MONTANA SINGLE-FAMILY HOMES

State Summary Statistics

2014
Full RBSA Dataset: *http://bit.ly/1rTVSjg*
neea.org

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EXECUTIVE SUMMARY

The purpose of this report is to provide a summary of Montana's single-family home energy use based on the Northwest Energy Efficiency Alliance's (NEEA) 2011 Residential Building Stock Assessment (RBSA) findings. It is accompanied by three other state-specific reports for Idaho, Oregon and Washington. Each state-specific report includes overall housing utility and energy statistics, and details the type and efficiency of housing components including windows, insulation, appliances and heating fuel types within each region of each state. The state-specific report findings are largely from the 2011 RBSA study, except where supplemental data sources have been noted.

The RBSA is sponsored by NEEA and was conducted by Ecotope, Inc. with support by Ecova™, Delta-T, Inc., and ORC International. The primary objective of the RBSA is to develop an inventory and profile of the Northwest's existing residential building stock based on field data from a representative, random sample of existing homes. The RBSA establishes the 2011 regional housing stock baseline for three residence categories: single-family homes, manufactured homes, and multi-family homes.

The results will guide future planning efforts and provide a solid base for assessing residential program energy savings throughout the Northwest. Ecotope designed the RBSA sample to include all public and investor-owned utilities in Idaho, western Montana, Oregon and Washington. The final RBSA sample included 99 utilities: 89 public utilities, seven investor-owned utilities, and three natural gas-only utilities. Field surveys were conducted on more than 1,850 sites across the Northwest, including more than 1,400 single-family homes.

The regional single-family, manufactured, and multi-family homes RBSA reports, and other state-specific single-family summary reports are available on NEEA's RBSA website. Also on the website is the RBSA Metering study, which studied 101 sites from the single-family home sample with a full set of instruments designed to assess electric and other energy uses across a variety of residential end uses.

Any questions or comments can be directed to Aaron James or the Market Research and Evaluation department at NEEA.

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The Northwest Energy Efficiency Alliance (NEEA) is an alliance of more than 140 Northwest utilities and energy efficiency organizations working on behalf of more than 13 million energy consumers. NEEA leverages its strong regional partnerships to effect market transformation by accelerating the adoption of energy-efficient products, services and practices.

Note: All RBSA data used in this report is weighted. The initial RBSA reports only have raw, un-weighted numbers so in some cases this will result in different numbers being reported.

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QUICK DEMOGRAPHIC OVERVIEW

As of 2012, the state of Montana had an estimated population of 1 million, growing at a quicker pace than the rest of the United States between 2010 and 2012 (2.7 versus 1.7 percent respectively). Montana had 486,141 housing units with 405,508 households. Montana has 2.37 persons per household compared to 2.61 nationally. The median value of owner-occupied housing units in Montana is $183,000, and the median household income is $45,456, compared to $181,400 and $53,046 respectively nationwide. Montana's population is far less dense than the U.S. average (6.8 people/mile^2 vs. 87.4 people/mile^2 respectively.) However, at 145,546 miles^2, Montana is the fourth largest state, and makes up four percent of the land mass of the entire U.S.

People Quick Facts[1]	Montana	REGION	USA
Population, 2012 estimate	1,005,494	13,395,755	313,873,685
Population, percent change, April 1, 2010 to July 1, 2012	+2.70%	+2.85%	+1.70%
Language other than English spoken at home, percent of persons age 5+, 2007-2011	4.60%	15.20%	20.50%
Mean travel time to work (minutes), workers age 16+, 2008-2012	18.00	23.36	25.40
Housing units, 2012	486,141	5,757,995	132,452,405
Homeownership rate, 2008-2012	68.50%	64.70%	66.10%
Housing units in multi-unit structures, percent, 2008-2012	16.60%	24.03%	25.90%
Median value of owner-occupied housing units, 2008-2012	$183,000.00	$247,641.00	$181,400.00
Households, 2008-2012	405,508	5,112,705	115,226,802
Persons per household, 2008-2012	2.37	2.51	2.61
Per capita money income in the past 12 months (2011 dollars), 2008-2012	$25,002.00	$ 28,080.00	$28,051.00
Median household income, 2008-2012	$45,456.00	$54,085.00	$53,046.00
Persons below poverty level, percent, 2008-2012	14.80%	13.86%	14.90%

[1]Staff, "State & County QuickFacts." U.S. Census Bureau Website. U.S. Department of Commerce, 28 May 2014. Web. 27 Mar 2014. < http://quickfacts.census.gov/qfd/states/30000.html>.

UTILITY AND ENERGY STATISTICS[2]

There are 575,995 utility customers in Montana, 473,018 of which are residential accounts. Residential customers in Montana account for 549 average megawatts (aMW) of demand, and 4.8 million megawatt hours (MWh) of usage. Sixty-two percent of residential accounts, representing 53 percent of usage, are with Investor Owned Utilities (IOUs). IOU customers pay around 6 percent more per kilowatt-hour (kWh) than other those in cooperatives; but also use around 29 percent less kWh per month, so their monthly cost is lower.

Customers by Utility Type (2012)	Cooperatives	Municipalities	Federal/ Other	Investor Owned Utilities	Total
Residential	158,222	-	21,593	293,203	473,018
Commercial & Industrial	27,588	-	2,790	72,599	102,977
Public Street & Highway Lighting	-	-	-	-	-
Other Public Authorities/ Transportation	-	-	-	-	-
Interdepartmental	-	-	-	-	-
Irrigation	-	-	-	-	-
Other Sales to Retail Energy Customers	-	-	-	-	-
Total Customers	185,810	0	24,383	365,802	575,995
Residential Electricity Costs	**Cooperatives**	**Municipalities**	**Federal/ Other**	**Investor Owned Utilities**	**Total**
Average Cost per kWh	10.0¢	-	6.68¢	10.6¢	10.8¢
Average Monthly Cost	$101.88	-	$0.00	$65.25	$75.93
Average Annual Cost	$1,102.70	-	$1,247.56	$783.03	$911.20
Average Monthly kWh	1,019	-	-	723	842
Average Annual kWh	12,225	-	13,831	8,681	10,102
Total Annual MWh	1,934,275	-	298,650	2,545,321	4,778,246
Total Annual aMW	222	-	34	292	549

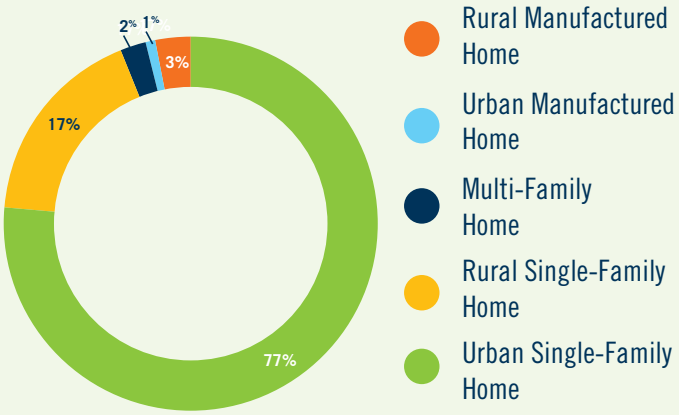
[2] *http://www.eia.gov/electricity/sales_revenue_price/xls/table6.xls; http://www.eia.gov/electricity/sales_revenue_price/xls/table7.xls; http://www.eia.gov/electricity/sales_revenue_price/xls/table8.xls ; http://www.eia.gov/electricity/sales_revenue_price/xls/table9.xls*

HOUSING FACTS
Location

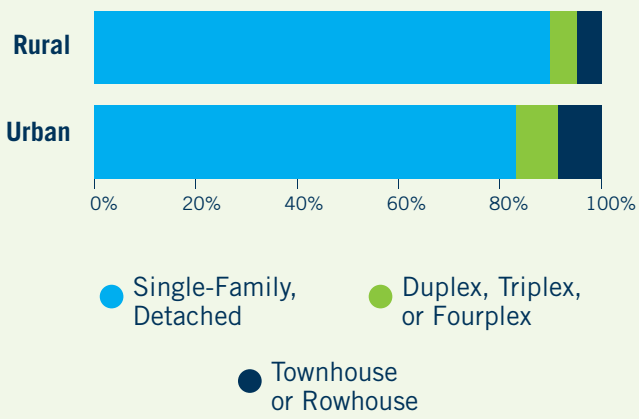
Seventy-seven percent of housing units in Montana are Single-Family (SF) homes; 63 percent of all SF homes are in urban counties[3]. Nearly all SF homes are detached, with less than 10 percent being either townhouse/rowhouses or duplex/triplex/quadplexes. Eighty-seven percent of SF homes are owner-occupied.

Housing in rural and urban counties have about the same average age – 43 to 44 years old. Nearly two-thirds were built before 1980 (58 percent), and 29 percent were built in 1990 or later. Housing sizes have grown slightly, averaging below 2,000 ft² prior to the 1950s, up to more than 2,400 ft² since the 1990s. Urban and rural homes are relatively close to the same size (2,155 ft² and 2,219 ft² respectively).

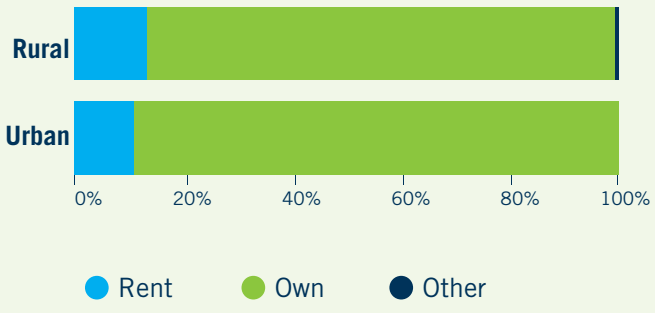
Housing Type



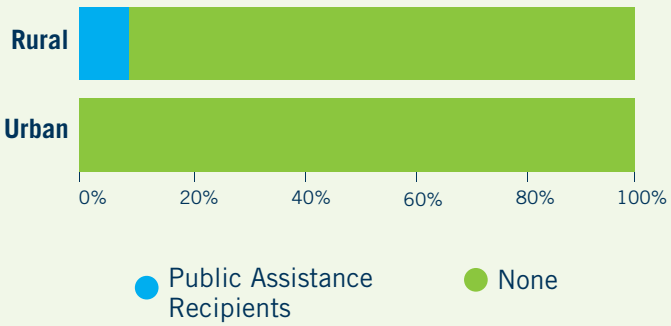
Single-Family Homes
(by Type and Region)



Renters vs. Owners
(by Region)

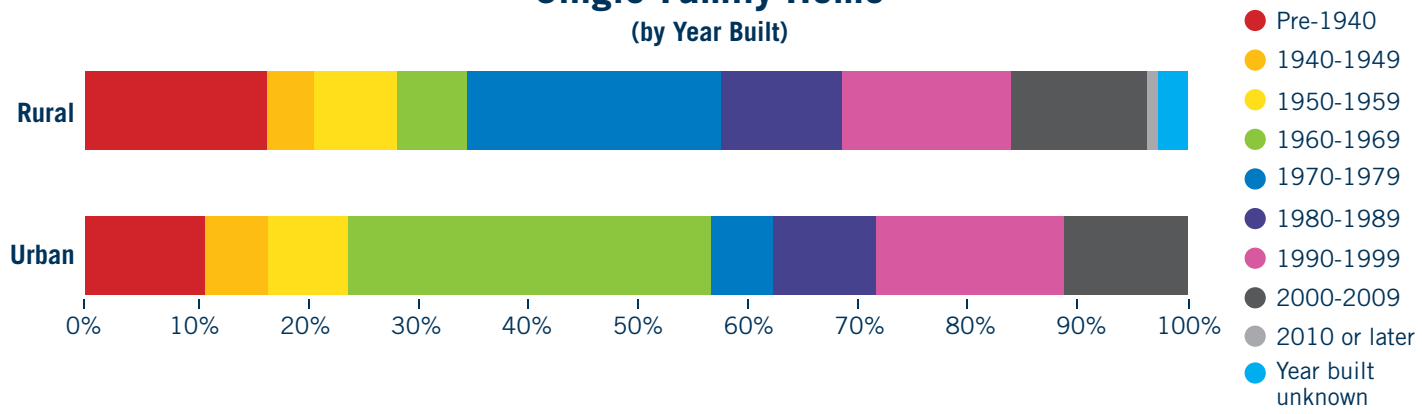


Public Assistance Recipients
(by Region)

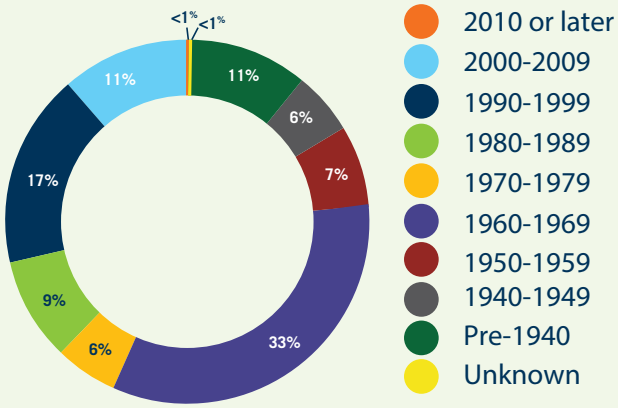


[3]Urban/Rural is based on the 2013 USDA Rural-Urban Continuum Codes with those counties in codes 1-3 considered to be Urban and all others considered to be Rural. http://www.ers.usda.gov/data-products/rural-urban-continuum-codes.aspx

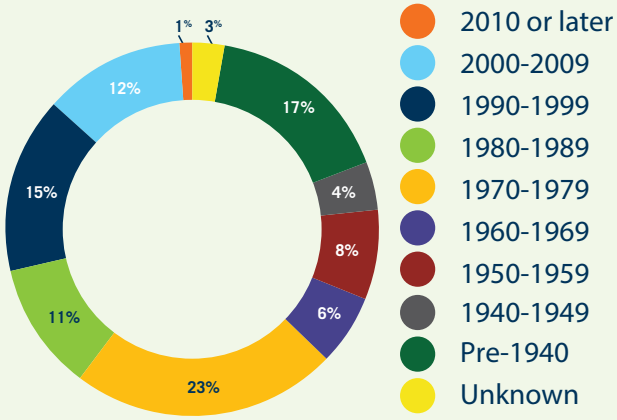
Single-Family Home
(by Year Built)



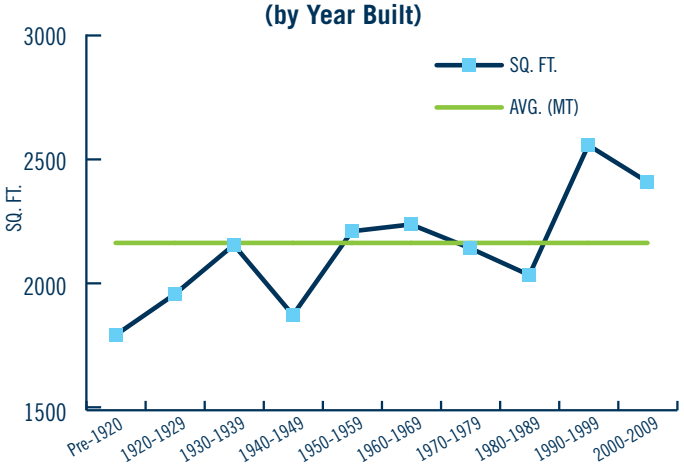
Urban Single-Family Home
(Year Built)



Rural Single-Family Home
(Year Built)



Average Home Size
(by Year Built)



Single-Family Home Statistics

	Avg. Age (Years)	Avg. Square Feet	Avg. # Rooms	Avg. # of Floors
Urban	44	2,155	11.4	1.2
Rural	43	2,219	11.7	1.2
Montana	43	2,204	11.7	1.2

TYPICAL HOUSE BY REGION[4]

Rural Montana

Built in 1968/Moved in: 1996
2,171 ft² -- 3.0 Bedrooms/2.0 Bath
1.2 floors, 11.8 rooms

Heating:
Gas Forced Air Heat (1998)

Refrigerator:
22 ft³/Built in 1998

Air Conditioning (AC):
19% have AC
Most Common: Window shaker (40%) or Central AC (35%)

Television:
Primary: 35"- 2005 (On for 5.7 hrs daily)
Secondary: 27"- 2002

Water Heater:
45g Gas/Built in 2001 or
48g Electric/Built in 2001

Washer:
Top-Load - 1997
Dryer:
Electric - 1999

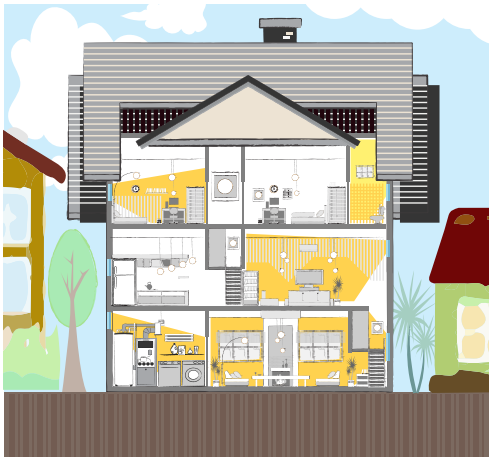
Urban Montana

Built in 1969/Moved in: 1996
2,155 ft² -- 3.1 Bedrooms/2.1 Bath
1.2 floors, 11.4 rooms

Heating:
Gas Forced Air (1995)

Refrigerator:
23 ft³/Built in 2000

Air Conditioning (AC):
35% have AC
Most Common: Central AC (63%)



Television:
Primary: 39"- 2007 (On for 5.6 hrs daily)
Secondary: 29"- 2002

Water Heater:
48g Gas/Built in 2001

Washer:
Top-Load - 1994 or
Front-Load - 2004
Dryer:
Electric - 1999

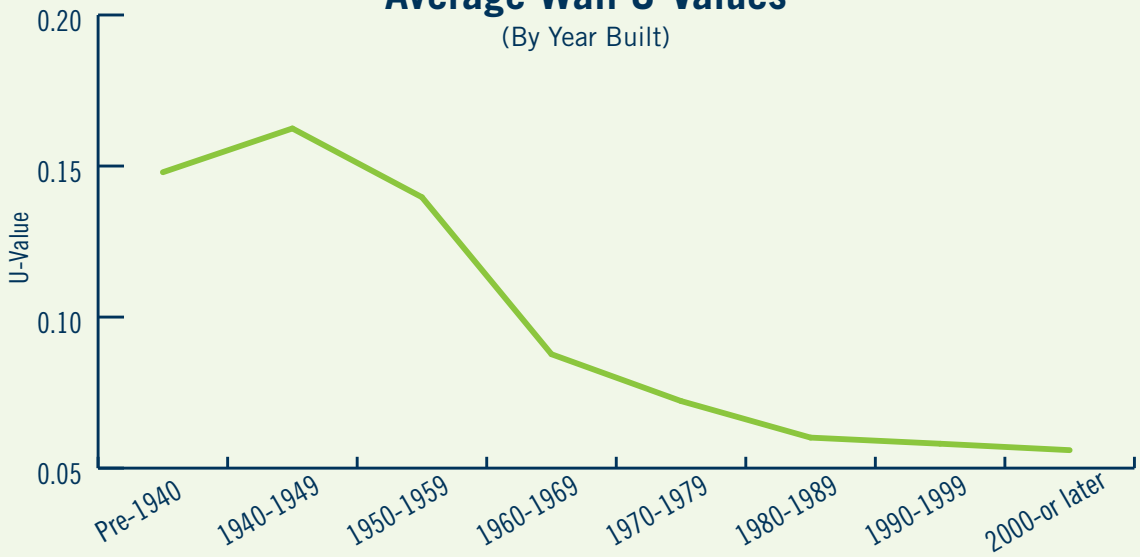
[4]There were 169 total observations in Montana.
RURAL Montana includes counties designated rural by the US Department of Agriculture's Urban/Rural index and includes 137 observations.
URBAN Montana includes counties designated uban by the US Department of Agriculture's Urban/Rural index and includes 32 observations.

INSULATION

The average U-value for walls, which describes how well a building element conducts heat, has decreased significantly from 0.15 in homes built before the 1940s, to 0.06 in the 2000s, as building codes have required better wall insulation. A significant majority of houses built prior to 1980 have lower R-values. R-value is a measure of thermal resistance, and is expressed as the thickness of the material (U-value is the inverse of R-value). Prior to 1980, houses had wall insulation of R-13 or less. Most houses built in 1980 or later have insulation of R-14 or better.

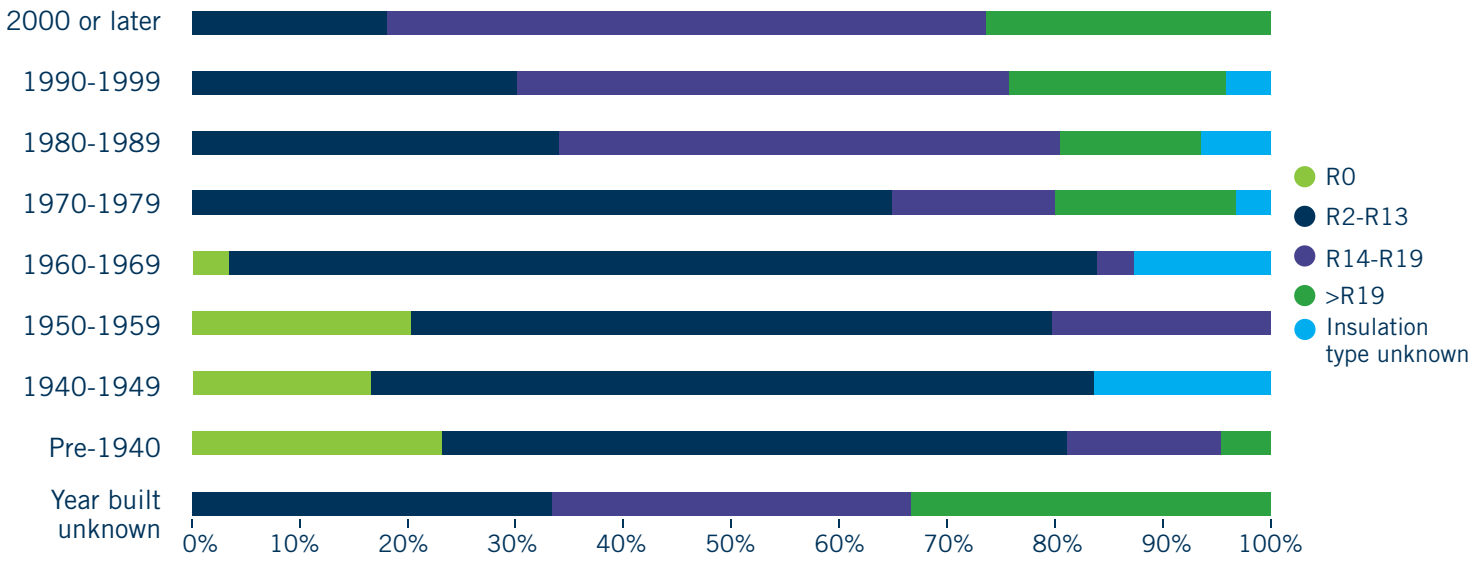
Average Wall U-Values

(By Year Built)



Average Insulation Type

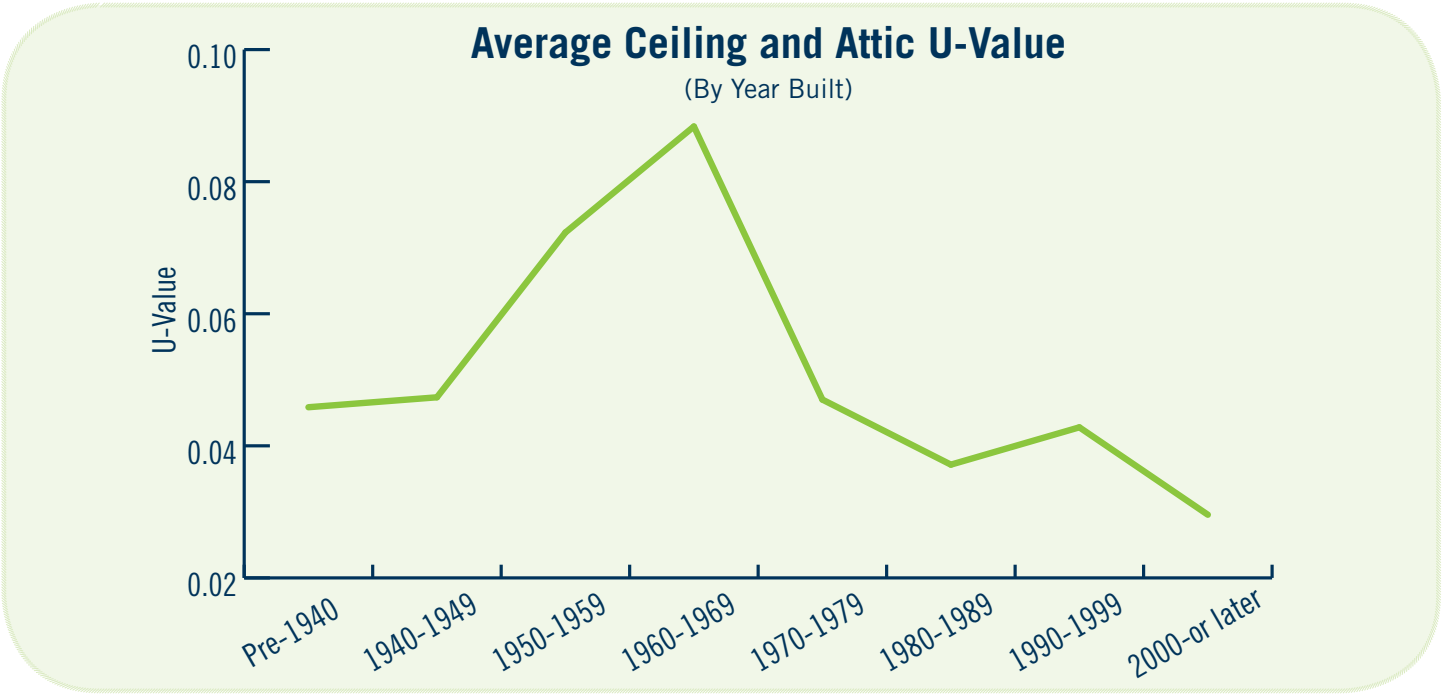
(By Year Built)

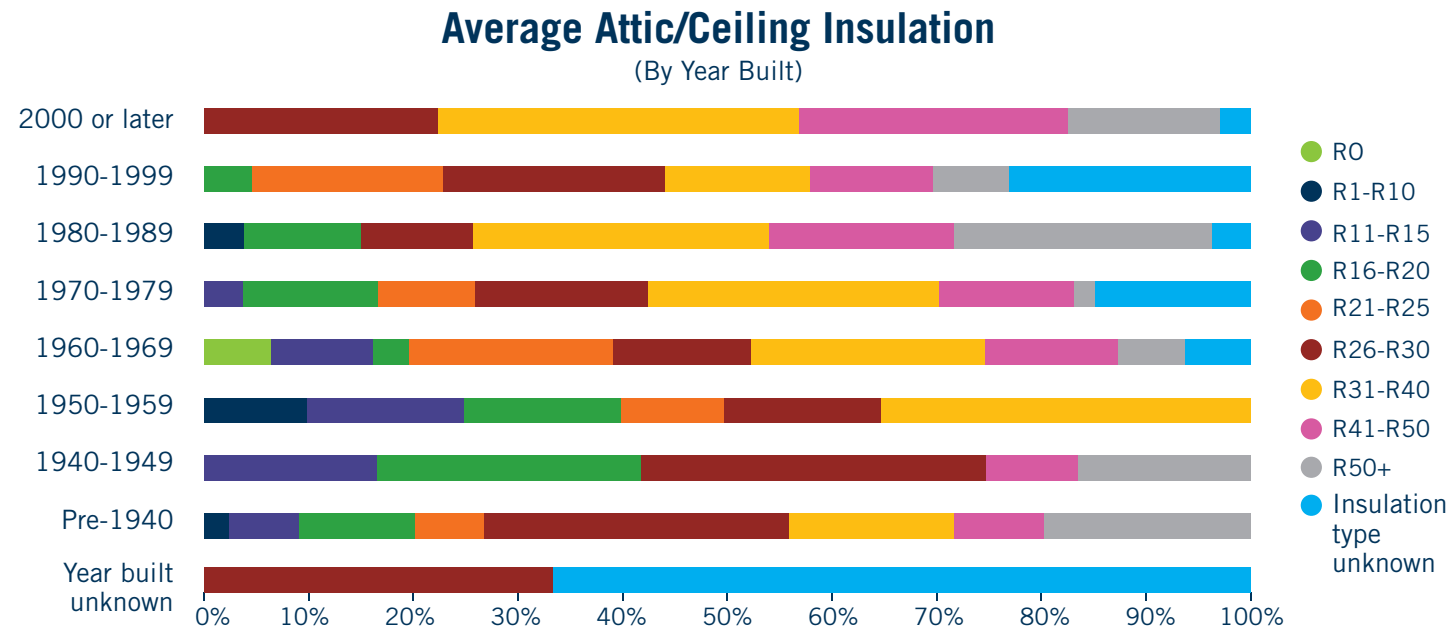


CEILINGS AND ATTICS/ FLOORS

As with walls, the average U-value for ceilings has dropped significantly from 0.05 in houses built prior to 1940, to 0.03 in homes built after 2000. However, there appears to be a significant increase in U-values through the 1960s before dropping again. It isn't clear what the cause for this increase is, though it could be a function of the small sample size for some vintages, combined with some remodels of older homes in the sample. Homes built prior to the 1980s mainly have ceiling insulation of R-30 or less. Ceiling insulation has increased, as most homes built since the 1980s have ceiling insulation of greater than R-30, with many now at R-50 or more.

While floor insulation has likely seen similar trends, surveyors were only able to collect data on about 13 percent of homes in the RBSA study, so similar statistics are not available.

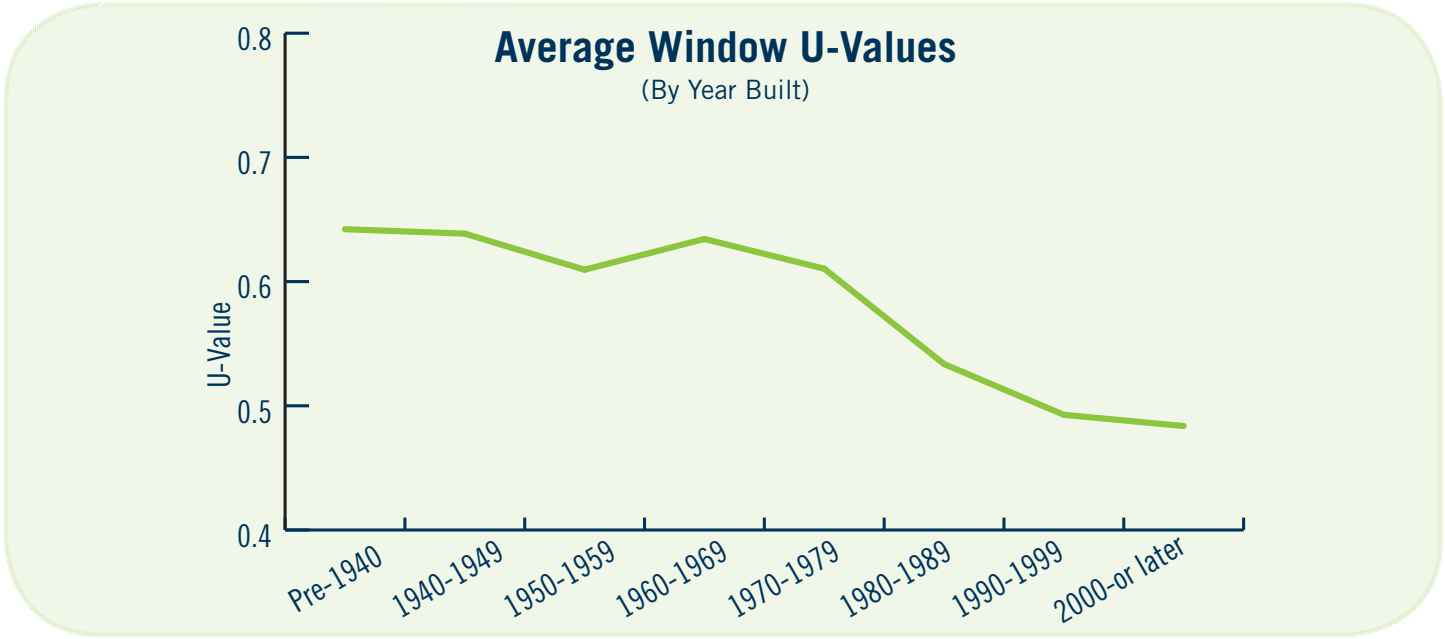


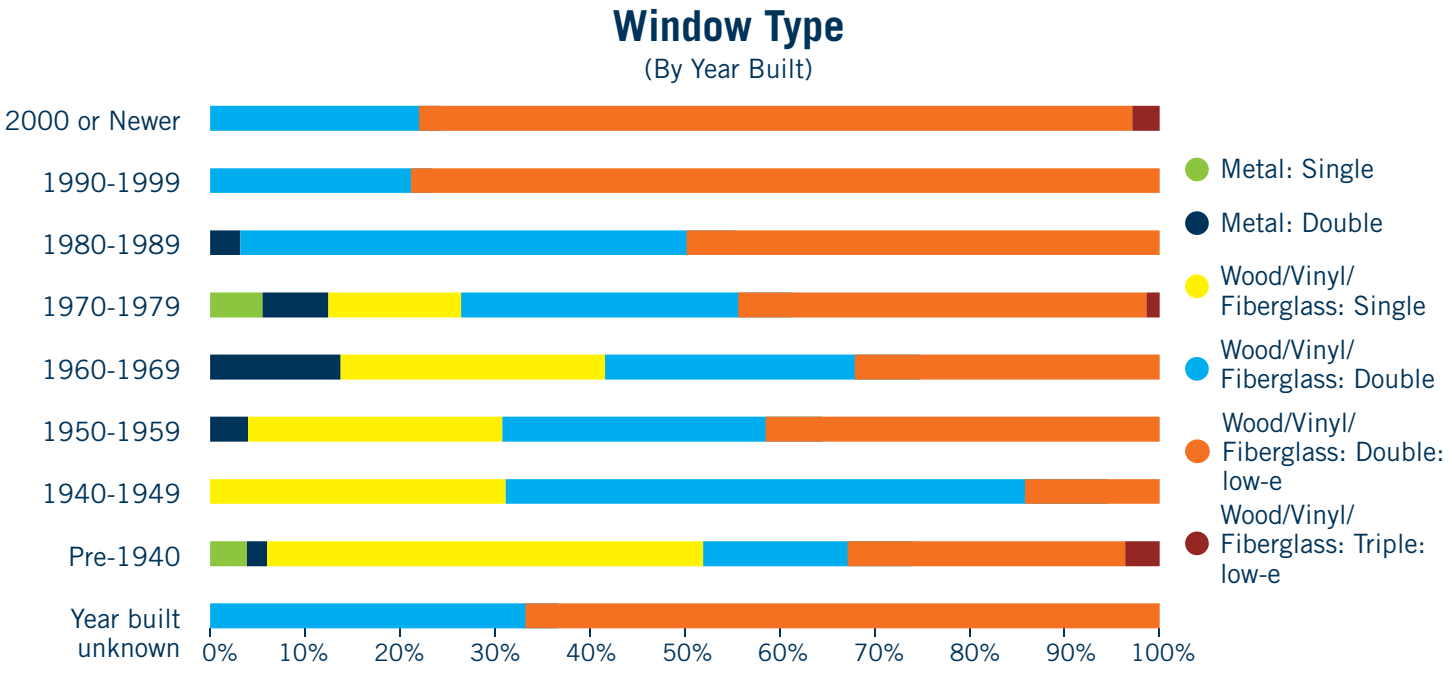


WINDOWS

As with walls and ceilings, window U-values have also dropped, from an average of 0.64 in homes built prior to the 1950s, to 0.48 in homes that were built after 2000. Prior to the 1970s, most houses were built with wood, and later, aluminum, single-pane windows. Building codes and new technologies brought in double-pane, insulated windows, as well as vinyl and fiberglass frames, significantly dropping window U-values.

Nearly all windows since the 1990s are insulated double-paned glass, with wood/vinyl/fiberglass frames. Most homes built since 2000 also have low-e glass. A small percentage of triple-pane, low-e windows are also showing up – likely as replacements for older windows.



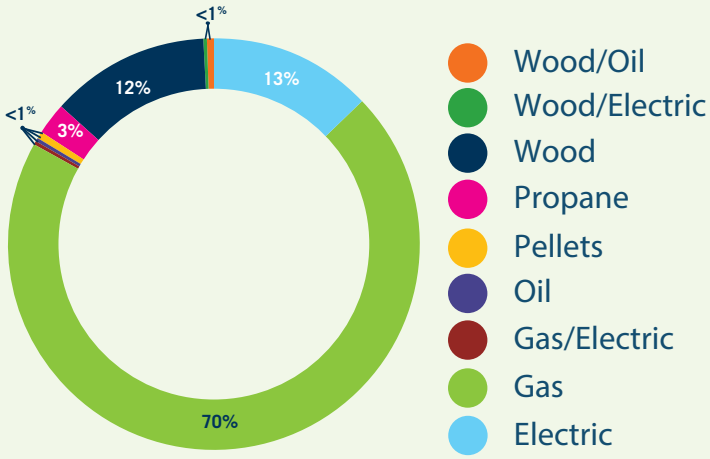


HEATING

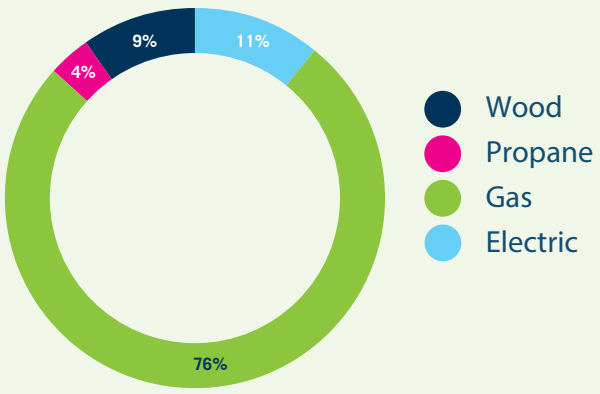
The most prevalent heating fuel for Montana SF homes is gas (70 percent). The remainder of heating fuels are split nearly equally between electric heat and wood (13 and 12 percent respectively). There is very little difference in the fuel mix between urban and rural counties in Montana.

State Heating Fuel Type

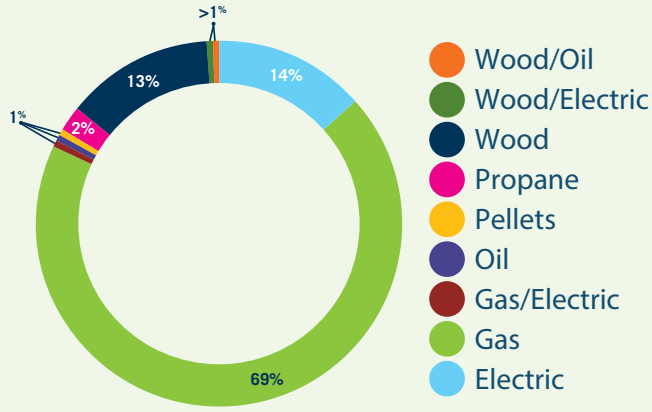
(Single-Family Homes)



Urban Single-Family Home/ Heating Fuel Type

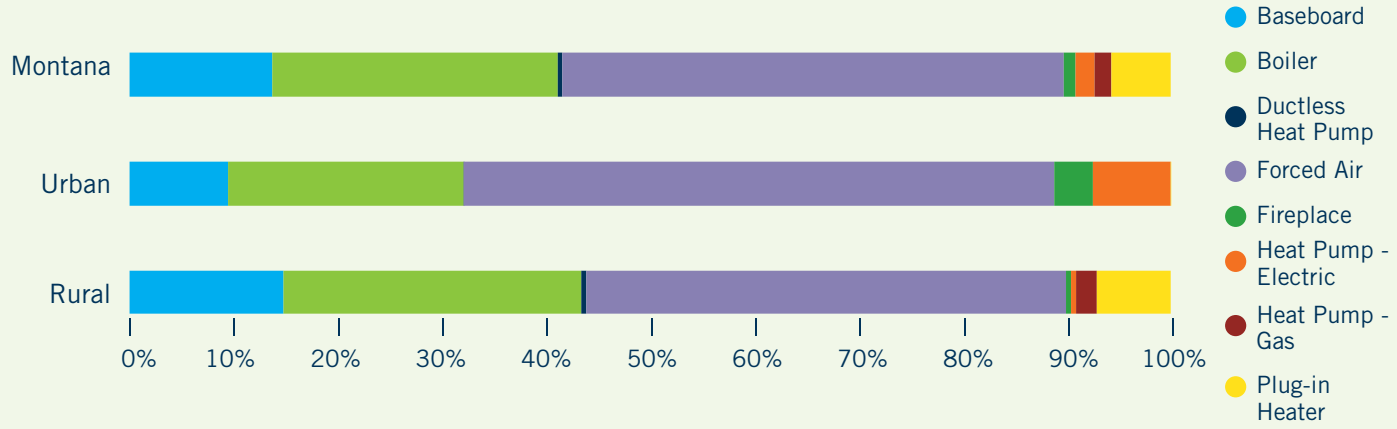


Rural Single-Family Home/ Heating Fuel Type



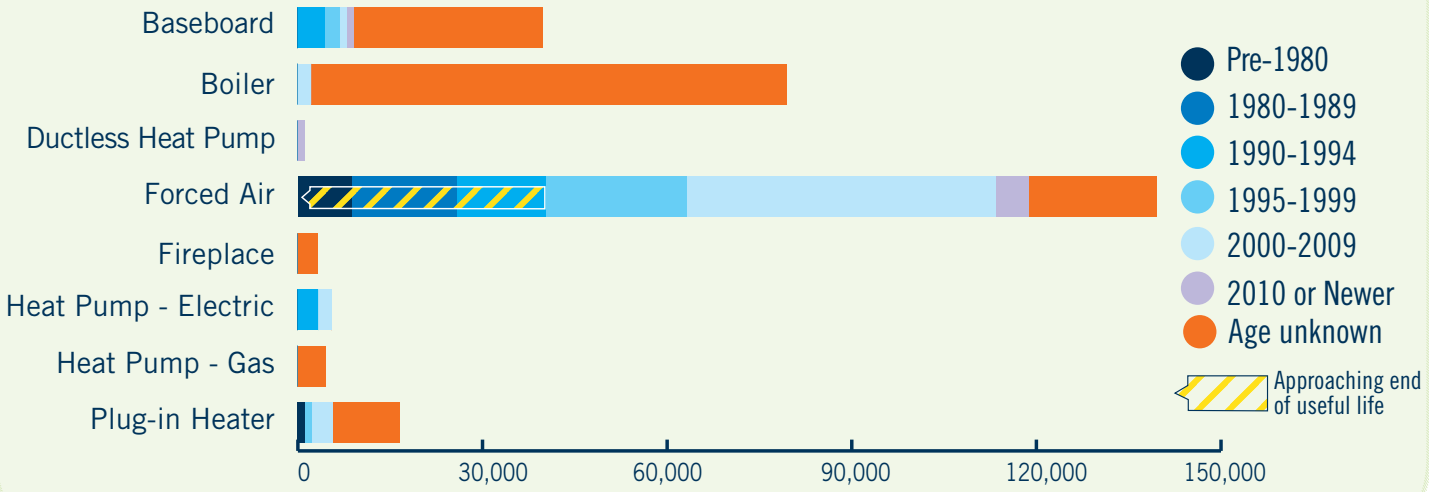
The dominant heat source in Montana is forced air (48 percent), followed by boilers (24 percent), and baseboard heaters (14 percent). In urban counties, forced air is more dominant than in rural counties (57 vs. 46 percent respectively), with boilers making up the difference in rural counties (29 percent in rural vs. 23 percent in urban counties). Nearly half of all forced air units (45 percent), are at, or nearing the end of their useful lives, which is estimated to be 15 years. There is not enough year of manufacture information about boilers or baseboard units to understand how many are potential replacement candidates due to age.

Primary Heating Types



Primary Heat Source Age

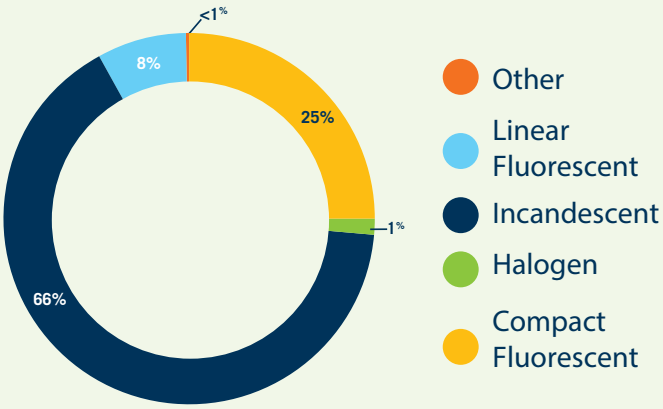
(by Total Number of Units)



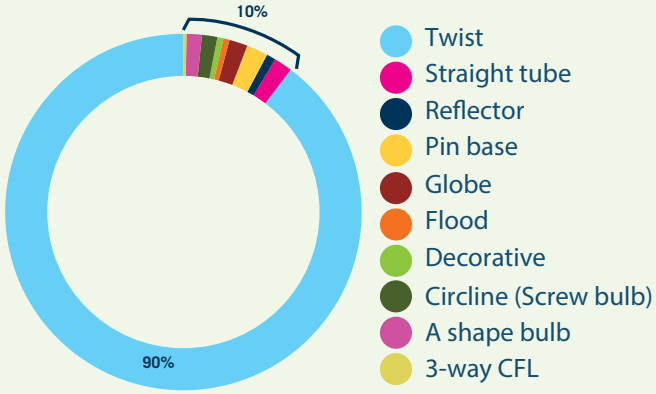
LIGHTING

Compact fluorescent bulbs (CFLs) now account for 25 percent of all SF home lighting in Montana, while incandescent bulbs remain the dominant light source, making up 66 percent of all bulbs. 60W incandescent bulbs remain the most populous bulb, making up nearly half of all incandescents (49 percent), and 32 percent of lamps overall. 60W bulbs still number more than all CFLs combined (1.8 million vs. 1.4 million respectively). Of CFLs, 90 percent are twisted bulbs. LED lights were too new to register before 2012.

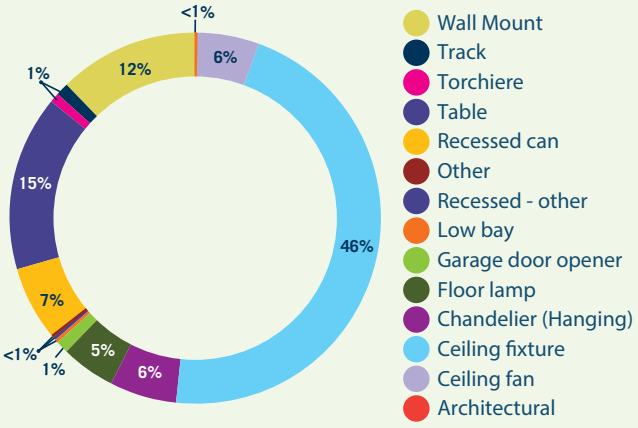
Lamp Type



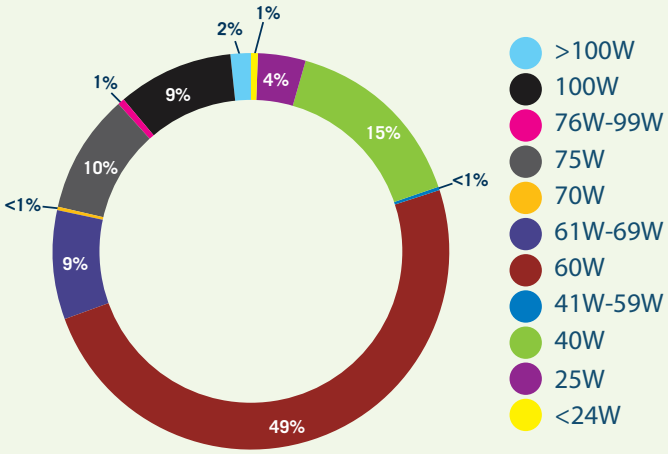
CFL Bulb Type



Fixture Type



Incandescent Wattage



Single Family Home: Lamp Category by Lighting Lamp Type – Total Lamps

	Compact Fluorescent	Halogen	Incandescent	Linear Fluorescent	Other	Total	% of Total*
3-Way CFL	4,262	0	0	0	0	4,262	0.07%
3-Way Incandescent	0	0	110,295	0	0	110,295	1.92%
A Shape Bulb	21,943	0	0	0	0	21,943	0.38%
Circline (Screw Bulb)	20,640	0	0	0	0	20,640	0.36%
Clear	0	0	124,471	0	0	124,471	2.16%
Colored	0	0	2,131	0	0	2,131	0.04%
Decorative	6,393	0	197,995	0	0	204,387	3.55%
Flood	10,654	0	0	0	0	10,654	0.19%
Fluorescent Other	0	0	0	4,261	0	4,262	0.07%
Fluorescent Unknown	0	0	0	6,551	0	6,551	0.11%
Globe	23,915	0	250,597	0	0	274,512	4.77%
Heat Lamp	0	0	15,233	0	0	15,233	0.26%
LED Interior	0	0	0	0	6,710	6,710	0.12%
Multifaceted Reflector	0	38,831	0	0	0	38,831	0.67%
Mini Base	0	0	77,979	0	0	77,979	1.35%
Other	0	6,551	4,420	0	2,131	13,102	0.23%
Parabolic Aluminized Reflector	0	21,784	0	0	0	21,784	0.38%
Pin Base	25,729	0	0	0	0	25,729	0.45%
Quartz Tube	0	17,206	0	0	0	17,206	0.30%
Reflector	13,930	0	307,866	0	0	321,796	5.59%
Standard A Lamp	0	0	2,687,046	0	0	2,687,046	46.67%
Straight Tube	23,756	0	0	0	0	23,757	0.41%
T-12	0	0	0	220,871	0	220,871	3.84%
T-4	0	0	0	42,546	0	42,547	0.74%
T-5	0	0	0	16,694	0	16,695	0.29%
T-8	0	0	0	151,855	0	151,855	2.64%
Twist	1,292,539	0	0	0	0	1,292,539	22.45%
Total	1,443,761	84,372	3,778,033	442,781	8,840	5,757,787	100%
	25.07%	1.47%	65.62%	7.69%	0.15%	100%	

*Rounded to the nearest tenth

Single Family Home: Lamp Category by Lighting Fixture Type – Total Lamps							
Lighting Fixture Type	Compact Fluorescent	Halogen	Incandescent	Linear Fluorescent	Other	Total	% of Total*
Architectural	0	0	3,434	2,131	0	5,565	0.10%
Ceiling Fan	125,774	1,145	188,679	0	0	315,598	5.48%
Ceiling Fixture	613,673	8,682	1,659,826	372,814	0	2,654,995	46.09%
Chandelier (Hanging)	97,950	9,668	229,605	0	0	337,223	5.85%
Exterior	-	-	-	-	-	0	0.00%
Floor Lamp	81,255	11,799	174,943	6,710	2,131	276,837	4.81%
Garage Door Opener	10,813	0	62,869	0	0	73,682	1.28%
High Bay	-	-	-	-	-	0	0.00%
Low Bay	0	0	0	4,262	0	4,262	0.07%
Other	0	0	5,565	0	0	5,565	0.10%
Recessed - Other	2,131	11,130	5,406	2,131	0	20,798	0.36%
Recessed Can	47,478	22,612	309,680	0	0	379,770	6.59%
Table	271,589	6,551	584,422	11,958	2,131	876,650	15.22%
Touchiere	16,061	0	27,860	2,131	0	46,052	0.80%
Track	16,378	10,654	37,334	0	2,289	66,656	1.16%
Wall Mount	160,660	2,131	490,699	40,645	2,289	696,424	12.09%
Total	1,443,761	84,372	3,780,323	442,781	8,840	5,760,076	100%
	25.06%	1.46%	65.63%	7.69%	0.15%	100%	

*Rounded to the nearest tenth

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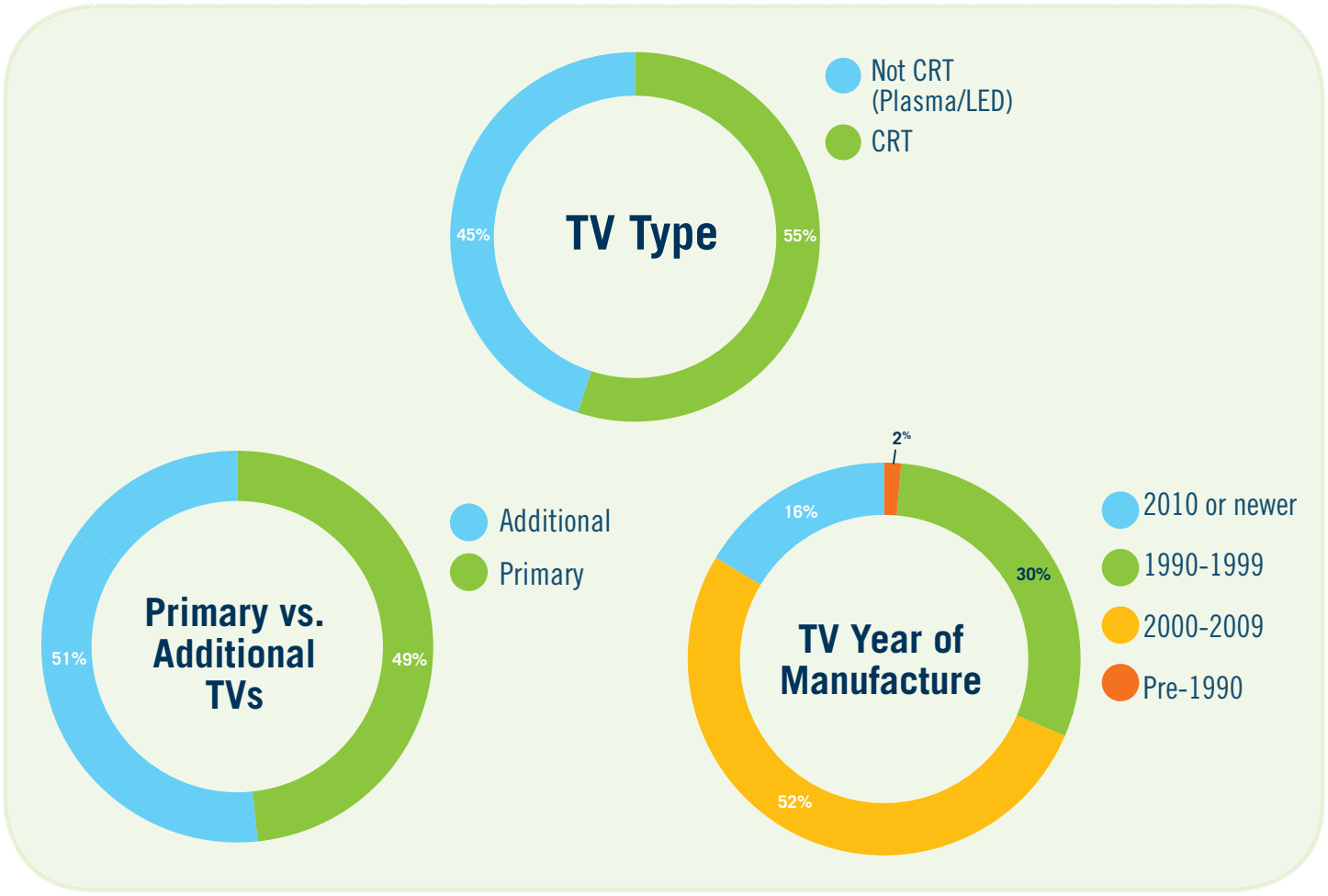
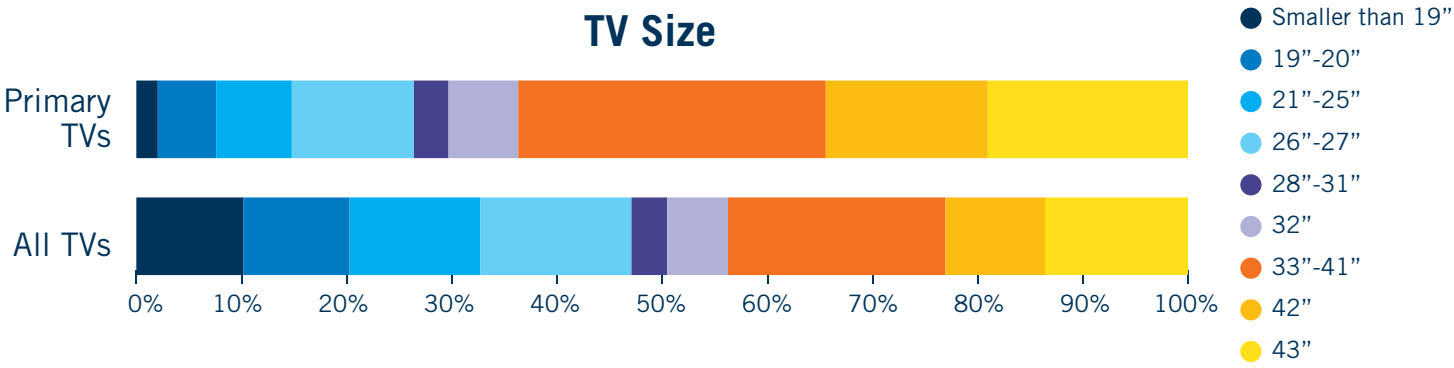
Televisions

In Montana SF homes, there are slightly more Cathode Ray Tube (CRT) TVs, than non-CRT (Plasma or LED) TVs – 55 percent vs. 45 percent respectively. Fifty-one percent of the TVs in SF homes are not primary use TVs, they are secondary or 'additional' TVs. Sixty-eight percent of TVs were manufactured after 2000, with 16 percent made in 2010 or later. Half of all TVs are smaller than 32". However, most primary use television sets are 33" or larger (64 percent). On average, primary use TVs are reported to be on for 5.6 to 5.7 hours each day.



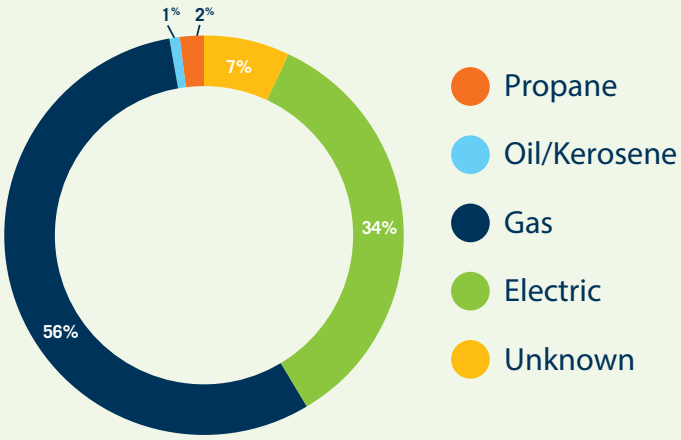


Water Heaters

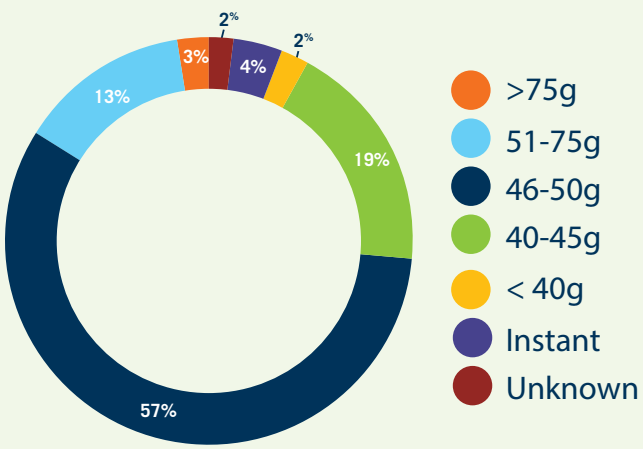
In Montana SF homes, gas water heaters are more prominent than electric water heaters (56 vs. 34 percent respectively). 46-50 gallon water tanks are by far the most common (57 percent), followed by 40-45 gallon tanks (19 percent). Instant water heaters make up four percent of SF home water heaters.

According to Lowes[5], the estimated life expectancy of a water heater is about 8 to 12 years, based on the manufacturer's suggested service life. While life expectancy varies with local weather, unit design, installation quality and maintenance level, nearly half of all SF home water heaters are 10 years or older (45 percent), and potentially need to be replaced. Forty-seven percent of electric water heaters and 43 percent of gas water heaters are older than 10 years, and are potential candidates for replacement. This does not include those whose year of manufacture is unknown (11 and 21 percent respectively).

Water Heater Fuel

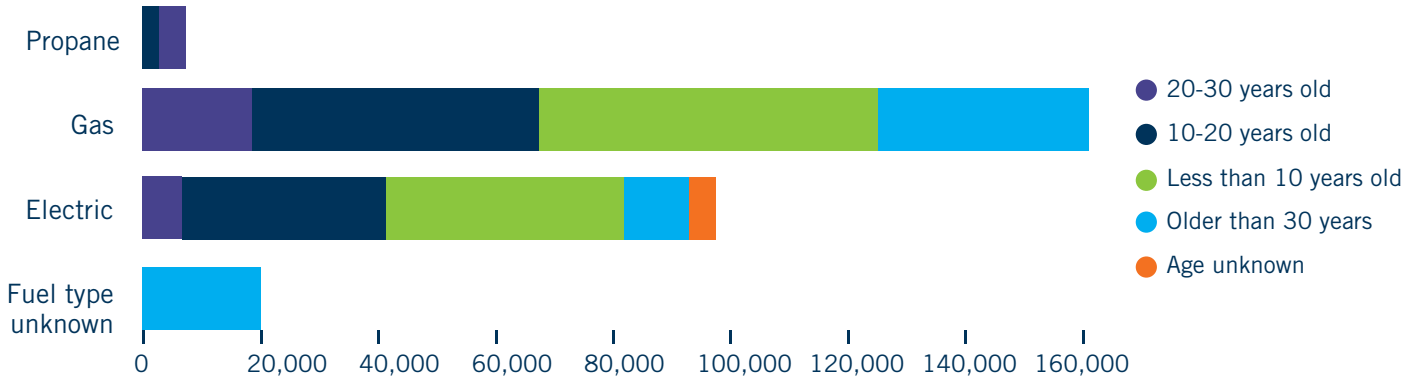


Water Heater Size



Total Water Heater Count

(Fuel Type by Year of Manufacture)

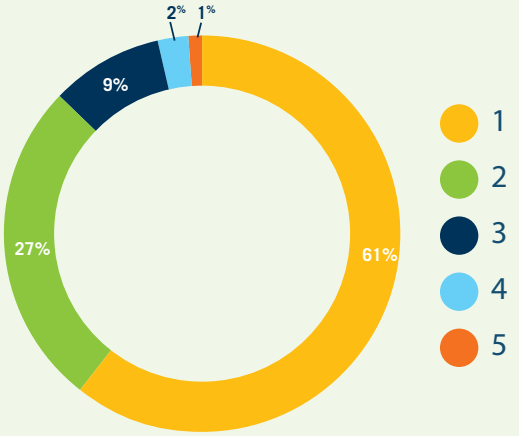


[5]"When to Replace a Water Heater." Lowes Web Site. N.p., n.d. Web. 8 Jan 2014. *< http://www.lowes.com/cd_Install a Water Heater_495279775_ >.*

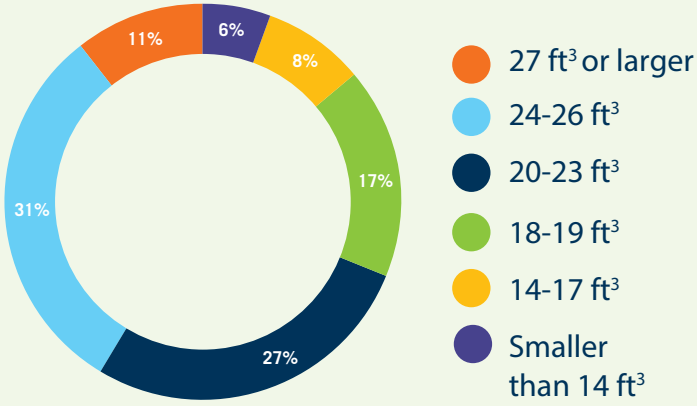
Refrigerators/Freezers

Thirty-nine percent of SF homes have more than one refrigerator/freezer, which includes refrigerators, freezers, wine coolers, and small refrigerators. Fifty-eight percent of all refrigerators are between 20 ft³ and 26 ft³. More than 88 percent of refrigerators have been manufactured since the National Appliance Energy Conservation Act (NAECA) of 1987, though most were built before 2010 (71 percent). About 185,720 refrigerators are more than 14 years old, which is past the estimated life expectancy for refrigerators[6]. Side-by side refrigerators/freezers are the dominant model, comprising 51 percent of refrigerators and 37 percent of all refrigerators and freezers.

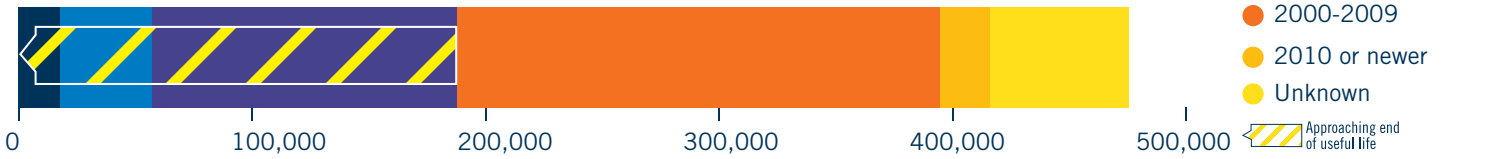
Number of Refrigerators/Freezers per Home



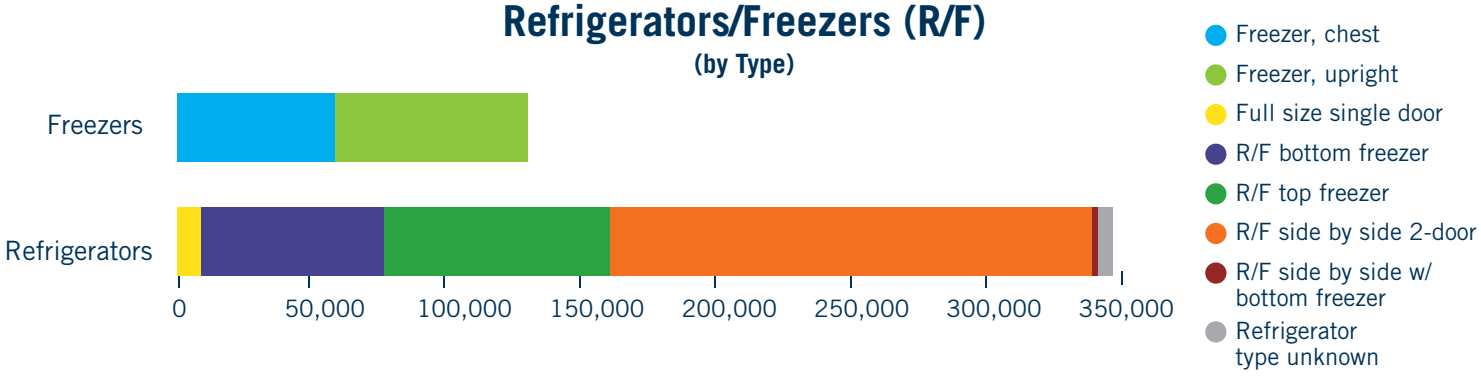
Refrigerator/Freezer Size



Total Refrigerator Count
(by Year of Manufacture)



Refrigerators/Freezers (R/F)
(by Type)

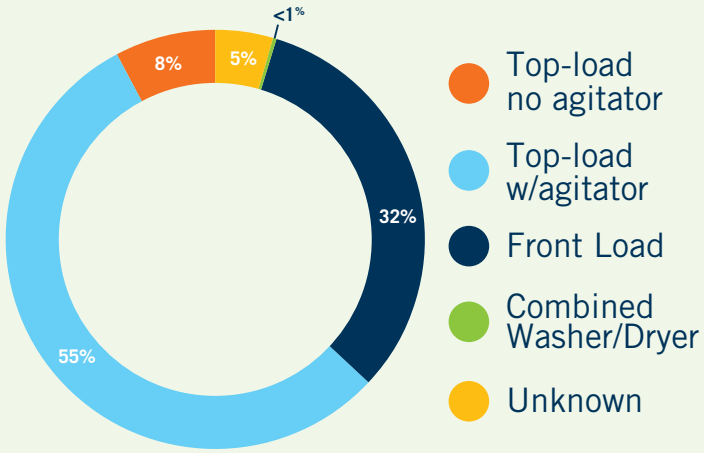


[6]Appliance Statistical Review via http://www.oldhouseweb.com/how-to-advice/life-expectancy.shtml

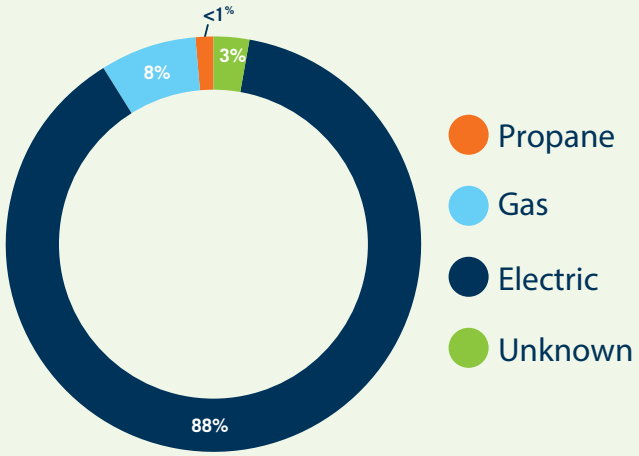
Clothes Washers/Dryers

Top-load washing machines are dominant in SF homes, making up 63 percent of all washing machines. Despite gas being available in a great number of homes and being a popular fuel for heat and hot water, nearly all dryers are electric (94 percent). Two-thirds of washers (191,796) and dryers (195,899) are more than 10 years old, which is at or near their estimated useful lives (13 years and 14 years respectively)[7].

Washer Type

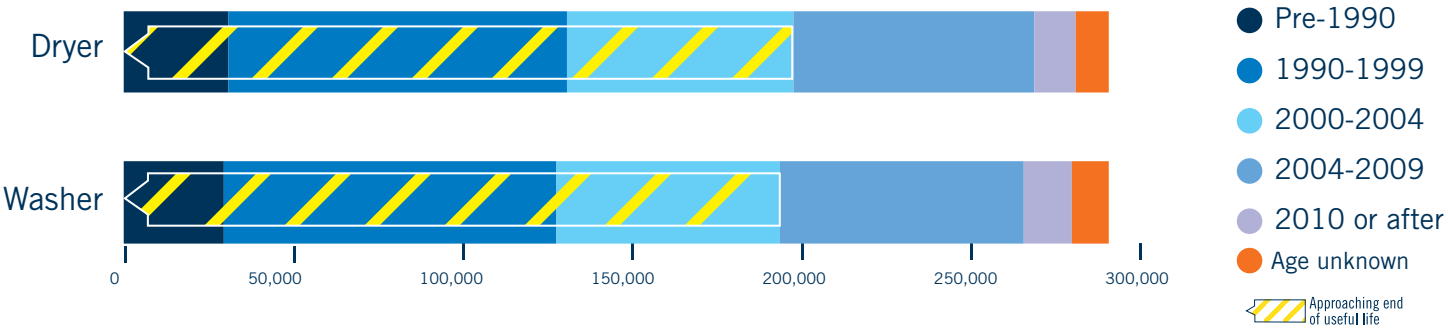


Dryer Fuel Type



Total Washer/Dryer Count

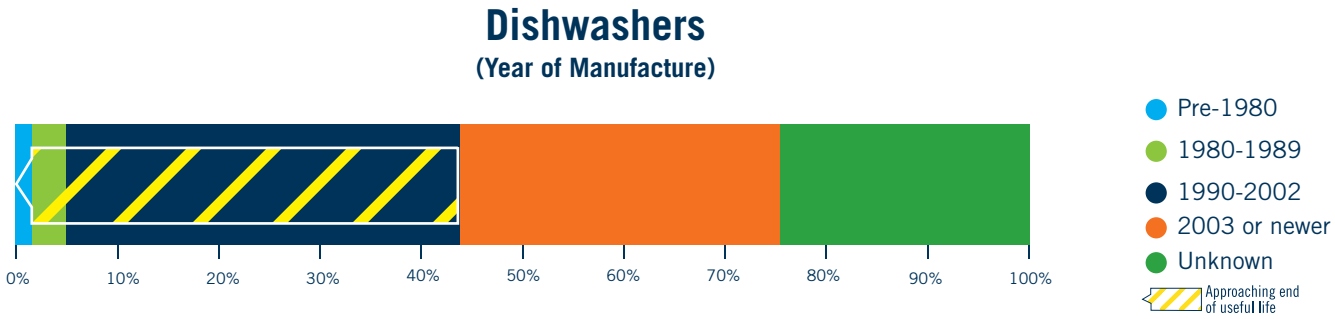
(by Year of Manufacture)

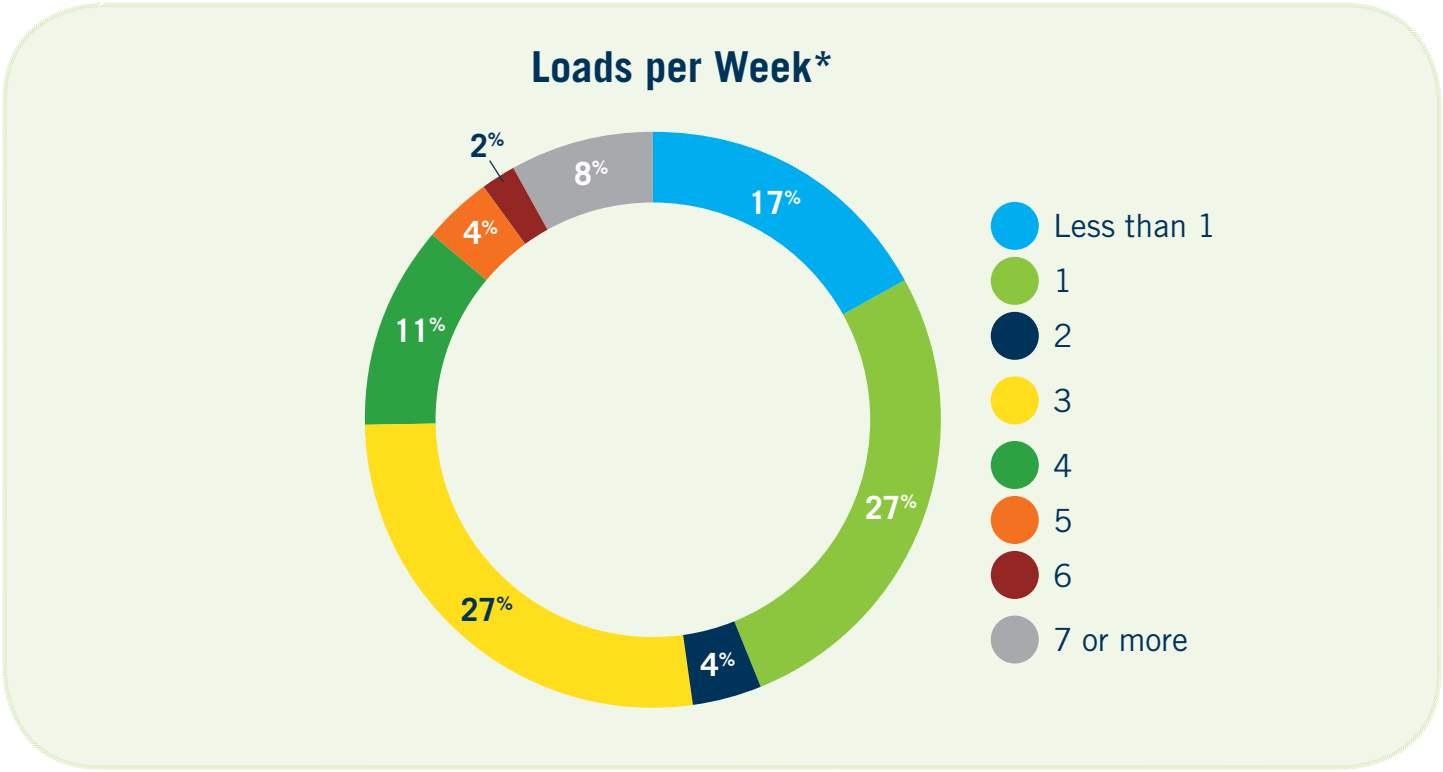


[7]Appliance Statistical Review via http://www.oldhouseweb.com/how-to-advice/life-expectancy.shtml I

Dishwashers

Forty-four percent of households (126,796) have a dishwasher older than 10 years – which is past the estimated life expectancy for dishwashers. Most households run three dishwasher loads or more per week (53 percent).





*Very small sample – only 31 homes reported load per week data