33.5	2.0	134
Region	35.4	1.3	411

Table 66. AVERAGE LIGHTING POWER DENSITY (LPD) BY ROOM TYPE (Compare to Table 64 in 2011 RBSA)

Room Type	Room LPD (W/sq. ft.)		
	Mean	EB	n
Bathroom	2.03▼	0.16	397
Bedroom	0.60▼	0.04	357
Closet	1.56▼	0.15	114
Dining Room	1.18▼	0.09	170
Family Room	0.58▼	0.05	105
Garage	0.59▼	0.03	34
Hall	1.43	0.13	297
Kitchen	0.98▼	0.07	372
Laundry	0.92▼	0.08	260
Living Room	0.50▼	0.04	271
Office	0.87	0.05	75
Other	0.83▼	0.08	35
All Room Types	1.02▼	0.03	411

Table 67. AVERAGE EXTERIOR LIGHTING POWER (WATTS) BY STATE
(Compare to Table 65 in 2011 RBSA)

State	Exterior Lighting Power (Watts)		
	Mean	EB	n
ID	151.5	37.4	62
MT	185.8	49.9	65
OR	138.6▼	25.4	87
WA	109.1▼	20.1	103
Region	130.4▼	13.8	317

Table 68. AVERAGE LIGHTING POWER DENSITY (LPD) BY STATE
(Compare to Table 66 in 2011 RBSA)

State	Home LPD (W/sq. ft.)		
	Mean	EB	n
ID	0.91▼	0.09	85
MT	1.00	0.19	84
OR	0.93▼	0.08	108
WA	0.80▼	0.06	134
Region	0.87▼	0.04	411

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Table 69. AVERAGE NUMBER OF APPLIANCES PER HOME BY TYPE
(Compare to Table 68 in 2011 RBSA)

Appliance	Number of Appliances per Home		
	Mean	EB	n
Dishwasher	0.79	0.04	411
Clothes Dryer	0.94	0.02	411
Freezer	0.43	0.05	411
Refrigerator	1.17	0.04	411
Clothes Washer	0.96▼	0.02	411
Water Heater	0.98	0.02	411

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Table 70. AVERAGE MANUFACTURE DATE OF APPLIANCES BY TYPE

Type	Average Manufacture Date		
	Mean	EB	n
Dishwasher	2007	0.7	285
Clothes Dryer	2006	0.7	169
Freezer	2007	0.5	66
Refrigerator	2006	0.7	273
Clothes Washer	2008	0.7	308

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Table 71. PERCENT OF APPLIANCES BEYOND MEASURE LIFE BY STATE

Type	Percent of Appliances		
	%	EB	n
Dishwasher	33.7%	4.3%	285
Clothes Dryer	33.0%	3.8%	169
Freezer	16.4%	1.5%	66
Refrigerator	25.2%	3.6%	273
Clothes Washer	21.2%	3.5%	308
Water Heater	31.2%	4.1%	265

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Table 72. DISTRIBUTION OF REFRIGERATOR/FREEZERS BY VINTAGE (Compare to Table 69 in 2011 RBSA)

Vintage	Refrigerators		
	%	EB	n
Pre 1980	0.0%	0.0%	0
1980-1989	1.7%	1.4%	7
1990-1994	7.8%	3.1%	23
1995-1999	12.9%▼	3.7%	39
2000-2004	11.1%▼	2.8%	49
2005-2009	22.5%▼	4.2%	82
2010-2014	29.2%▲	4.6%	97
Post 2014	14.8%	3.7%	53
Total	100.0%	0.0%	287

Table 73. DISTRIBUTION OF REFRIGERATORS BY TYPE
(Compare to Table 70 in 2011 RBSA)

Refrigerator Type	Refrigerators		
	%	EB	n
Full Size Refrigerator Only	0.5%▼	0.8%	3
Mini Refrigerator	6.3%▲	2.3%	28
Refrigerator with Bottom Freezer	12.1%	3.1%	53
Refrigerator with Side-by-Side Freezer	24.3%	3.9%	106
Refrigerator with Top Freezer	50.1%▼	4.6%	232
Side-by-Side Refrigerator with Bottom Freezer	6.8%▲	2.3%	34
Total	100.0%	0.0%	400

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Table 74. AVERAGE REFRIGERATOR VOLUME BY TYPE
(Compare to Table 71 in 2011 RBSA)

Refrigerator Type	Volume (cu. ft.)		
	Mean	EB	n
Full Size Refrigerator Only	21.7	NA	2
Mini Refrigerator	5.2▲	0.3	20
Refrigerator with Bottom Freezer	22.3▲	0.3	47
Refrigerator with Side-by-Side Freezer	23.1▲	0.3	85
Refrigerator with Top Freezer	19.3	0.3	187
Side-by-Side Refrigerator with Bottom Freezer	24.2	0.4	30
All Refrigerator Types	19.7	0.1	334

Table 75. DISTRIBUTION OF STANDALONE FREEZERS BY TYPE IN HOMES WITH STANDALONE FREEZERS (Compare to Table 72 in 2011 RBSA)

Freezer Type	Freezers		
	%	EB	n
Freezer, chest	42.7%	7.0%	75
Freezer, upright	57.3%	7.0%	89
Total	100.0%	0.0%	156

Table 76. AVERAGE FREEZER VOLUME BY TYPE (Compare to Table 73 in 2011 RBSA)

Freezer Type	Freezer Volume (cu. ft.)		
	Mean	EB	n
Freezer, chest	8.3▼	0.7	66
Freezer, upright	17.6	1.0	77
All Refrigerator Types	13.0▼	0.6	136

Table 77. DISTRIBUTION OF CLOTHES WASHERS BY VINTAGE
(Compare to Table 74 in 2011 RBSA)

Vintage	Clothes Washers		
	%	EB	n
Pre 1980	0.0%	NA	0
1980-1989	1.6%▼	1.8%	4
1990-1994	3.2%▼	2.0%	9
1995-1999	8.0%▼	2.6%	31
2000-2004	15.3%▼	3.5%	50
2005-2009	23.6%▼	4.3%	74
2010-2014	31.4%▲	4.7%	93
Post 2014	17.0%	4.0%	47
Total	100.0%	0.0%	308

Table 78. DISTRIBUTION OF CLOTHES WASHERS BY TYPE AND STATE
(Compare to Table 75 in 2011 RBSA)

Clothes Washer Type	Percentage of Clothes Washers										
	ID		MT		OR		WA		Region		n
	%	EB	%	EB	%	EB	%	EB	%	EB	
Horizontal Axis	23.8%	8.4%	16.0%	7.8%	25.5%	7.5%	30.9%	7.2%	27.0%▲	4.2%	95
Stacked Washer/Dryer	0.0%	0.0%	1.0%	6.1%	2.1%	4.4%	0.0%	0.0%	0.7%▼	1.1%	3
Vertical Axis (with agitator)	67.3%	8.9%	66.9%	9.5%	59.4%▼	8.3%	59.0%	7.5%	60.9%▲	4.6%	250
Vertical Axis (without agitator)	8.9%	5.5%	16.2%▲	8.1%	13.1%	6.1%	10.1%	4.8%	11.4%▲	3.0%	46
Total	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	393

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Table 79. DISTRIBUTION OF CLOTHES WASHERS BY TYPE AND VINTAGE
(Compare to Table 76 in 2011 RBSA)

Clothes Washer Type	Vintage														n
	Pre 1980		1980–1989		1990–1994		1995–1999		2000–2004		2005–2009		Post 2009		
	%	EB	%	EB	%	EB	%	EB	%	EB	%	EB	%	EB	
Horizontal Axis	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	4.2%	2.3%	12.9%▼	3.3%	22.8%▼	4.2%	19.9%▲	4.2%	85
Stacked Washer/Dryer	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2
Vertical Axis (with agitator)	0.0%	0.0%	2.8%▼	2.4%	5.4%▼	2.6%	11.8%▼	3.1%	18.8%	3.7%	28.6%	4.6%	11.1%▲	3.2%	185
Vertical Axis (without agitator)	0.0%	0.0%	0.0%	0.0%	3.0%	4.6%	1.3%▼	2.1%	3.9%▼	1.6%	4.7%▼	2.8%	34.0%▲	4.2%	37
All Clothes Washer Types	0.0%	0.0%	1.6%▼	1.8%	3.2%▼	2.0%	8.0%▼	2.6%	15.3%▼	3.5%	23.6%▼	4.3%	17.0%▲	4.0%	308

Table 80. AVERAGE NUMBER OF CLOTHES WASHER LOADS PER WEEK BY STATE
(Compare to Table 77 in 2011 RBSA)

State	Clothes Washer Loads per Week		
	Mean	EB	n
ID	4.2	0.5	85
MT	4.0	0.5	84
OR	4.2	0.4	108
WA	3.7▼	0.3	134
Region	4.0▼	0.2	411

Table 81. AVERAGE CLOTHES WASHER SIZE (CU. FT.) BY STATE

State	Average Clothes Washer Size (cu. ft.)		
	Mean	EB	n
ID	3.2	0.1	81
MT	3.1	0.1	76
OR	3.3	0.2	101
WA	3.4	0.1	123
Region	3.3	0.1	381

Table 82. DISTRIBUTION OF CLOTHES DRYERS BY VINTAGE (Compare to Table 78 in 2011 RBSA)

Vintage	Clothes Dryer		
	%	EB	n
Pre 1980	0.8%▼	1.6%	2
1980-1989	3.4%▼	2.3%	7
1990-1994	5.4%▼	3.3%	9
1995-1999	5.4%▼	2.9%	10
2000-2004	19.3%	4.8%	36
2005-2009	28.0%	8.7%	43
2010-2014	20.3%▲	4.9%	39
Post 2014	17.4%	8.4%	23
Total	100.0%	0.0%	169

Table 83. PERCENTAGE OF DRYER LOADS PER WASHER LOAD BY STATE (Compare to Table 79 in 2011 RBSA)

State	Dryer Loads per Washer Load		
	%	EB	n
ID	80.5%	5.8%	80
MT	91.2%	3.7%	83
OR	88.5%	4.1%	108
WA	85.8%	4.1%	128
Region	86.4%	2.4%	399

Table 84. DISTRIBUTION OF VENTED DRYERS BY STATE

State	Percent of Dryers that are Vented		
	%	EB	n
ID	97.7%	2.6%	80
MT	96.6%	3.2%	70
OR	98.3%	1.9%	103
WA	97.6%	2.2%	120
Region	97.8%	1.3%	373

Table 85. DISTRIBUTION OF DRYERS BY FUEL TYPE AND STATE

Dryer Fuel	DISTRIBUTION OF DRYERS										
	ID		MT		OR		WA		Region		n
	%	EB	%	EB	%	EB	%	EB	%	EB	
Electric	95.2%	4.4%	96.7%	4.0%	96.5%	3.3%	96.9%	2.9%	96.5%	1.8%	373
Natural Gas	3.0%	6.1%	1.0%	6.5%	2.2%	4.5%	2.4%	4.7%	2.3%	1.8%	7
Propane	1.8%	11.2%	2.2%	13.7%	1.3%	8.2%	0.7%	4.2%	1.2%	1.3%	4
Total	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	384

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Table 86. DISTRIBUTION OF DISHWASHERS BY VINTAGE (Compare to Table 80 in 2011 RBSA)

Vintage	Dishwashers		
	%	EB	n
Pre 1980	0.4%	2.3%	1
1980-1989	0.9%▼	1.5%	3
1990-1994	3.2%▼	2.5%	7
1995-1999	15.0%	3.9%	42
2000-2004	14.3%▼	4.2%	34
2005-2009	25.0%	4.8%	72
2010-2014	29.6%▲	5.1%	89
Post 2014	11.6%	3.3%	37
Total	100.0%	0.0%	285

Table 87. AVERAGE NUMBER OF DISHWASHER LOADS PER WEEK
(Compare to Table 81 in 2011 RBSA)

State	Dishwasher Loads per Week		
	Mean	EB	n
ID	2.9▲	0.4	85
MT	2.6	0.5	84
OR	2.7	0.3	108
WA	3.0▲	0.3	134
Region	2.9▲	0.2	411

Table 88. DISTRIBUTION OF COOK TOP FUEL BY TYPE
(Compare to Table 82 in 2011 RBSA)

Fuel Type	Cook Top Fuel		
	%	EB	n
Electric	89.5%	2.5%	346
Gas	8.7%	2.3%	47
Propane	1.8%▼	1.2%	9
Total	100.0%	0.0%	402

Table 89. DISTRIBUTION OF OVEN FUEL BY TYPE
(Compare to Table 83 in 2011 RBSA)

Fuel Type	Oven Fuel		
	%	EB	n
Electric	90.6%	2.3%	353
Gas	8.1%	2.3%	44
Propane	1.3%▼	0.9%	8
Total	100.0%	0.0%	405

Table 90. PERCENTAGE OF APPLIANCES THAT ARE WI-FI COMPATIBLE BY APPLIANCE TYPE AND STATE

Type	Percent of Appliances that are Wi-Fi Enabled										
	ID		MT		OR		WA		Region		n
	%	EB	%	EB	%	EB	%	EB	%	EB	
Clothes Dryer	0.0%	0.0%	0.0%	0.0%	0.9%	1.5%	2.4%	2.4%	1.4%	1.2%	385
Freezer	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	153
Refrigerator	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.0%	1.6%	0.5%	0.7%	410
Stove/Oven	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.8%	1.3%	0.4%	0.6%	404
Clothes Washer	0.0%	0.0%	0.0%	0.0%	1.3%	2.1%	1.7%	1.9%	1.2%	1.1%	386

Table 91. DISTRIBUTION OF WATER HEATER FUEL BY STATE
(Compare to Table 84 in 2011 RBSA)

Water Heater Fuel Type	Water Heaters										
	ID		MT		OR		WA		Region		n
	%	EB	%	EB	%	EB	%	EB	%	EB	
Electric	73.3%	8.5%	53.2%	9.3%	90.4%	5.3%	91.3%	4.3%	85.5%	2.9%	293
Natural Gas	18.1%	6.9%	34.4%	7.4%	9.6%	5.9%	7.0%	4.4%	11.6%	2.7%	66
Propane	8.6%	6.9%	12.4%	7.8%	0.0%	0.0%	1.7%	3.6%	3.0%	1.4%	15
Total	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	374

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Table 92. DISTRIBUTION OF WATER HEATER LOCATION BY STATE
(Compare to Table 85 in 2011 RBSA)

Water Heater Location	Water Heaters										
	ID		MT		OR		WA		Region		n
	%	EB	%	EB	%	EB	%	EB	%	EB	
Basement	0.0%	0.0%	4.2%	8.3%	0.0%	0.0%	0.0%	0.0%	0.3%	0.7%	2
Crawlspace	0.0%	0.0%	0.9%	5.7%	0.0%	0.0%	1.5%▲	1.3%	0.8%	0.5%	3
Garage	3.2%	6.6%	0.9%	5.7%	1.4%	3.0%	0.0%	0.0%	1.0%	0.9%	5
Main House	78.5%	7.6%	69.2%	9.2%	74.8%	7.4%	76.2%	5.9%	75.5%	3.8%	298
Other	18.3%	7.1%	24.8%	8.6%	23.7%	7.4%	22.3%	6.0%	22.4%	3.8%	95
Total	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	399

Table 93. DISTRIBUTION OF WATER HEATERS BY DETAILED TYPE

Detailed Type	Distribution of Water Heaters		
	%	EB	n
Instantaneous-Electric Resistance	0.3%	0.7%	2
Instantaneous-Fossil Fuel Condensing	1.0%	1.5%	3
Instantaneous-Fossil Fuel Non-Condensing	0.7%	0.8%	4
Storage-Electric Heat Pump (Packaged)	0.7%	1.5%	2
Storage-Electric Resistance	85.1%	3.0%	289
Storage-Fossil Fuel Condensing	0.9%	0.9%	6
Storage-Fossil Fuel Non-Condensing	11.2%	2.6%	63
Storage-Indirect Water Heater	0.1%	0.5%	1
Total	100.0%	0.0%	369

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Table 94. DISTRIBUTION OF ALL WATER HEATER LOCATIONS BY SPACE HEATING FUEL TYPE (Compare to Table 86 in 2011 RBSA)

Water Heater Location	All Water Heaters by Space Heating Fuel										
	Electric		Natural Gas		Oil		Pellets		Wood		n
	%	EB	%	EB	%	EB	%	EB	%	EB	
Basement	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2
Crawlspace	46.9%	0.0%	53.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	3
Garage	68.0%▼	5.4%	24.1%	0.0%	0.0%	0.0%	0.0%	0.0%	8.0%	14.5%	5
Main House	72.2%	4.0%	15.1%	3.3%	0.5%	1.1%	2.3%	1.8%	6.3%▼	2.4%	298
Other	81.2%▲	2.2%	12.3%	2.0%	0.0%	0.0%	1.8%	3.9%	3.0%▼	5.5%	26

Table 95. DISTRIBUTION OF WATER HEATERS BY VINTAGE (Compare to Table 87 in 2011 RBSA)

Vintage	Water Heaters		
	%	EB	n
Pre 1990	3.3%▼	2.2%	10
1990-1999	19.1%▼	4.5%	51
2000-2004	19.9%	4.7%	46
2005-2009	26.5%	5.0%	77
2010-2014	23.1%▲	4.7%	64
Post 2014	8.1%	3.3%	19
Total	100.0%	0.0%	265

Table 96. AVERAGE NUMBER OF SHOWERHEADS AND FAUCETS PER HOME BY STATE

Fixture Type	Average Number of Showerheads and Faucets per Home										Count	n
	ID		OR		MT		WA		Region			
	Mean	EB	Mean	EB	Mean	EB	Mean	EB	Mean	EB		
Bathroom Faucet	2.1	0.1	2.1	0.2	2.2	0.1	2.1	0.1	2.1	0.1	858	409
Kitchen Faucet	1.0	0.1	1.0	0.1	1.0	0.0	1.0	0.0	1.0	0.0	407	409
Shower	0.7	0.1	0.6	0.1	0.7	0.1	0.6	0.1	0.6	0.1	259	409
Shower / Bathtub combo with diverter valve	1.0	0.1	1.1	0.1	1.1	0.1	1.1	0.1	1.1	0.1	438	409
Shower / Bathtub combo with separate valve	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	11	409

* Count represents the total number of fixtures. Means are based on the number of fixtures in each bin.

* n represents the total number of homes.

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Table 97. DISTRIBUTION OF SHOWERHEAD FLOW RATE BY STATE
(Compare to Table 88 in 2011 RBSA)

Flow Rate (GPM)	Showerheads											
	ID		MT		OR		WA		Region		Count	n
	%	EB	%	EB	%	EB	%	EB	%	EB		
≤ 1.5	26.9%	15.6%	36.1%	22.4%	19.3%	11.3%	20.9%	11.7%	22.5%	7.5%	100	82
1.6 - 2.0	38.0%	17.2%	30.3%	16.8%	28.8%	11.4%	26.5%	12.9%	29.1%	7.0%	115	99
2.1 - 2.5	27.1%	18.3%	23.0%	15.4%	40.6%	11.2%	43.0%	11.6%	38.5%	6.8%	140	116
2.6 - 3.5	8.0%	26.4%	10.6%	18.1%	9.4%	17.3%	7.4%	20.5%	8.4%	10.2%	34	32
≥ 3.6	0.0%	0.0%	0.0%	0.0%	1.8%	20.1%	2.3%	28.8%	1.7%	16.4%	6	6
Total	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	395	255

* No statistical testing performed because results include all showerheads. RBSA I only included primary.
* Count represents the total number of fixtures. Percentages are based on the number of fixtures in each bin.
* n represents the total number of homes.
* GPM data have been calibrated to adjust for systematic bias in the data collection approach.
* GPM error bounds incorporate both sampling and measurement uncertainty. Measurement uncertainty adjusts for systematic bias in the data collection approach

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Table 98. DISTRIBUTION OF BATHROOM FAUCET FLOW RATE BY STATE

Flow Rate (GPM)	Bathroom Faucet Flow Rate										Count	n
	ID		MT		OR		WA		Region			
	%	EB	%	EB	%	EB	%	EB	%	EB		
≤ 1.5	37.4%	12.5%	48.9%	11.7%	40.0%	9.3%	30.9%	8.7%	36.2%	5.2%	237	153
1.5 - 2.2	47.4%	12.6%	30.1%	11.1%	44.4%	9.2%	43.5%	9.0%	43.2%	5.4%	273	180
≥ 2.3	15.2%	10.6%	20.9%	10.2%	15.6%	7.7%	25.6%	7.9%	20.6%	4.6%	124	96
Total	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	634	313

* Count represents the total number of fixtures. Percentages are based on the number of fixtures in each bin.
* n represents the total number of homes.
* GPM data have been calibrated to adjust for systematic bias in the data collection approach.
* GPM error bounds incorporate both sampling and measurement uncertainty. Measurement uncertainty adjusts for systematic bias in the data collection approach

Table 99. DISTRIBUTION OF KITCHEN FAUCET FLOW RATE BY STATE

Flow Rate (GPM)	Kitchen Faucet Flow Rate										Count	n
	ID		MT		OR		WA		Region			
	%	EB	%	EB	%	EB	%	EB	%	EB		
≤ 1.5	48.1%	12.3%	57.1%	13.2%	41.9%	9.6%	37.7%	8.2%	42.0%	5.2%	131	128
1.5 - 2.2	39.8%	12.0%	25.2%	9.1%	46.2%	9.5%	51.2%	8.5%	45.9%	5.2%	144	141
≥ 2.3	12.0%	11.4%	17.7%	13.8%	11.9%	8.6%	11.1%	7.8%	12.0%	4.6%	40	40
Total	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	315	305

* Count represents the total number of fixtures. Percentages are based on the number of fixtures in each bin.
* n represents the total number of homes.
* GPM data have been calibrated to adjust for systematic bias in the data collection approach.
* GPM error bounds incorporate both sampling and measurement uncertainty. Measurement uncertainty adjusts for systematic bias in the data collection approach

Table 100. AVERAGE NUMBER OF TELEVISIONS PER HOME BY STATE
(Compare to Table 89 in 2011 RBSA)

State	Televisions per Home		
	Mean	EB	n
ID	1.94	0.19	85
MT	1.86	0.21	84
OR	1.97	0.15	108
WA	1.91	0.15	134
Region	1.93	0.09	411

Table 101. AVERAGE TELEVISION POWER BY VINTAGE
(Compare to Table 90 in 2011 RBSA)

Vintage	Television Power (W)		
	Mean	EB	n
Pre 1990	54.5	NA	2
1990-1994	78.5	13.3	5
1995-1999	66.7▼	3.0	9
2000-2004	80.5	3.6	25
2005-2009	124.1	9.3	71
2010-2014	71.1▼	5.1	112
Post 2014	58.6	3.8	45
Unknown Vintage	77.6	6.1	171
All Vintages	80.3▼	2.4	312

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Table 102. DISTRIBUTION OF TELEVISION SCREENS BY TYPE AND VINTAGE
(Compare to Table 91 in 2011 RBSA)

Vintage	Television Screens												
	CRT		LCD		LED		LED+LCD		Plasma		Other		n
	%	EB	%	EB	%	EB	%	EB	%	EB	%	EB	
Pre 1990	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	2
1990-1994	84.7%▼	6.1%	15.3%	19.7%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	7
1995-1999	96.6%	1.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	3.4%	5.4%	10
2000-2004	86.6%▼	2.5%	4.1%	7.9%	0.0%	0.0%	0.0%	0.0%	8.6%	1.5%	0.7%	1.8%	32
2005-2009	12.2%▼	3.6%	68.1%	4.5%	1.5%	1.8%	1.3%	1.5%	15.8%	3.6%	1.1%	1.3%	101
2010-2014	0.0%	0.0%	57.3%	5.1%	35.0%	4.9%	2.4%	2.1%	5.4%	2.4%	0.0%	0.0%	162
Post 2014	0.0%	0.0%	21.5%	4.1%	77.8%	3.9%	0.0%	0.0%	0.7%	2.4%	0.0%	0.0%	68
All Vintages	11.4%▼	3.2%	47.6%	5.4%	31.3%	4.9%	1.4%	1.4%	7.9%	3.0%	0.5%	0.6%	288

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Table 103. DISTRIBUTION OF TELEVISIONS BY ROOM TYPE
(Compare to Table 92 in 2011 RBSA)

Room	Televisions		
	%	EB	n
Bathroom	0.3%	0.4%	2
Bedroom	45.3%▲	3.0%	252
Closet	0.1%	0.2%	1
Dining Room	1.0%	0.7%	7
Family Room	10.5%	1.6%	79
Garage	0.2%	0.3%	2
Hall	0.2%	0.2%	1
Kitchen	1.5%	0.7%	14
Laundry	0.0%▼	0.1%	1
Living Room	39.3%	1.1%	304
Office	1.3%▼	0.7%	11
Other	0.4%	0.4%	2
Total	100.0%	0.0%	396

Table 104. AVERAGE PRIMARY TELEVISION ON-TIME HOURS PER DAY PER HOME BY STATE
(Compare to Table 93 in 2011 RBSA)

State	Television On-Time per Home (hours/day)		
	Mean	EB	n
ID	6.8▼	0.8	80
MT	6.1	1.0	83
OR	6.7	0.9	107
WA	7.6	1.0	126
Region	7.1	0.6	396

Table 105. AVERAGE NUMBER OF SET-TOP BOXES PER HOME BY STATE
(Compare to Table 94 in 2011 RBSA)

State	Set-Top Boxes per Home		
	Mean	EB	n
ID	0.92▼	0.20	85
MT	1.04	0.23	84
OR	1.21▼	0.17	108
WA	1.10	0.15	134
Region	1.10▼	0.09	411

Table 106. PERCENTAGE OF HOMES WITH SET-TOP BOXES
(Compare to Table 95 in 2011 RBSA)

State	Homes with Set-Top Boxes		
	%	EB	n
ID	54.3%▼	8.5%	85
MT	64.5%	9.5%	84
OR	70.3%▼	7.5%	108
WA	68.0%	6.9%	134
Region	66.6%▼	4.2%	411

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Table 107. PERCENTAGE OF SET-TOP BOXES WITH DVR CAPABILITY BY STATE
(Compare to Table 96 in 2011 RBSA)

State	Set-Top Boxes with DVR		
	%	EB	n
ID	51.9%▲	13.5%	39
MT	56.7%▲	12.6%	53
OR	54.8%▲	10.2%	76
WA	52.2%▲	9.1%	84
Region	53.3%▲	5.7%	252

Table 108. PERCENTAGE OF HOMES WITH GAMING SYSTEMS
(Compare to Table 97 in 2011 RBSA)

State	Homes with Gaming Systems		
	%	EB	n
ID	23.5%	7.9%	85
MT	26.2%	8.8%	84
OR	23.6%	7.0%	108
WA	27.4%	6.4%	134
Region	25.6%	3.9%	411

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Table 109. AVERAGE NUMBER OF GAMING SYSTEMS PER HOME
(Compare to Table 98 in 2011 RBSA)

State	Gaming Systems per Home		
	Mean	EB	n
ID	0.30	0.11	85
MT	0.39	0.16	84
OR	0.35	0.13	108
WA	0.41	0.11	134
Region	0.38	0.07	411

Table 110. AVERAGE NUMBER OF COMPUTERS PER HOME BY STATE
(Compare to Table 99 in 2011 RBSA)

State	Computers per Home		
	Mean	EB	n
ID	0.92	0.16	85
MT	0.94	0.21	84
OR	1.08▼	0.16	108
WA	1.01	0.15	134
Region	1.01	0.09	411

Table 111. PERCENTAGE OF HOMES WITH COMPUTERS BY STATE
(Compare to Table 100 in 2011 RBSA)

State	Homes with Computers		
	%	EB	n
ID	66.2%	8.7%	85
MT	62.1%	8.8%	84
OR	75.7%	6.9%	108
WA	68.7%	6.7%	134
Region	70.0%	4.0%	411

Table 112. AVERAGE NUMBER OF AUDIO SYSTEMS PER HOME BY STATE
(Compare to Table 101 in 2011 RBSA)

State	Audio Systems per Home		
	Mean	EB	n
ID	0.45▼	0.13	85
MT	0.90	0.30	84
OR	0.61▼	0.18	108
WA	0.47▼	0.10	134
Region	0.55▼	0.08	411

Table 113. AVERAGE NUMBER OF SUBWOOFERS PER HOME BY TYPE
(Compare to Table 102 in 2011 RBSA)

Subwoofer Type	Subwoofers per Home		
	Mean	EB	n
Passive	0.12	0.04	411
Powered	0.06▼	0.02	411
All Subwoofers	0.09▼	0.02	411

Table 114. AVERAGE NUMBER OF OCCUPANTS PER HOME BY STATE
(Compare to Table 104 in 2011 RBSA)

State	Occupants per Home		
	Mean	EB	n
ID	2.58	0.29	85
MT	2.34	0.30	84
OR	2.48	0.28	108
WA	2.38	0.25	134
Region	2.44	0.15	411

Table 115. AVERAGE NUMBER OF OCCUPANTS BY AGE CATEGORY BY STATE
(Compare to Table 105 in 2011 RBSA)

Age Category	Number of Occupants										
	ID		MT		OR		WA		Region		n
	Mean	EB	Mean	EB	Mean	EB	Mean	EB	Mean	EB	
18 Years or Younger	0.67	0.26	0.59	0.24	0.48	0.24	0.58▼	0.18	0.56	0.12	411
Between 19 and 64	1.40	0.17	1.14	0.20	1.21	0.18	1.22	0.17	1.24	0.10	411
65 Years or Older	0.51	0.14	0.61	0.16	0.80	0.15	0.58	0.10	0.64	0.07	411
All Ages	2.58	0.29	2.34	0.30	2.48	0.28	2.38	0.25	2.44	0.15	411

Table 116. DISTRIBUTION OF HOMES BY OWNERSHIP TYPE AND STATE
(Compare to Table 106 in 2011 RBSA)

Ownership Type	Percentage of Homes										
	ID		MT		OR		WA		Region		n
	%	EB	%	EB	%	EB	%	EB	%	EB	
Occupy without rent	0.0%	0.0%	0.9%	5.7%	0.6%	4.0%	0.5%	3.0%	0.5%	0.7%	3
Own / buying	90.5%	4.9%	84.5%	7.2%	95.3%▲	3.6%	90.0%▲	4.1%	91.3%▲	2.4%	370
Prefer not to say	1.1%	6.6%	0.0%	0.0%	0.0%	0.0%	2.0%	2.7%	1.1%	1.2%	4
Rent	8.4%	5.2%	14.6%	7.5%	4.1%▼	4.4%	7.6%▼	4.1%	7.2%▼	2.3%	34
Total	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	411

Table 117. PERCENTAGE OF HOMES AS PRIMARY RESIDENCE BY STATE
(Compare to Table 107 in 2011 RBSA)

State	Homes as Primary Residence		
	%	EB	n
ID	100.0%	0.0%	85
MT	99.1%	1.5%	84
OR	99.4%	1.1%	108
WA	100.0%	0.0%	134
Region	99.7%▲	0.4%	411

Table 118. DISTRIBUTION OF HOMES WITH ELECTRIC FUEL ASSISTANCE BY PERCENTAGE OF ASSISTANCE AND STATE (Compare to Table 109 in 2011 RBSA)

Percentage of Assistance	Homes with Electric Fuel Assistance										
	ID		MT		OR		WA		Region		n
	%	EB	%	EB	%	EB	%	EB	%	EB	
Less than 25%	5.3%▼	5.6%	14.2%	7.2%	1.3%▼	2.6%	2.6%	3.4%	3.5%	1.5%	21
Between 26% and 50%	1.1%	7.1%	0.0%	0.0%	1.6%	3.1%	2.5%	3.3%	1.8%	1.5%	6
Between 51% and 75%	0.0%	0.0%	1.0%	6.2%	0.8%	5.0%	1.0%	6.0%	0.8%	1.2%	3
Between 76% and 100%	0.0%	0.0%	1.0%	6.2%	0.0%	0.0%	0.6%▼	4.0%	0.4%▼	0.9%	2
No Utility Bill Assistance	93.6%	4.7%	83.8%	7.0%	96.2%	2.6%	93.4%	3.7%	93.5%▲	2.1%	360
Total	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	392

Table 119. DISTRIBUTION OF HOMES WITH GAS FUEL ASSISTANCE BY PERCENTAGE OF ASSISTANCE AND STATE (Compare to Table 110 in 2011 RBSA)

Percentage of Assistance	Homes with Gas Fuel Assistance										
	ID		MT		OR		WA		Region		n
	%	EB	%	EB	%	EB	%	EB	%	EB	
Less than 25%	0.0%	0.0%	8.5%	6.3%	0.0%	0.0%	0.0%	0.0%	0.9%	0.7%	6
Between 26% and 50%	3.8%	23.4%	0.0%	0.0%	3.3%	18.8%	0.0%	0.0%	1.5%	3.0%	2
Between 51% and 75%	0.0%	0.0%	1.4%	8.9%	0.0%	0.0%	5.7%	32.8%	2.7%	6.9%	2
Between 76% and 100%	0.0%	0.0%	1.4%	8.9%	0.0%	0.0%	0.0%	0.0%	0.2%▼	1.0%	1
No Utility Bill Assistance	96.2%	6.3%	88.6%	6.1%	96.7%	5.4%	94.3%	9.3%	94.7%	4.3%	84
Total	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	95

Table 120. AVERAGE HEATING THERMOSTAT SETPOINT BY STATE
(Compare to Table 111 in 2011 RBSA)

State	Heating Thermostat Setpoint (°F)		
	Mean	EB	n
ID	69.8▼	0.7	81
MT	68.9	0.8	81
OR	69.7	0.5	106
WA	68.6	0.6	130
Region	69.1	0.3	398

Table 121. PERCENTAGE OF HOMES REPORTING A HEATING SETBACK BY STATE
(Compare to Table 112 in 2011 RBSA)

State	Homes Reporting Heating Setback		
	%	EB	n
ID	45.7%	9.5%	77
MT	42.2%▼	9.7%	80
OR	59.6%	8.4%	99
WA	63.7%	7.5%	113
Region	58.2%	4.6%	369

Table 122. AVERAGE SIZE OF HEATING SETBACK BY STATE
(Compare to Table 113 in 2011 RBSA)

State	Heating Setback (°F)		
	Mean	EB	n
ID	2.1▼	0.6	77
MT	2.1▼	0.8	80
OR	3.5▼	0.8	99
WA	4.5▼	0.8	113
Region	3.6▼	0.5	369

Table 123. AVERAGE COOLING THERMOSTAT SETPOINT BY STATE
(Compare to Table 114 in 2011 RBSA)

State	Cooling Thermostat Setpoint (°F)		
	Mean	EB	n
ID	72.9	0.9	72
MT	71.1▼	1.2	51
OR	71.9	0.9	66
WA	71.8	0.9	78
Region	71.9	0.5	267

Table 124. PERCENTAGE OF HOMES REPORTING A COOLING THERMOSTAT SETUP BY STATE (Compare to Table 115 in 2011 RBSA)

State	Homes Reporting Cooling Setup		
	%	EB	n
ID	25.5%▲	10.4%	56
MT	0.0%	0.0%	32
OR	11.7%	7.5%	51
WA	10.5%	7.1%	58
Region	12.0%	4.3%	197

Table 125. DISTRIBUTION OF THERMOSTATS BY TYPE AND STATE

Thermostat Type	Distribution of Thermostats										
	ID		MT		OR		WA		Region		n
	%	EB	%	EB	%	EB	%	EB	%	EB	
Manual thermostat - Analog	28.7%	8.7%	48.6%	10.2%	31.8%	7.7%	25.2%	6.5%	29.7%	4.0%	131
Manual thermostat - Digital	30.5%	8.9%	20.3%	7.0%	20.5%	7.0%	13.9%	5.3%	18.7%	3.5%	86
Programmable thermostat	38.6%	9.4%	28.8%	9.5%	43.7%	8.3%	56.9%	7.3%	47.9%	4.5%	174
Smart thermostat	0.0%	0.0%	0.0%	0.0%	0.9%	5.5%	0.0%	0.0%	0.3%	1.8%	1
Smart/Wi-Fi thermostat	1.1%	6.9%	0.0%	0.0%	1.3%	7.8%	0.5%	3.0%	0.8%	1.1%	3
Wi-Fi enabled thermostat	0.0%	0.0%	2.2%	13.7%	1.9%	4.2%	3.2%	3.4%	2.3%	1.7%	7
None	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.4%	2.6%	0.2%	1.2%	1
Total	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	396

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Table 126. PERCENTAGE OF HOMES WITH AT LEAST ONE SMART POWER STIP BY STATE

State	Homes with Smart Power Strips		
	%	EB	n
ID	0.0%	0.0%	85
MT	3.0%	3.8%	84
OR	3.4%	2.4%	108
WA	0.9%	1.1%	134
Region	1.8%	1.0%	411

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Table 127. DISTRIBUTION OF POWER STRIPS BY USE TYPE

Power Strip Use	DISTRIBUTION OF POWER STRIPS										
	ID		MT		OR		WA		Region		n
	%	EB	%	EB	%	EB	%	EB	%	EB	
Entertainment Center	52.0%	13.1%	35.0%	13.6%	39.9%	10.1%	57.6%	11.9%	49.1%	6.6%	148
Home Office	30.5%	12.6%	25.4%	13.8%	33.1%	9.9%	25.7%	11.2%	28.7%	6.2%	98
Other	17.5%	10.7%	39.7%	15.2%	27.0%	9.1%	16.8%	7.0%	22.2%	4.6%	73
Total	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	209

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Table 128. PERCENTAGE OF HOUSEHOLDS REPORTING GAS SERVICE BY STATE
(Compare to Table 116 in 2011 RBSA)

State	Households Reporting Gas Service		
	%	EB	n
ID	30.6%	8.6%	85
MT	53.5%	8.8%	83
OR	13.9%	5.7%	107
WA	10.8%	4.6%	130
Region	17.9%	3.1%	405

Table 129. DISTRIBUTION OF WOOD USE AS HEATING FUEL BY STATE
(Compare to Table 117 in 2011 RBSA)

Annual Wood Use	Homes Using Wood Fuel										
	ID		MT		OR		WA		Region		n
	%	EB	%	EB	%	EB	%	EB	%	EB	
< 1 Cord	1.1%	6.6%	0.0%	0.0%	1.3%	2.6%	4.6%▲	3.3%	2.7%▲	1.6%	10
1-3 Cords	9.8%	6.6%	12.8%	7.4%	13.5%	5.9%	8.0%▼	4.0%	10.4%	2.7%	44
4-6 Cords	4.8%▼	6.2%	10.3%	7.7%	4.0%	4.1%	4.3%	3.8%	4.8%▼	2.0%	18
> 6 Cords	0.0%	0.0%	3.0%	6.6%	1.3%	7.8%	0.0%	0.0%	0.6%	1.0%	3
None	84.4%	6.8%	73.8%	8.8%	80.0%	6.6%	83.1%	5.2%	81.5%	3.4%	336
Total	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	411

Table 130. DISTRIBUTION OF PELLET FUEL USE BY STATE
(Compare to Table 118 in 2011 RBSA)

Annual Pellet Fuel Use	Homes Using Pellet Fuel										
	ID		MT		OR		WA		Region		n
	%	EB	%	EB	%	EB	%	EB	%	EB	
< 1 Ton	1.1%	6.6%	3.0%	6.6%	0.0%	0.0%	2.2%	2.9%	1.4%	1.2%	6
1-2 Tons	1.1%	6.6%	0.0%	0.0%	1.5%	2.9%	1.6%	3.3%	1.4%	1.3%	5
2-4 Tons	4.0%	5.4%	0.0%	0.0%	2.1%	4.3%	2.2%	2.9%	2.2%	1.5%	8
None	93.9%	4.5%	97.0%	3.8%	96.5%	2.9%	94.1%	3.4%	95.0%	2.0%	392
Total	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	411

Table 131. DISTRIBUTION OF OIL FUEL USE BY STATE
(Compare to Table 119 in 2011 RBSA)

Annual Oil Fuel Use	Homes Using Oil Fuel										
	ID		MT		OR		WA		Region		n
	%	EB	%	EB	%	EB	%	EB	%	EB	
< 100 Gallons	0.0%	0.0%	0.0%	0.0%	0.8%	5.0%	0.0%	0.0%	0.3%	1.6%	1
100-250 Gallons	2.9%	6.0%	2.1%	13.0%	0.0%	0.0%	0.0%	0.0%	0.6%	0.8%	3
251-500 Gallons	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0
None	97.1%	3.4%	97.9%	3.4%	99.2%	1.3%	100.0%	0.0%	99.2%	0.7%	407
Total	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	411

Table 132. DISTRIBUTION OF PROPANE FUEL USE BY STATE
(Compare to Table 120 in 2011 RBSA)

Annual Propane Fuel Use	Homes Using Propane Fuel										
	ID		MT		OR		WA		Region		n
	%	EB	%	EB	%	EB	%	EB	%	EB	
< 50 Gallons	1.8%	11.2%	3.0%	6.6%	0.9%	5.7%	0.5%	3.0%	1.0%	1.0%	5
50-250 Gallons	0.0%	0.0%	4.0%	5.7%	0.8%▼	5.0%	1.5%	3.1%	1.3%▼	1.1%	6
251-500 Gallons	2.1%	4.3%	7.3%	7.4%	0.0%	0.0%	0.8%	4.9%	1.3%	1.0%	7
501-1000 Gallons	1.1%	6.6%	5.8%	5.5%	0.0%	0.0%	0.0%	0.0%	0.6%	0.5%	6
> 1000 Gallons	1.8%	11.2%	3.0%	6.6%	0.0%	0.0%	0.0%	0.0%	0.5%	0.7%	3
None	93.1%▲	5.0%	76.9%	8.6%	98.2%▲	2.0%	97.2%	2.3%	95.3%▲	1.6%	384
Total	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	411

Table 133. PERCENTAGE OF HOUSEHOLDS REPORTING RECENT SELF-FUNDED CONSERVATION BY STATE
(Compare to Table 121 in 2011 RBSA)

State	Households Reporting Recent Self-Funded Conservation Improvements		
	%	EB	n
ID	51.2%▲	9.3%	85
MT	59.4%	9.6%	84
OR	60.0%▲	8.1%	107
WA	54.5%▲	6.8%	134
Region	56.2%▲	4.3%	410

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Table 134. PERCENTAGE OF HOUSEHOLDS REPORTING RECENT USE OF UTILITY CONSERVATION PROGRAMS BY STATE (Compare to Table 122 in 2011 RBSA)

State	Households Reporting Use of Utility Incentives		
	%	EB	n
ID	10.2%▼	5.3%	78
MT	6.7%▼	4.0%	80
OR	8.4%▼	4.3%	100
WA	12.9%	5.1%	119
Region	10.6%▼	2.8%	377

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Table 135. PERCENTAGE OF HOUSEHOLDS REPORTING USE OF CONSERVATION TAX CREDITS (Compare to Table 123 in 2011 RBSA)

State	Households Reporting Recent Conservation Tax Credits		
	%	EB	n
ID	8.0%	7.7%	44
MT	4.8%	4.5%	49
OR	6.4%	5.1%	65
WA	11.6%▲	6.3%	74
Region	8.9%	3.5%	232

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Table 136. PERCENTAGE OF HOUSEHOLDS REPORTING USE OF BOTH UTILITY AND TAX CREDIT CONSERVATION PROGRAMS
(Compare to Table 124 in 2011 RBSA)

State	Households Reporting Use of Utility and Tax Credit Conservation Programs		
	%	EB	n
ID	1.1%	1.9%	78
MT	0.0%	0.0%	80
OR	2.7%	2.7%	100
WA	4.8%	3.2%	119
Region	3.2%	1.7%	377

Table 137. PERCENT OF HOMES REPORTING HAVING COMPLETED AN ENERGY AUDIT IN THE LAST TWO YEARS

State	Homes Reporting Energy Audit		
	%	EB	n
ID	6.4%	4.2%	81
MT	13.3%	7.1%	81
OR	5.5%	4.0%	100
WA	1.8%	1.7%	124
Region	4.5%	1.7%	386

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Table 138. PERCENTAGE OF HOUSEHOLDS WITH AN ELECTRIC VEHICLE

State	Home with Electric Vehicles		
	%	EB	n
ID	0.0%	0.0%	85
MT	0.0%	0.0%	84
OR	1.3%	1.5%	108
WA	0.4%	0.7%	134
Region	0.6%	0.6%	411

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Table 139. PERCENTAGE OF HOUSEHOLDS WITH SOLAR PANELS

State	Homes with Solar Panels		
	%	EB	n
ID	0.0%	0.0%	85
MT	0.9%	1.5%	84
OR	0.0%	0.0%	108
WA	0.8%	1.3%	134
Region	0.4%	0.6%	411

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Table 140. PERCENTAGE OF HOUSEHOLDS REPORTING USE OF SMART EQUIPMENT

State	Homes with Smart Equipment		
	%	EB	n
ID	4.2%	3.4%	85
MT	0.0%	0.0%	84
OR	2.2%	2.5%	108
WA	4.0%	2.7%	134
Region	3.1%	1.5%	411

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Table 141. DISTRIBUTION OF HOUSEHOLD INCOME BY STATE

Household Income Level	Household Income										
	ID		MT		OR		WA		Region		n
	%	EB	%	EB	%	EB	%	EB	%	EB	
Less than $25,000	48.4%	9.7%	52.6%	10.8%	41.0%	8.9%	37.3%	7.6%	41.2%	4.7%	155
$25,000 or more, but less than $50,000	25.1%	8.4%	27.3%	10.0%	32.4%	8.5%	40.7%	8.0%	34.9%	4.7%	114
$50,000 or more	26.5%	8.8%	20.1%	8.9%	26.6%	8.2%	22.0%	6.4%	23.9%	4.1%	82
Total	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	100.0%	0.0%	351

Table 142. AVERAGE ANNUAL KWH PER HOME BY STATE
(Compare to Table 125 in 2011 RBSA)

State	kWh per Home		
	Mean	EB	n
ID	14,962.7▼	1,422.2	76
MT	10,666.5	1,228.4	72
OR	13,555.2	1,025.6	97
WA	15,531.3▼	935.3	120
Region	14,430.2▼	581.5	365

Table 143. AVERAGE WEATHER NORMALIZED KWH PER HOME BY STATE
(Compare to Table 126 in 2011 RBSA)

State	kWh per Home		
	Mean	EB	n
ID	14,612.7	1,418.4	76
MT	10,756.4	1,255.3	72
OR	13,213.7	1,035.3	97
WA	15,374.4▼	903.6	120
Region	14,209.1▼	572.6	365

Table 144. AVERAGE ELECTRIC EUI PER HOME BY HEATING FUEL TYPE AND STATE (Compare to Table 127 in 2011 RBSA)

State	Electric EUI per Home (kWh/sq. ft.)						
	Other Heat		Electric Heat		All Homes		n
	Mean	EB	Mean	EB	Mean	EB	
ID	8.9▼	1.0	14.4	1.0	11.6▼	0.7	75
MT	7.1▼	1.0	13.1	2.2	10.1	1.1	72
OR	8.8▲	0.7	10.8▼	0.8	9.8▼	0.5	97
WA	7.8▼	0.8	13.3▼	0.9	10.7▼	0.6	120
Region	8.2▼	0.4	12.7▼	0.5	10.5▼	0.3	364

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Table 145. AVERAGE ESTIMATED ANNUAL ELECTRIC SPACE HEAT PER HOME BY STATE (Compare to Table 128 in 2011 RBSA)

State	Space Heat per Home (kWh)		
	Mean	EB	n
ID	8,100.9	1,698.8	43
MT	8,175.8	5,604.8	8
OR	6,836.9	918.5	78
WA	8,129.4▼	850.0	99
Region	7,720.2▼	664.7	228

Table 146. AVERAGE ANNUAL GAS USE PER HOME BY STATE
(Compare to Table 129 in 2011 RBSA)

State	Therms per Home		
	Mean	EB	n
ID	579.4	110.1	11
MT	604.5▼	58.2	38
OR	452.9	93.1	12
WA	539.6	253.1	8
Region	527.2	87.1	69

Table 147. AVERAGE WEATHER NORMALIZED GAS USE PER HOME BY STATE
(Compare to Table 130 in 2011 RBSA)

State	Therms per Home		
	Mean	EB	n
ID	577.4	104.3	11
MT	617.2	53.3	38
OR	438.2	93.7	12
WA	550.7	264.5	8
Region	528.1	90.3	69

Table 148. AVERAGE GAS EUI PER HOME BY HEATING FUEL AND STATE (Compare to Table 131 in 2011 RBSA)

State	Gas EUI per Home (Therms/sq. ft.)						
	Other Heat		Gas Heat		All Homes		n
	Mean	EB	Mean	EB	Mean	EB	
ID	0.27	NA	0.58	0.18	0.43	0.09	10
MT	0.49	0.10	0.53▼	0.09	0.51▼	0.05	38
OR	0.16▼	0.06	0.36▼	0.03	0.26▼	0.02	12
WA	0.25	NA	0.45▼	0.08	0.35▼	0.04	8
Region	0.26▲	0.01	0.45▼	0.04	0.36▼	0.02	68

Table 149. AVERAGE ESTIMATED GAS SPACE HEAT BY STATE (Compare to Table 132 in 2011 RBSA)

State	Space Heat per Home (Therms)		
	Mean	EB	n
ID	433.5▼	82.1	9
MT	555.6	66.6	35
OR	302.3▼	47.4	9
WA	487.3	117.4	6
Region	428.6▼	37.9	59

Table 150. AVERAGE ANNUAL ELECTRICITY AND GAS USE PER HOME BY STATE
(Compare to Table 133 in 2011 RBSA)

State	kBtu per Home		
	Mean	EB	n
ID	60,985.6	5,637.8	65
MT	67,586.3	6,185.3	60
OR	52,875.7	3,785.3	97
WA	57,598.6	3,792.9	117
Region	57,378.9▼	2,308.0	339

Table 151. AVERAGE ELECTRICITY AND GAS EUI BY STATE
(Compare to Table 134 in 2011 RBSA)

State	EUI per Home (kBtu/sq. ft.)		
	Mean	EB	n
ID	51.2	4.8	65
MT	50.9▼	7.2	60
OR	41.3	2.9	97
WA	45.9▼	3.4	117
Region	45.6▼	2.0	339

Table 152. AVERAGE WEATHER-NORMALIZED ELECTRICITY AND GAS EUI BY STATE (Compare to Table 135 in 2011 RBSA)

State	EUI per Home (kBtu/sq. ft.)		
	Mean	EB	n
ID	50.0	4.8	65
MT	51.2▼	7.0	60
OR	40.3	3.0	97
WA	45.6▼	3.4	117
Region	45.0▼	2.0	339

Table 153. AVERAGE ANNUAL OTHER FUEL USE PER HOME BY STATE (Compare to Table 136 in 2011 RBSA)

State	kBtu per Home		
	Mean	EB	n
ID	14,845.2	8,310.1	85
MT	32,977.7	10,439.2	84
OR	11,565.7	4,919.4	108
WA	8,271.3	3,351.2	134
Region	12,226.0	2,601.2	411

Table 154. AVERAGE EUI, OTHER FUEL USE
(Compare to Table 137 in 2011 RBSA)

State	EUI per Home (kBtu/sq. ft.)		
	Mean	EB	n
ID	9.9	4.5	85
MT	21.0	6.6	84
OR	10.2	5.3	108
WA	5.5▼	2.1	134
Region	8.9	2.1	411

Table 155. SUMMARY STATISTICS BY EUI QUARTILES

Quartile and EUI Range	Summary Statistics by EUI Quartile										
	Conditioned Area		Electric Heat		Efficient Lighting		Air Conditioning		Electric Hot Water		n
	Mean	EB	%	EB	%	EB	%	EB	%	EB	
1 (< 6.33)	1,666.2	41.2	39.8%	3.7%	40.1%	4.7%	60.3%	3.8%	51.4%	4.0%	91
2 (6.33 - 10.07)	1,433.2	25.9	71.2%	3.0%	42.0%	4.5%	79.0%	3.7%	78.3%	3.4%	91
3 (10.07 - 13.73)	1,300.8	35.2	78.9%	3.6%	47.3%	5.0%	80.5%	3.5%	88.8%	2.7%	91
4 (> 13.73)	1,153.7	36.0	83.7%	2.7%	42.9%	4.7%	59.9%	4.0%	85.3%	3.0%	91

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Addendum: Report Updates

Cadmus made the following updates to the RBSA II report and Appendix A tables.

RBSA II Updated GPM Flow Rate Calibration

Cadmus used two different techniques to measure fixture flow rates for the RBSA II study: a flow bag and a flow microweir. Technicians did not record which method was used at the time of data collection. The study results for water flow rate were higher than those recorded in the RBSA I study, raising understandable concerns about market trends and data reliability. To address these concerns and appropriately calibrate RBSA II results, Cadmus took these actions:

- Tested the accuracy of the two measurement methods (flow bag and microweir) and developed calibration factors for each method
- Contacted the field technicians who collected the RBSA II data to determine faucets and showerheads for which Cadmus could identify the measurement method with a high level of certainty

Our testing found that the measurements from both flow bags and microweirs were consistently higher than the actual flow rate of the faucets and showerheads. Based on this testing, applying a calibration factor for each method produced results that more accurately represent RBSA II average flow rates. Therefore, we developed calibration factors for the two measurement methods, based on our testing, and applied it to flow rates where we were confident in the measurement method used by the field technician.

The results of this calibration are presented in the showerhead and faucet aerator GPM flow rate tables of this report and Appendix A.

RBSA II UA and Total Heat Loss Methodology

Based on stakeholder feedback, Cadmus updated its method for calculating UA values and total heat-loss estimates for the RBSA II. These updated methods add several elements for consistency with RBSA I and incorporate Regional Technical Forum standard practices, NREL Efficiency Measure Database and Super Good Cents load calculations, including heat loss through building assembly layers and components.

The results of this update are presented in the insulation and UA chapters and tables of this report and Appendix A.

Other Updates and Corrections

As part of this update, Cadmus also addressed identified inconsistencies and oversights in several tables. These updates did not produce any significant change to the report or its key findings.

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