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2011 Water Heater Market Update

Prepared by:
Verinnovation Inc.
2442 NW Market Street #17
Seattle, WA 98107

Northwest Energy Efficiency Alliance
PHONE:
503-688-5400
FAX
503-688-5447
EMAIL
info@neea.org

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1.0 Executive Summary

Water heaters represent a major energy conservation opportunity in the Northwest. Heating water can represent between 15 and 24 percent of a home's total energy use. Yet the large majority of residential water heaters in people's homes today are far less efficient than they could be. According to the Northwest Power and Conservation Council (NWPCC), for example, achievable gains in electric water heater efficiency could yield 70 average megawatts (aMW) of power savings through 2015, and up to 335 aMW through 2025.

This report presents the findings of a study of the Northwest water heater market, sponsored by the Northwest Energy Efficiency Alliance (NEEA), aimed at understanding the factors driving water heater sales in today's economy, with a special focus on high efficiency water heaters. The study utilized a mixture of primary research using both quantitative and qualitative methods, and secondary research using reliable government and industry sources.

The research found a market buffeted by two crosswinds. On one hand, the economic downturn has pared back water heater sales and made consumers more skittish about major purchases. On the other hand, a growing imperative for energy conservation is expanding the manufacturers' offerings of high efficiency water heaters — models that offer substantial utility bill savings over the long term, yet typically carry higher up-front costs. These two trends create both a need and an opportunity to bridge the gap between cash–conscious consumers and the money-saving opportunities offered by the new generation of high–efficiency water heaters.

1.1 Summary of Key Findings

The recession has deflated the water heater market. Water heater sales have fallen 20 percent since their peak in the mid–2000s, driven mostly by a 72-percent decline in new construction. Voluntary purchases have also fallen modestly. These declines have increased the prominence of emergency replacements in the overall market, and may have made manufacturers and major retailers more guarded about sharing sales figures.

Consumers are interested in — but skeptical about — efficient models. Consumers find that energy efficiency and ENERGY STAR rankings are significant selling points, rating them as the first and third most important factors respectively when purchasing a water heater.[1] For cost-conscious consumers, efficiency rebates and incentives are powerful motivations for buying efficient water heaters. Yet many consumers (26%) appear skeptical about claims of utility bill savings and are willing to pay only a modest premium for energy efficiency. This skepticism is reinforced by installers, some of whom have had poor experiences with heat pump water heaters in particular.

[1] See Table H-11 in Appendix D.

Education gaps hinder adoption. In our research, both consumers and installers indicated that they would be more likely to buy/sell energy-efficient water heaters if they were better able to judge the benefits and understand the process.

Consumers focus on price, with gas tankless as the main "alternative" water heater. Homeowners remain largely disengaged from water heater decisions: they're focused on price (86%), but show little interest in particular brands (11%) or high-end water heater features (11%). The exception is among higher income and better educated consumers, who show a particularly strong interest in tankless gas water heaters. To meet this demand, some Northwest installers now specialize in tankless installations.

How consumers research and purchase is changing. Although few national and Northwest consumers buy water heaters online, a growing share research online before buying. At the same time, both recent and potential consumers in the Northwest seem to be trending toward major national home improvement stores for water heater purchases and away from smaller chain retail stores. The big three (Sears, Home Depot, and Lowes) comprise the largest channel for water heater sales. Direct sales through contractors and installers (plumbers) account for the second largest channel for recent purchases, and consumers trust contractors and installers more than any other distribution source for information.

1.2 Summary of Recommendations

Focus on cost first. The single greatest overall influence on water heater consumers in today's market is the cost of purchase and installation. Our research found that point– of–purchase incentives, particularly utility and manufacturer rebates, most motivated consumers, although tax credits and interest–free financing also generated interest. Rebates and tax incentives are especially important in driving planned purchases.

Educate consumers and installers. Consumers show modest awareness of heat pump water heaters, with significantly better awareness of, and interest in, gas tankless models. At the same time, some installers are skeptical that heat pump water heaters produce the promised utility savings in the Northwest climate — a problem that may be exacerbated by poor understanding of installation best practices. Giving both consumers and installers clear, accurate, and up–to–date information about heat pump water heaters — including proof that they work in the Northwest's climate, and clear information about proper installation early in the purchasing process — is key to boosting consumer acceptance and demand.

Streamline building codes. Many installers cite local building codes as increasing both the complexity and the cost of installations, particularly for high efficiency models. Leveraging opportunities to streamline and clarify codes could remove a significant non- market barrier to the faster uptake of high efficiency water heaters.

Cultivate the technology. The Northwest, with its high installed base of electric water heaters and broad public interest in energy efficiency, is already a national hotspot of interest in heat pump water heaters. As the technology matures the region could make major gains in water heater efficiency. However, those gains are not inevitable, achieving them will require broad cooperation in ensuring that heat pump water heaters are installed properly, working effectively, and genuinely saving Northwest consumers money.

2.0 Introduction

The Northwest Energy Efficiency Alliance (NEEA), a non-profit organization working in collaboration with more than 100 Northwest utilities and other partners to maximize energy efficiency in the Northwest, has a keen interest in accelerating the adoption of high efficiency residential water heaters. To better understand the dynamics of the market, both in the Northwest and nationally, NEEA commissioned Verinnovation Inc. to update NEEA's 2006 report on the residential water heater market.[2]

The 2011 Water Heater Market Update was conducted from June 2011 to October 2011. The study sought to characterize the Northwest residential water heater market and to gain a clear understanding of behaviors and attitudes of both consumers and suppliers. NEEA was particularly interested in the potential for adoption of heat pump water heaters. This is driven by market indicators that show between 60 and 65 percent of all water heaters in the four Northwest states of Washington, Idaho, Montana, and Oregon, use electricity as their primary fuel source. At the time of the publication of this study, the only high efficiency option readily available on the consumer market is the heat pump water heater.

NEEA was also interested in learning more about other high efficiency water heaters, such as tankless gas water heaters, to find other areas for potential market barriers and opportunities to getting more high efficiency water heaters into homes. Appendix H lists the study's goals.

2.1 Key Market Characteristics

Market concentration. Three firms — A.O. Smith, Rheem, and Bradford White — dominate the U.S. water heater manufacturing sector.[3]
Sputtering sales. U.S. water heater sales have fallen by more than 20 percent since their 2004 peak, mainly due to a decline in new home construction, but also because of an apparent decline in planned water heater purchases.
Electric edges out gas in the Northwest. Electric water heaters represent just under 50 percent of the U.S. water heater market — but roughly 66 percent of the water heaters currently installed in Washington and Oregon homes.
Low sales of high efficiency water heaters. Heat pump water heaters represent less than 1 percent of all water heaters sold nationally. Both sales and public awareness of high efficiency water heaters have increased, largely due to federal tax credits created in 2009.

2.2 Market Background[4]

Historically, the water heater market has seen consistent growth, tied to construction starts. Sales depend on a robust housing market and follow boom cycles. Recent changes and factors to consider:

- As of 2006, when NEEA conducted its previous water heater market study, approximately 9.35 million new water heaters shipped from August 1, 2004 through July 31, 2005 across the nation, a decline from 9.55 million in 2003 and 9.63 million in 2004.

[2] http://neea.org/research/reports/06-158.pdf
[3] Ryan et al., *ENERGY STAR Water Heater Market Profile*, U.S. Department of Energy, September 2010
[4] *Assessment of the Residential Water Heater Market in the Northwest, Market Research Report, 06-158,* Northwest Energy Efficiency Alliance, July 2006. http://neea.org/research/reports/06-158.pdf

- The previous study indicated an electric water heater share among Northwest replacements of 57 percent. Approximately 6.3 percent of existing homes replaced their water heater each year.
- Although large manufacturers likely overstated market shares, there was no definitive assessment of alternative water heater technologies in the 2006 report. During the 2011 study, we too found manufacturers overly optimistic in their reporting, though none directly disclosed market share percentages. The numbers included in this report have been extrapolated based on shipment data and recent market changes.

Consumer data of the previous survey included self-reported data stating:

- 4.5 percent of new water heaters were tankless units
- 2.1 percent were heat pumps
- 3.5 percent were other types of alternative water heating technologies.

The 2006 water heater market consisted of two primary distribution channels:

- The first connected manufacturers to distributors (including plumbing supply houses) and wholesalers. The water heaters were then sold to contractors or homeowners, or to retailers to reach homeowners and installers.
- The second connected manufacturers directly to the retail market, private labeling brands for retailers such as Home Depot or Lowe's, Sears, and True Value Hardware.

New construction supported about 20 percent of the overall 2006 water heater market.

3.0 Methodology

Verinnovation designed the research to characterize the supply and demand sides of the Northwest water heater market and to identify the attitudes and opinions that drive the behaviors of consumers and other market participants. Between July and October 2011, Verinnovation reached nearly 1,500 market actors — including homeowners, recent water heater purchasers, plumbers, installers, retailers, industry experts, and shoppers. We obtained primary quantitative data through phone and online surveys, secondary market data from trusted government and industry sources, and qualitative data through in-depth interviews, online discussions, and on-site interviews with shoppers, homeowners, and water heater installers. We outline more information about our research participants in section 3.6 Sample Disposition.

3.1 Questionnaire Design

Verinnovation worked closely with NEEA to draft initial questionnaires and facilitation guides for this study. NEEA modified the scope substantially from the 2006 study to engage more market actors and potential purchasers. The key questions in 2011 focused on trends for high efficiency water heaters, particularly heat pump water heaters, as Northwest homeowners use a high percentage of electric water heaters. We kept many survey questions similar to those in the 2006 phone survey to maintain comparability for trends where possible. We have included copies of all questionnaires and facilitation guides in Appendix G.

3.2 Literature Review and Secondary Research

Verinnovation reviewed more than 200 documents to gain insight into the existing water heater market. These documents helped identify trends, challenges and drivers that affect not only the general water heater market, but specifically the heat pump water heater market. We reviewed and compared U.S. government data sources such as the U.S. Census Bureau's *American Community Survey* and *New Residential Construction* data series, independent research reports, journal and magazine articles, and reports published by industry organizations such as the American Council for an Energy Efficiency Economy (ACEEE). We also reviewed utility and manufacturer online and printed marketing materials for alternative technologies, including tankless and heat pump water heaters.

We include a complete list of literature resources in Appendix B: References.

3.3 Supply Side Research

We conducted supply side research using a combination of the following quantitative and qualitative data collection techniques. The diversity of respondents characterizes the market and reveals supplier attitudes and behaviors.

TABLE 3.1: SUPPLIERS SAMPLE DISPOSITION AND COMPLETES BY DATA COLLECTION MODE

	Manufacturers		Retailers/ Wholesalers/ Distributors		Installers	
Mode	Target	Completes	Target	Completes	Target	Completes
Online Surveys	25	0	125	0	150	11
Phone Surveys	25	2	75	102	100	101
In-Depth Interviews			5	10		
On-site interviews	-	-	7	6	3	3
Online Discussions	50 total suppliers	18 total suppliers				
Mystery Shopping	-	-	10	10	-	8

3.4 Consumer Side Research

We conducted consumer side research using a combination of the following quantitative and qualitative data collection techniques. Respondents provided quantitative and qualitative information to reveal consumer purchasing attitudes, behaviors and preferences.

TABLE 3.2: EXPERTS AND HOMEOWNERS SAMPLE DISPOSITION AND COMPLETES BY DATA COLLECTION MODE

	Experts		Recent Purchasers		Potential Purchasers	
Mode	Target	Completes	Target	Completes	Target	Completes
Online Surveys	-	-	500	66	500	740
Phone Surveys	-	-	150	33	150	267
In-Depth Interviews	5	16			5	8
On-site interviews	-	-	10 (total)	4		4
Online Discussions	-	-	50 total consumers	17 total consumers	-	-

Appendix H includes tables with detailed information about supply side and consumer side survey methods.

3.5 Combined Research

We attempted to engage consumers and suppliers in discussions, using a combination of proprietary and popular networks such as LinkedIn, Facebook, and Twitter. The purpose of the method was to reach willing, qualified participants who use non-traditional communication and buying channels. Though we used online and offline techniques to recruit participants, the participant group of 25 registered participants and 215 inactive social network followers did not result in any significant findings.

Verinnovation integrated the data from all sources. We cross-tabulated and cross-referenced the data from all collection modes to chart the validity of our research techniques against the secondary research market findings. We used a weighting system to characterize all qualitative data for validity and reliability.

3.6 Sample Disposition

We selected the sample frame to include the following: supply side actors, homeowners, and industry experts. We divided the sample to reflect population breaks for each of the four states in the region. A chart with population statistics can be found in Appendix F.

3.7 Considerations

A demographic analysis shows sharp differences between online and phone respondents. The phone group was older than the typical Northwest resident, but close to the Northwest average for both income and education. In contrast, the online respondents were approximately five years younger than the phone group, had roughly four additional years of schooling, and made about $24,000 more per year than the phone respondents.

In addition to online discussions, we missed target participants on 10 out of 21 data collection modes. We have included more information and list all study considerations in Appendix C.

4.0 Findings

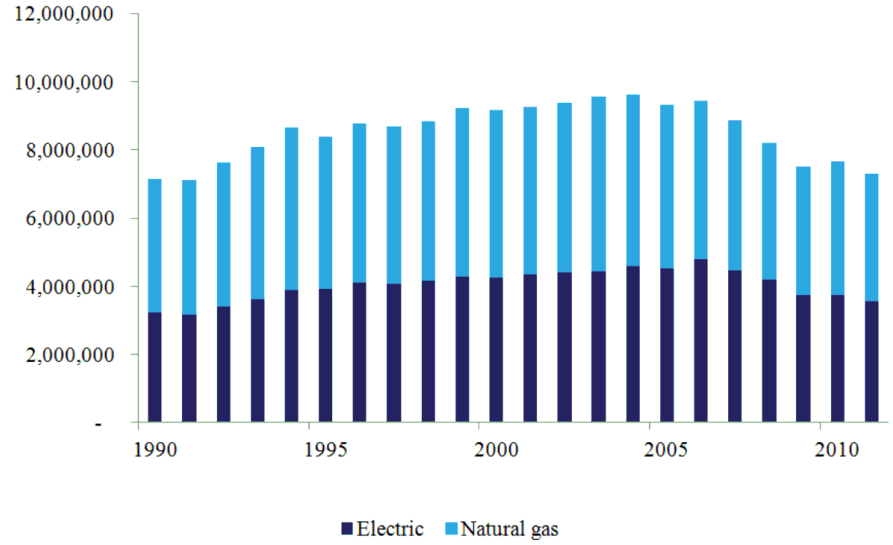
We based the following findings on a cross reference of primary and secondary research sources. We use footnotes to call out secondary sources and to reference the data table and appendix associated with each illustration from our primary research.

4.1 Market Characterization

4.1.1 National and Regional Market Size and Share Estimates

Nationwide sales of standard electric storage water heaters — the dominant type of water heater sold in the United States — totaled 7.7 million units in 2010, a 20 percent decline from the peak of 9.6 million units sold in 2004. Preliminary 2011 data suggests that the slump in the water heater market continues, with sales through August 2011, running four to five percent below their 2010 pace (see the last bar in Figure 4.A for 2011 estimate.)

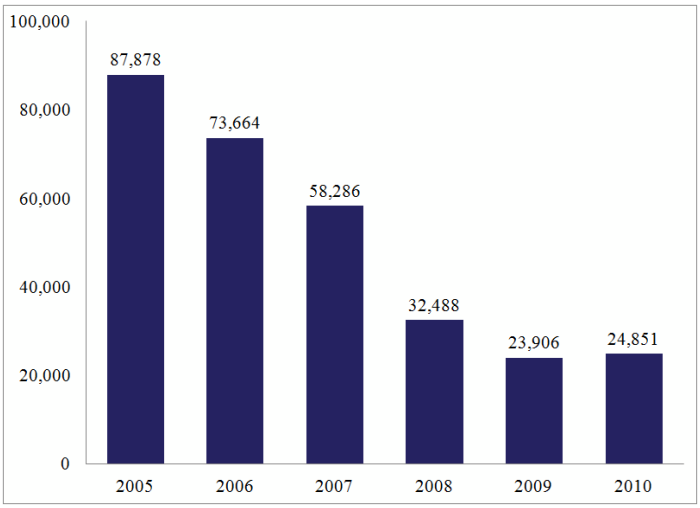
FIGURE 4.A. U.S. SALES OF STANDARD ELECTRIC & NATURAL GAS WATER HEATERS, BY YEAR[5]



Most of the decline in water heater sales follows the collapse in new home construction. Nationally, total housing starts fell from 2.1 million new units in 2005 to just 587,000 in 2010. Across the four Northwest states, annual building permits for new single-family homes fell by more than 72 percent between 2005 and 2010. Water heater sales fared better thanks to sales to existing, aging building stock, posting a decline of 18 percent from 2005 to 2010. Preliminary data suggest that housing construction remains sluggish, with Northwest housing permits for January 2011 to August 2011 roughly 10 percent lower than the same period in 2010.

[5] Source: Air Conditioning, Heating, and Refrigeration Institute, "Historical Research Data." 2010. http://www.ahrinet.org/historical+data.aspx. Note that 2011 sales estimated from January-August data.

FIGURE 4.B. PERMIT AUTHORIZATIONS FOR PRIVATELY OWNED SINGLE-FAMILY HOUSING UNITS, NORTHWEST STATES[6]



When residential construction peaked in the mid-2000s, new homes accounted for more than 20 percent of the total residential water heater market. But with the collapse in new construction, that figure dipped to roughly 7 percent.[7]

TABLE 4.1. ESTIMATED U.S. WATER HEATER SALES, BY REASON FOR PURCHASE[8]

Reason for purchase	2005	2010
New construction	21%	7%
Planned	28%	30%
Poor performance	20%	25%
Failure	31%	37%

In some regions of the Northwest, new construction accounted for as little as 5 percent of residential water heater sales in 2010. Nonetheless, the smaller retailers and independent installers we surveyed stated that new construction still represents roughly 13 percent of their sales (see Table 4.2).

[6] "US Census Bureau New Residential Construction, Historic Annual Building Permit Data by State," http://www.census.gov/const/www/newresconstindex_excel.html

[7] Authors' calculations, corroborated by "A.O. Smith 2010 Annual Report," http://www.aosmith.com/WorkArea/linkit.aspx?LinkIdentifier=id&ItemID=769&libID=776.

[8] "Poor Performance vs. Failure," in ENERGY STAR Water Heater Market Profile, http://www.energystar.gov/ia/partners/prod_development/new_specs/downloads/water_heaters/ Water_Heater_Market_Profile_2010.pdf
New construction estimated from "U.S. Census Bureau New Residential Construction," http://www.census.gov/const/www/newresconstindex.html Failure rate for existing units was assumed to be constant between 2005 and 2010.

TABLE 4.2. RETAILER AND INSTALLER ESTIMATES OF NEW CONSTRUCTION VS. REPLACEMENTS[9]

Comparison of Sales to New Construction and Replacement				
Market	Installers (Online)	Installers (Phone)	Retailers	**Average**
New Construction	12%	17%	8%	13%
Replacement	88%	83%	92%	87%
Respondents (n)	*12*	*101*	*85*	*198*

SI22 a, b; SR8, 9. What percentage of water heater installations/sales are for new construction? Replacements?

Northwest retailers and plumbing supply houses sold roughly 326,000 residential water heaters in Washington, Oregon, Idaho, and Montana combined in 2010 (see Table 4.3.) These estimates account for new residential construction permits issued and the number of houses built in each jurisdiction, coupled with national estimates for replacement rates, adjusted for national sales and housing construction totals.

TABLE 4.3 ESTIMATED WATER HEATER SALES BY STATE, REGION AND THE U.S., 2010.[10]

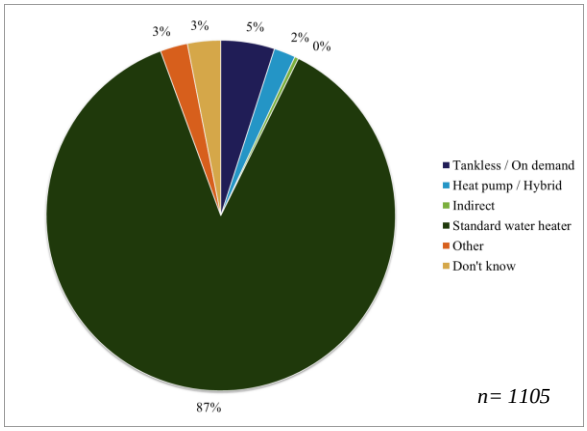
Estimated water heater sales, 2010*	
Idaho	40,000
Montana	28,000
Oregon	94,000
Washington	164,000
Northwest	326,000
United States	7,655,000

The unusually high share of electric water heaters in the Northwest represents one potential source of error in this estimate in this market estimate. Both anecdotal evidence and an analysis of the U.S. Energy Information Administration (EIA) 2005 Residential Energy Consumption Survey (RECS) suggest that electric water heaters have a slightly longer average lifespan than gas water heaters. Given the Northwest's high reliance on electric water heaters, longer life spans for electric water heaters could mean fewer replacement sales and lower overall sales in the Northwest than Table 4.3 suggests.

On the other hand, our online survey of recent water heater purchasers and information from installer surveys suggest that sales of alternative water heaters such as heat pump and tankless models are on the rise. Air-Conditioning, Heating, and Refrigeration Institute (AHRI) excludes both tankless and heat pump water heaters from their sales figures. Sales of non-standard water heaters may increase Northwest sales above the level shown in Table 4.3. The respondents in our survey revealed that 87 percent of them have a standard water heater.

[9] See Table S-13 in Appendix E.
[10] Figures are approximate. Data sources include Census Surveys of Housing and Residential Construction, statistics from the Air-Conditioning, Heating, and Refrigeration Institute, and estimates of water heater replacement rates.

FIGURE 4.C. WATER HEATER TYPE AMONG HOMEOWNER SURVEY RESPONDENTS[11]



HR7, HP4. Which type of water heater do you have now?

4.1.2 Market Shares by Manufacturer and Brand

The most recent national estimates of water heater manufacturer market share for the U.S. (from 2008) show that three manufacturers dominate the market: A.O. Smith, Rheem, and Bradford White. A.O. Smith has captured 46 percent of the U.S. water heater market (see Table 4.4). Rheem-Ruud falls close behind, with 37 percent. Bradford White, which focuses on wholesale trade and has essentially no retail presence, trails the two sales leaders, focusing its sales efforts on wholesalers and contractors.[12] The three manufacturers market their products under dozens of different brand names.

TABLE 4.4 ESTIMATED WATER HEATER MANUFACTURER MARKET SHARES[13]

	2001	2005	2008	Estimated 2010 Northwest Sales
AO Smith-State-American	45%	42%	46%	150,000 (46%)
Rheem-Ruud[14]	41%	40%	37%	121,000 (37%)
Bradford White	14%	17%	13%	42,000 (13%)
Others[15]		1%	4%	13,000 (4%)

This table reflects the most recent national sales data scaled to match our estimates of Northwest sales. We were unable to obtain regional sales figures from manufacturers, major retailers, and many plumbing supply houses.

[11] See Table H-02 in Appendix D.

[12] "You would not find our water heaters at the local retail center…," on Bradford White website, http://www.bradfordwhite.com/about.asp.

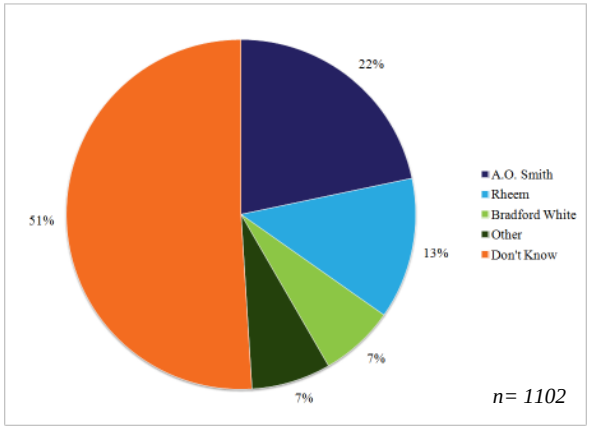
[13] Sources: Market share for 2001 from *Appliance Magazine — A Portrait of the U.S. Appliance Industry*, Sept. 2002 (as reported in *Assessment of the Residential Water Heater Market in the Northwest, Market Research Report, 06-158*, Northwest Energy Efficiency Alliance, July 2006.), with A.O. Smith and American Water Heater combined. Market share for 2005 from *Assessment of the Residential Water Heater Market in the Northwest, Market Research Report, 06-158*, Northwest Energy Efficiency Alliance, July 2006. Market share for 2008 from "32nd Annual Portrait of the U.S. Appliance Industry," *Appliance Magazine*, September 2009. Northwest market sales should be viewed with particular caution; these figures represent national brand shares scaled to the Northwest.

[14] Numbers include standard tank units sold under the GE brand.

[15] Numbers include high efficiency units manufactured by Air Generate and GE. Air Generate has not reported sales numbers in any of the sources identified in this study. Based on market share calculations, Air Generate and GE represent an estimated total of 0.3 to 0.5 percent of the overall market share, based on estimated sales of 1,000 to 1,600 units in the Northwest.

The majority of homeowners we contacted, including many who had purchased their water heaters within the previous year, could not name the brand of water heater that was currently in their home. This and other pieces of evidence suggest that consumers are disengaged from water heater decisions. Among homeowners who were able to identify their water heater brand, Rheem and A.O. Smith together account for the large majority of water heaters currently installed, with Bradford White trailing — similar to the national market positions. Since Rheem and A.O. Smith market water heaters under dozens of different brand names, many of the water heater brands listed as "other" may actually have been manufactured by one of these two companies.

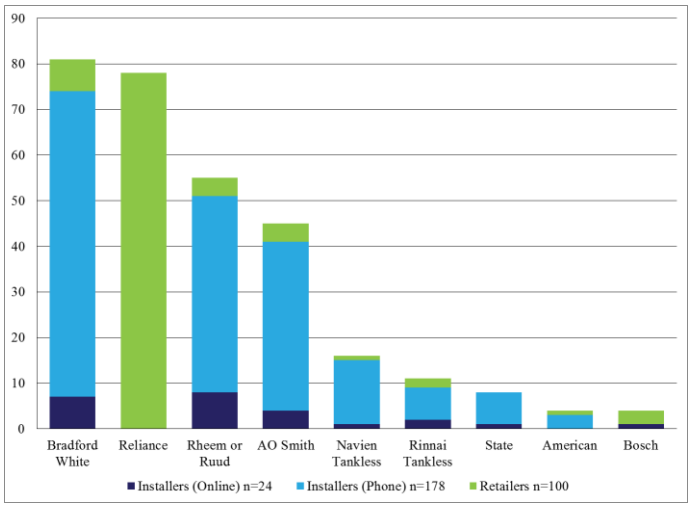
FIGURE 4.D. MANUFACTURER INSTALLED BASE AMONG HOMEOWNER SURVEY RESPONDENTS.[16]



HR8A, HP6. What brand of water heater do you have?

Among installers who responded to our surveys, Bradford White was the clear sales leader. Bradford White focuses exclusively the wholesale market, eschewing the retail market entirely. Among retailers who responded to our surveys, Reliance was far and away the leading brand. (See Figure 4.E.) Note that A.O Smith manufactures water heaters marketed under the Reliance, State, and American brands. Rheem manufactures GE brand standard water heaters.

FIGURE 4.E. TOP BRANDS FOR SUPPLIERS BY RESPONDENT TYPE[17]



SI8, SR7b. Which are your two main water heater brands?

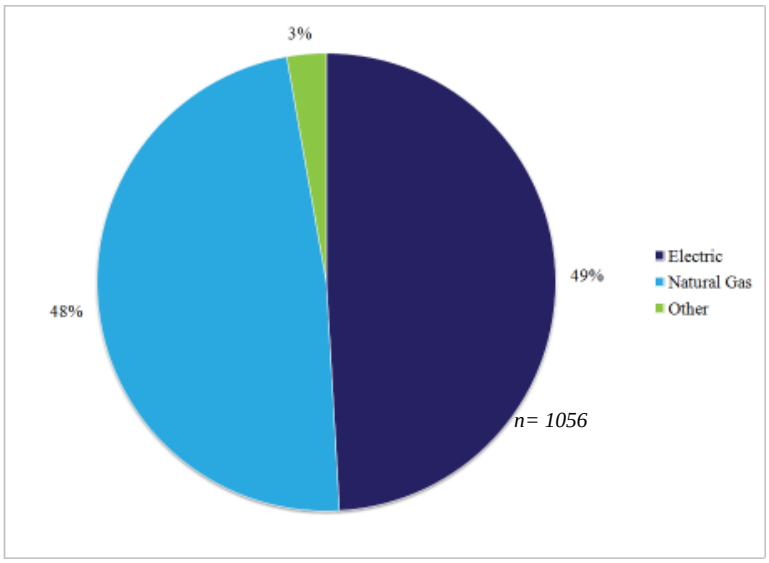
[16] See Table H-04 in Appendix D.
[17] See Table S-06 in Appendix E.

4.1.3 Market Share by Fuel

Nationally, 52 percent of American homes use natural gas as the primary water heating fuel source, 41 percent of homes use electricity, and 7 percent use propane, fuel oil, or another fuel.[18] But in the Pacific Northwest — with its long history of low electricity prices — electric models remain the norm. Recent federal data suggests that roughly 61 percent of Northwest homes use electricity as the primary water heating fuel.[19] Similarly, supply side actors who responded to our phone surveys indicated that 59 percent of water heaters sold were electric models.[20]

Among our total sample of homeowner and supplier respondents, however, electric models roughly equal gas models.

FIGURE 4.F. WATER HEATER FUEL TYPE[21]

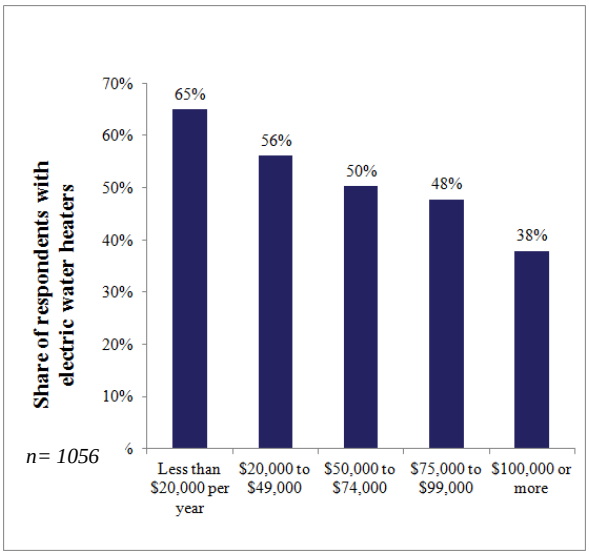


HR9, HR7A, HP4A, HP5. What type of fuel does your water heater use now?

Our homeowner surveys showed a marked demographic split. Respondents to our phone survey leaned heavily towards electric water heaters, while a majority of our online survey respondents reported using natural gas as their primary water heater fuel. Online survey respondents reported higher incomes than phone respondents, revealing a clear correlation between higher household incomes and lower reliance on electricity for heating water (see Figure 4.G.)

[18] *Residential Energy Consumption Survey*, U.S. Energy Information Administration (EIA), 2009.
[19] Estimated from *Residential Energy Consumption Survey*, EIA, 2009, "Number of Natural Gas Consumers (residential)," EIA, and *American Community Survey*, U.S. Census Bureau
[20] See Table S-07 in Appendix E.
[21] See Table H-01 in Appendix D.

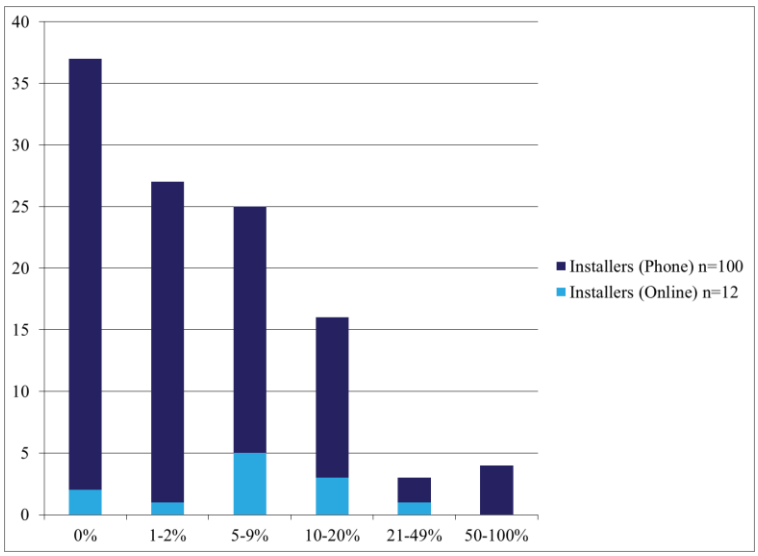
FIGURE 4.G. TOTAL HOMEOWNER RESPONDENTS WITH ELECTRIC WATER HEATERS, BY INCOME



HR9, HR7A, HP4A, HP5. What type of fuel does your water heater use now?

Our survey of water heater installers found that seven percent of reported installations included a shift from electric to gas (see Figure 4.H.) However, our installer sample may have been tilted towards both gas water heaters and tankless models, so these findings may overstate the actual pace of fuel switching in the population as a whole.

FIGURE 4.H. NUMBER OF INSTALLS REPLACING ELECTRIC WITH GAS[22]



SI10. What percentage of your total water heater installations includes replacing an electric water heater with a gas unit?

Similarly, our online surveys (though not our phone surveys) showed some fuel switching from electric to gas among recent purchasers. Phone survey respondents, who tended to be older, more cost-conscious and less technologically savvy than online respondents, reported little fuel switching.[23]

[22] See Table S-08 in Appendix E.

[23] The online respondent pool was biased toward younger, better educated and more affluent households.

TABLE 4.5. RECENT PURCHASERS WHO SWITCHED FUELS[24]

Recent Purchasers Who Switched Fuels				
	Switched to			*Respondents (n)*
	Gas	Electric	Other	
Recent (Online Survey)	8	3	1	*66*
Recent (Phone Survey)	1	2	0	*33*
Grand Total	9	5	1	*99*
Total Share	9%	5%	1%	

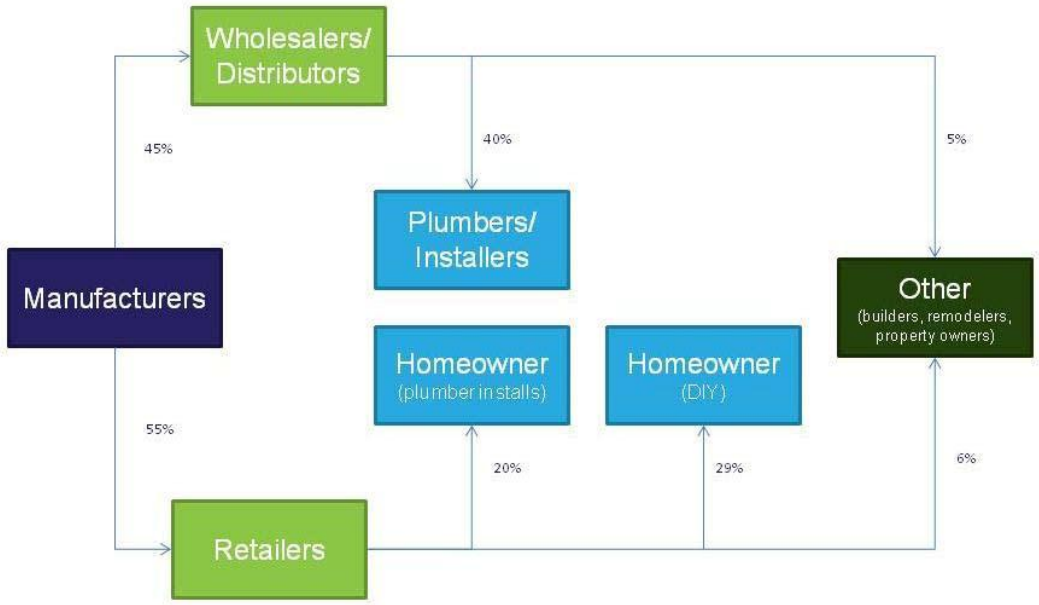
HR10 vs. HR9. What fuel did you use for your OLD water heater? vs. What type of fuel does your water heater use now?

From the available evidence, we conclude that net fuel switching for replacement installations in the Northwest is modest — consistent with national evidence — but to the extent that it does occur, it favors a shift from electric to gas, particularly for installations of gas tankless units among more affluent households.

4.2 Market Structure and Relationships

The decline of housing construction and the sputtering national economy shifted the structure and relationships on the supply side of the market. Previous studies estimated that water heater sales were split roughly 50/50 between the retail and wholesale markets. But with the collapse of sales for new housing, our research shows that retail sales gained prominence in the overall supply chain, particularly the big box retailers.

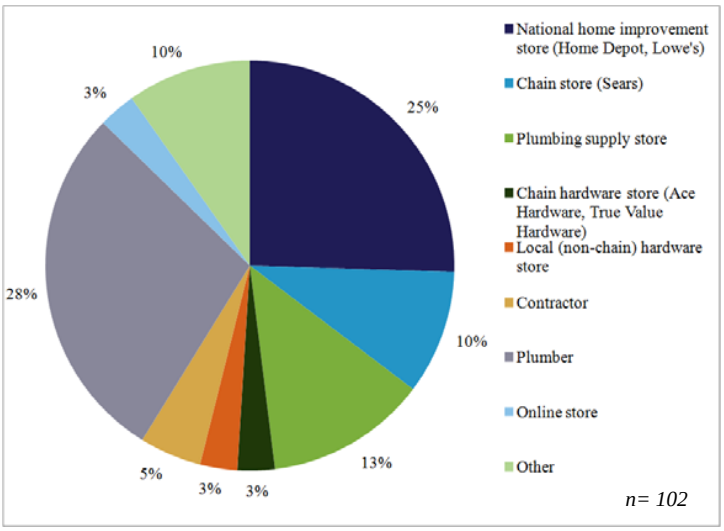
FIGURE 4.I WATER HEATER MARKET SUPPLY CHAIN 2011 ESTIMATE[25]



[24] Refer to Tables H-34 and H-34A in Appendix D.
[25] Estimated from new construction trends, supply chain surveys, and secondary sources.

Among recent purchasers interviewed, six times more respondents purchased their water heaters from one of the big three retailers (Home Depot, Lowe's, and Sears) than from smaller chain and independent hardware stores (such as True Value, Ace Hardware). Distributors trailed the big three by nearly 23 percentage points (See Figure 4.I).

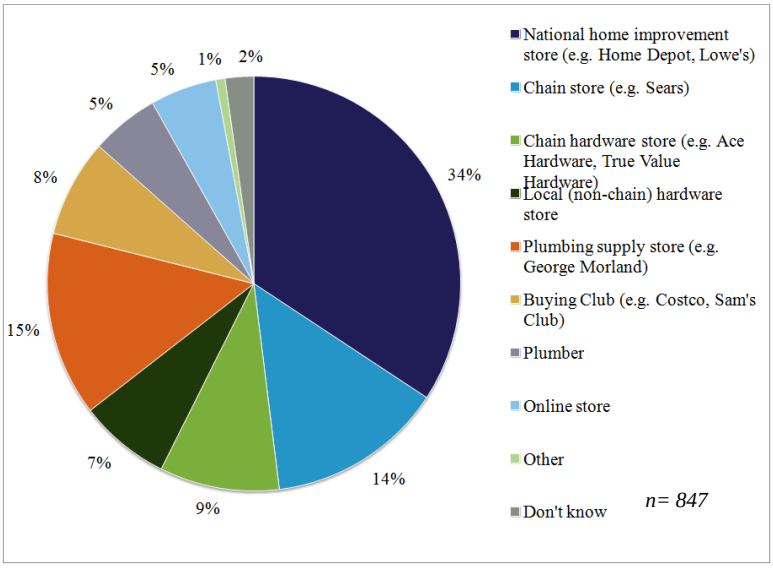
FIGURE 4.J. POINTS OF PURCHASE BY RECENT PURCHASERS[26]



HR16. At what type of store was the water heater purchased?

Though 33 percent of recent purchasers purchased their water heaters from installers (contractors and plumbers), only 5 percent of potential purchasers stated that they would prefer working with a plumber or contractor. Among all potential purchasers — including both online and phone surveys — nearly three times as many respondents suggested that they would shop at one of the big three retailers than a hardware store.

FIGURE 4.K. PREFERRED POINTS OF PURCHASE BY POTENTIAL PURCHASERS[27]



HP9B. What kind of store(s) would you visit?

[26] See Table H-05 in Appendix D.
[27] See Table H-29 in Appendix D.

Nationally, the decline in planned water heater purchases gives a relative market share advantage to plumbers, contractors, and retailers who cater to emergency water heater replacement. The suppliers we surveyed reported that 61 percent of their sales and installs address emergency replacements (see Table S-14 in Appendix E.) The recent purchasers we surveyed show that 57% of purchases resulted from pre-planning.[28] The difference between the supplier and the recent purchaser survey respondents could reflect two different view points. For consumers, emergency replacements only included a sudden failure. In supplier surveys, respondents did not clarify how they defined an emergency replacement.

Compared with NEEA's experience with their 2006 water heater market report, water heater manufacturers and retailers treated sales and marketing data as closely-held trade secrets. Industry observers mentioned trends towards greater secrecy. *Appliance Magazine*, which formerly published annual water heater manufacturer market share estimates, discontinued that publication — in part because appliance manufacturers expressed more reluctance to share sales data with the general public.[29] Similarly, we did not access significant water heater sales data from manufacturers and retailers. Our research participants and industry reports confirm that the economic downturn increased risk aversion and information retention.

4.2.1 Manufacturer Trends

With just a few manufacturers responding, many of the findings for manufacturers originate from secondary research and are included in section 4.1 of this report. Since 2006, the U.S. water heater manufacturing sector continued a long-standing trend of increasing market consolidation. In 2006, A.O. Smith purchased GSW, the parent company of American Water Heater Company, which commanded 17 percent of the U.S. residential water heater market the prior year.[30] With that acquisition, A.O. Smith vaulted to a clear lead in national market share (see Table 4.3, above). In 2010, the company entered into a joint venture with Japanese company Takagi to market and manufacture tankless water heaters in the U.S. In August of 2011, the company completed its acquisition of competitor Lochinvar, which manufactured commercial and residential water heaters and boilers used in hydronic heating systems.[31]

4.2.2 Findings from Distributors and Wholesalers

Many distributors and wholesalers (known as plumbing supply houses) sell directly to the public and/or offer installation services. We designed the retailer surveys with distributors and wholesalers in mind, but installer data points also include their survey responses, as some classified themselves as installers instead of distributors (per SIC and NAICS codes).

An important note for this report: among major Northwest plumbing supply houses, Ferguson operates the most Northwest outlets. Its parent company, Wolesley PLC,

[28] See Figure H-06 in the Consumer Purchase Behavior section of this report. Table H-06 in Appendix D includes more detail.
[29] Market share for 2001 from *Appliance Magazine — A Portrait of the U.S. Appliance Industry*, Sept. 2002 (as reported in *Assessment of the Residential Water Heater Market in the Northwest, Market Research Report, 06-158,* Northwest Energy Efficiency Alliance, July 2006.), with A.O. Smith and American Water Heater combined. Market share for 2005 from *Assessment of the Residential Water Heater Market in the Northwest, Market Research Report, 06-158,* Northwest Energy Efficiency Alliance, July 2006. Market share for 2008 from "32nd Annual Portrait of the U.S. Appliance Industry," *Appliance Magazine*, September 2009.
[30] *Appliance Magazine*, as quoted in NEEA 2006 report.
[31] http://www.streetinsider.com/Corporate+News/A.+O.+Smith+(AOS)+Completes+Acquisition+of+Lochinvar+ Corporation%3B+Deal+Accretive+Starting+in+Q4/6746395.html

commands more than 20 percent of the national market, more than any other national company.[32] Keller Supply, second largest in the Northwest, recently ranked the nation's 20th largest plumbing supply wholesaler.[33] We list other significant Northwest plumbing suppliers in table 4.6 below.

TABLE 4.6. NUMBER OF STORES/OUTLETS OF TOP PLUMBING SUPPLY HOUSES IN THE PACIFIC NORTHWEST[34]

	Washington	Oregon	Idaho	Montana	Northwest
Ferguson	40	21	13	6	80
Keller	20	8	4	3	35
Johnstone	11	5	2	2	20
Consolidated	7	5	5		17
Pacific	9				9
George Morlan		9			9
Grover	1	3	3		7
Total, above	*88*	*51*	*27*	*11*	*177*

4.2.3 Findings from Retailer Interviews

Retailers provide consumers with direct access to water heaters and in some cases also offer installation services. Retailers often sell to the trade on behalf of consumers and provide referrals to installation partners. Small retailers and hardware stores comprised the largest percentage of respondents in our surveys (see Table S-104 in Appendix E).

On-site and in-depth interviews revealed that the experience level of salespeople with high efficiency technology varies greatly among retailers. According to our interviews, bigger players place more emphasis on price as a selling point. They leverage volume discounts and exclusive relationships on one or two brands. Conversely, smaller retailers compete on service, focusing on individual customers and selling the features and benefits of higher end, higher efficiency water heaters through sales training.

As with manufacturers, we found retailers reluctant to share detailed market share data. Two of the big three major retail chains, for example, declined to disclose sales information. However, based on the number of retail outlets in the Northwest, coupled with data from our homeowner surveys, Home Depot leads the market in retail water heater sales in the region (see Table 4.7).

TABLE 4.7. NUMBER OF RETAIL OUTLETS FOR THE TOP THREE NORTHWEST WATER HEATER RETAILERS.

	Washington	Oregon	Idaho	Montana	Northwest
Home Depot	45	25	11	13	94
Lowe's	37	13	8	5	63
Sears	40	33	12	8	93

[32] "Plumbing in the U.S.", IBISWorld Industry Report 23511b, June 2011
[33] http://www.kellersupply.com/div-residentialplumbing.html
[34] Sources: company websites and American Supply Association directory.

Note: Sears stores include major retail, mall, hardware, and outlet stores, as well as Sears Hometown stores, but exclude Sears auto centers, optical centers, and other smaller Sears-branded outlets.

Retail sales of new and replacement water heaters align with regional estimates of fuel types, as shown in Table 4.8.

TABLE 4.8. COMPARISON OF FUEL AND REPLACEMENT TYPE FOR RETAILERS

Comparison of Fuel and Replacement Type	
	Share
New Electric	6%
New Gas	2%
Replace Electric	69%
Replace Gas	23%
Respondents (n)	*95*

SR8, 9. What percentage of your gas/electric water heater sales are for new construction? Replacements?

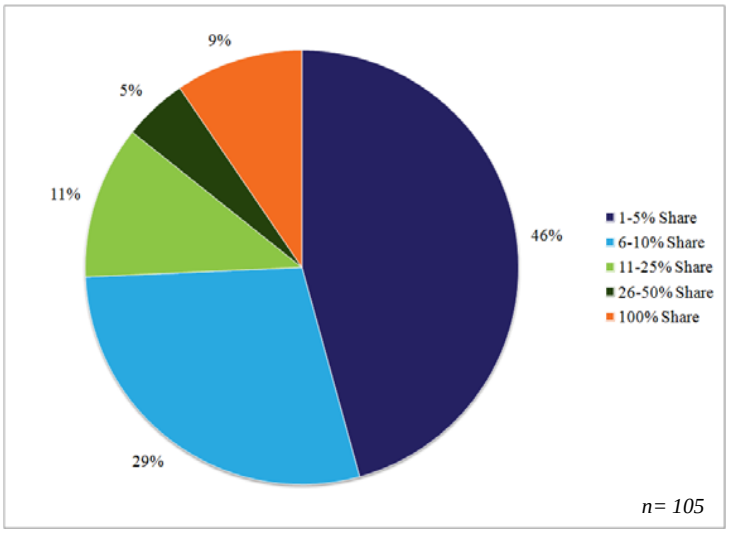
4.2.4 Findings from Installer Interviews

Among the supply side actors contacted for this study, installers delivered the most extensive sales and market data. Verinnovation reached the following installer groups:

- Independent plumbing contractors (approximately 80 percent of the market) who install water heaters as part of their services
- Water heater installation specialists (e.g. Fast Water Heaters)
- Plumbing contractors that also act as distributors (e.g. George Morlan, Grover, Rush)

For 75 percent of installers, water heaters make up 10 percent or less of their total sales and installation business.

FIGURE 4.L. WATER HEATERS AS PERCENTAGE OF TOTAL BUSINESS (INSTALLERS)[35]



SI7. What percentage do water heater installations make up of your total business?

[35] See Table S-05 in Appendix E.

Installers more often make recommendations to the consumer based on the consumer's characteristics and needs, and the plumber's own interests, in terms of expected profits revenues, the chances of getting the job, a lasting relationship with the client, and his reputation in general.

Installers resell more than 91 percent of the water heaters they install.

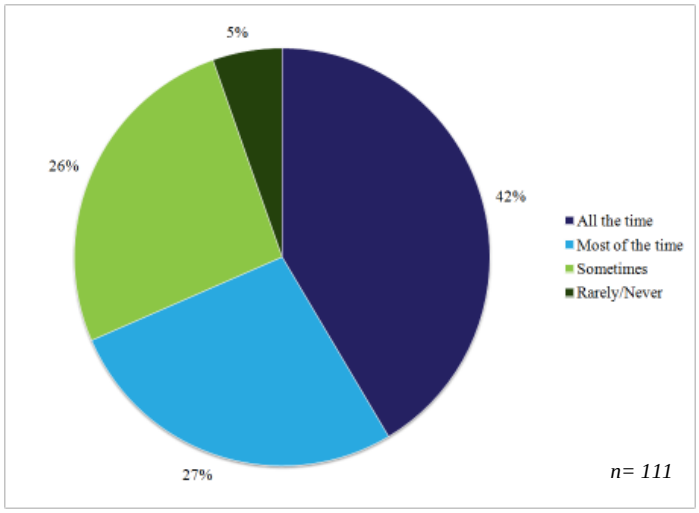
TABLE 4.9. INSTALLATIONS THAT INCLUDE RESOLD UNITS VS. DIRECT PURCHASE BY CONSUMER

Installations that Include Resold Units vs. Direct Purchase by Consumer			
	Resell	Direct	*Respondents (n)*
Installers (Online Survey)	91.0%	9.0%	*9*
Installers (Phone Survey)	91.3%	8.7%	*102*
Total Share	91.3%	8.7%	*113*

SI18a, b. What percentage of your installations are water heaters you resell to customers? What percentage of your installations are water heaters your customers purchase directly from retailers or distributors?

The vast majority of installers said that they discuss efficiency options with their customers. However, one of the installers we interviewed said that he discusses it "on occasion, when someone buys a high efficiency unit."

FIGURE 4.M. PERCENTAGE OF INSTALLERS WHO DISCUSS HIGH EFFICIENCY OPTIONS[36]



SI27. How often do you discuss energy savings and high efficiency appliances with potential water heater customers?

We learned through in-depth and on-site interviews that though installers know about newer water heater technologies, many found few chances to learn about them in depth because of the overwhelming standard water heater replacement workload. One of our study participants, Fast Water Heater Company, reported that 90 percent of their installations required replacing standard water heaters as quickly as possible. The three installers from our ride alongs at Fast Water Heater reported that 86% of installs resulted from an emergency. Installers spent their time updating their understanding about newer technologies on standard tanks, such as

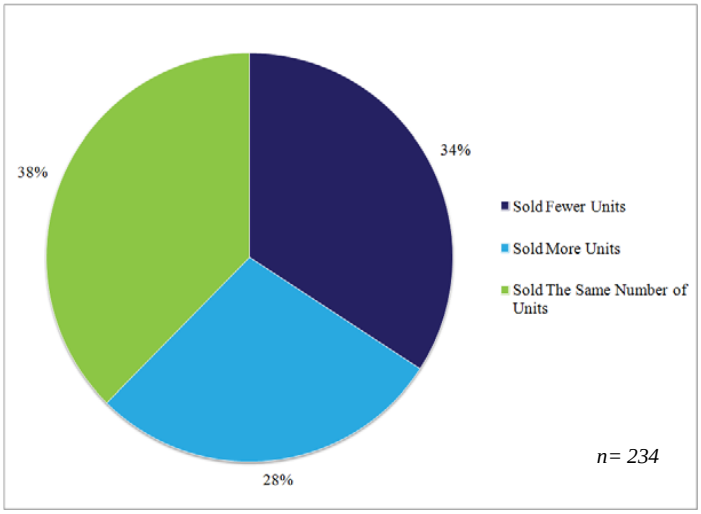
[36] See Table S-17 in Appendix E.

electronic ignitions or direct venting. One of the more experienced installers interviewed remarked that he preferred installing tankless units because they were more challenging, and he was not impressed by the performance of heat pump water heaters.

4.2.5 Reseller vs. Installer Perspectives

Overall, a majority of retailers and installers reported that they sold more or the same number of water heater units in 2010 as they did in 2009.

FIGURE 4.N. ANNUAL CHANGE IN WATER HEATER VOLUME FOR RETAILERS AND INSTALLERS, 2009 TO 2010[37]



SI5, SR3. Was this more or fewer water heaters than in the year before? By how many?

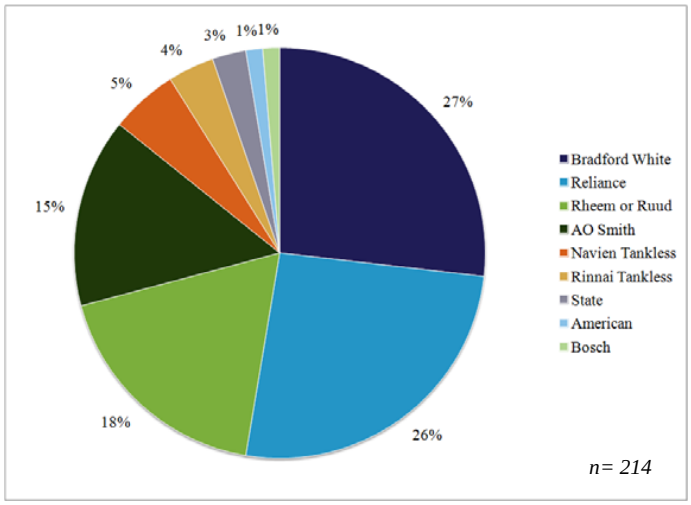
In-depth interviews with installers and suppliers revealed several themes that could affect sales of high efficiency water heaters for 2011 and beyond.

- **Resellers' priorities can conflict with installers'.** According to our qualitative research, resellers, including retailers, distributors, and wholesalers, want to sell high-margin products. Installers, however, prefer to find the best fit for their customers, and make a point of assessing customer needs and answering their technical and performance questions. Although 80 percent of installation professionals in the plumbing industry are independent,[38] many of them rely on subcontractor agreements with larger retailers. They then find themselves unable to discuss or promote models not supported by the retailer. The differences in perspectives about which models and options to promote surfaced 25 times in our qualitative interviews.
- **Inventory affects sales recommendations.** Resellers recommend the products they have in stock, either on the sales floor or in the back of the truck. According to the installers we interviewed in our three ride alongs, installers on emergency calls often carry a few units most often requested by homeowners. One installer said that he recommends "whatever is going to fit." One of our experts noted that "[w]ithout the efficient water heater on the truck, it doesn't matter what cost the model is."
- **Some installers wish for more product testing before roll-out.** In our in-depth interviews and mystery shops, we saw concern and skepticism about the rate at which new products were being rolled into market. Installers stated that they pay attention to factors that distress the customer and new technologies that don't work increase customer distress. In fact, minimizing

[37] See Table S-03 in Appendix E.
[38] ibid to IBISWorld Industry Report 42172.

customer distress levels showed up 60 times as a key theme in qualitative research. One supplier said that the popular "green theme" misleads customers because they can ultimately pay more due to failures and performance shortfalls of products that rush to market.

FIGURE 4.P. TOP BRANDS FOR SUPPLIERS BY MARKET SHARE[39]



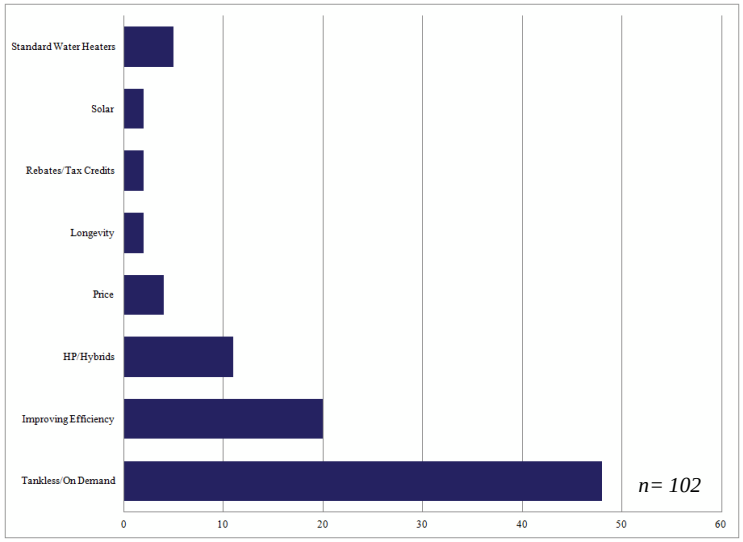
SI8, SR7b. Which are your two main water heater brands?

4.3 Market and Technology Trends and Barriers

4.3.1 Overall Market Trends

When asked to identify key market trends in the water heater industry, the retailers and manufacturers we surveyed singled out two key market trends: improving energy efficiency and tankless water heaters.

FIGURE 4.Q. NUMBER OF MENTIONS OF TOP WATER HEATER MARKET TRENDS, BY RETAILERS AND MANUFACTURERS[40]



SR16. What do you perceive are the latest trends in water heating products?

[39] See Table S-06 in Appendix E.
[40] See Table S-22 in Appendix E.

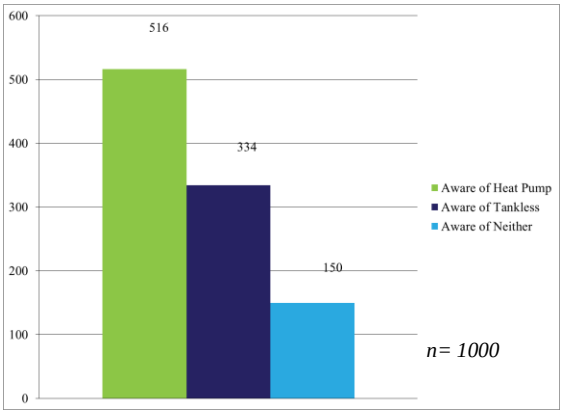
Interviews with industry experts supported suppliers' perceptions. Experts frequently cited energy efficiency as the most significant driver of change in the water heater market over the last five years, and the factor mostly likely to drive change over the next five to ten years. Since 2006, they said, the drive toward greater efficiency included:

- The introduction of many new energy-efficient water heater models
- The update of federal energy efficiency standards for water heaters, which will come into effect in 2015
- ENERGY STAR ratings for water heaters, giving utilities a respected benchmark for creating conservation rebates and incentives, while giving consumers a well-recognized designation for gauging water heater performance.

Similarly, both expert interviews and secondary research show that tankless water heaters lead in prominence. Other options, such as heat pump and/or solar water heaters, show up less often in the marketing materials, even though information shows that these units often have quicker paybacks and lower fossil fuel consumption than tankless units. A 61% increase from January 2004 to January 2011 in Internet search traffic for "tankless water heater" reflects growing consumer interest.[41]

When asked which high efficiency water heaters respondents recognized, 52 percent of all potential purchasers indicated awareness of heat pump water heaters. Thirty-three percent indicated awareness of tankless water heaters. Only 15 percent of potential purchasers indicated no awareness of any of the high efficiency options in our potential purchaser surveys. Though more consumers recognize heat pump water heaters in this study, tankless water heater sales outpace heat pump water heater sales by a factor of 13 (see Table 4.10).

FIGURE 4.R. AWARENESS OF HIGH EFFICIENCY WATER HEATER OPTIONS[42]



HP16. Are you aware of high efficiency water heaters such as…

4.3.2 Heat Pump Water Heater Trends and Barriers

Our research shows that though homeowners know about heat pump water heaters, adoption and sales remain low. Internet search statistics show that Oregon and Washington rank first and second, respectively, among U.S. states in the prevalence of online searches for the term "heat pump water heater." Among U.S. cities, Portland and Seattle rank first and third respectively for such searches.[43]

[41] Source: Google Insights for Search. www.google.com/insights/search/#q=tankless%20water%20heater&geo=US&cmpt=q.
[42] See Table H-17 in Appendix D.
[43] Source: Google Trends. http://www.google.com/trends?q=heat+pump+water+heater&geo=usa&sa=N.

For heat pump water heaters in particular, Internet search metrics suggest that people who search for heat pump water heaters seek product reviews and information on financial incentives.[44] These correlations (between product reviews and searches) suggest that a large segment of potential purchasers plan their water heater purchases — and that over the past few years, the federal energy efficiency tax credit and other financial incentives motivated these buyers. Sales representatives and installers in our interviews confirmed this trend, stating that when the tax credit ends, they expect high efficiency water heater sales to decline.

Though consumers are searching for heat pump water heaters, a mere 18 percent of suppliers offer them.[45] Our research shows a consumer preference for standard water heaters and the need for supplier education. Among the suppliers we surveyed, tankless water heaters outsell heat pump water heaters by more than eight percentage points.

TABLE 4.10. SHARE OF SALES BY WATER HEATER TYPE[46]

Share of Sales by Water Heater Type				
	High Efficiency Water Heater Type			
	Tankless	Indirect	Heat Pump	*Respondents (n)*
Installers (Online)	29.7%		1.4%	*12*
Installers (Phone)	13.3%	9.7%	1.0%	*96*
Manufacturers	27.5%	2.5%	5.0%	*2*
Retailers	2.4%	1.2%	0.2%	*98*
Overall Average	9.3%	5.3%	0.7%	*208*

SI12,13,13a, SR11, SM9,11. What percentage of your gas/electric water heater sales are tankless (or on demand)? Indirect units? Heat pump water heaters (also known as hybrid water heaters)?

We attribute the low sales percentage to lack of education about heat pump water heaters and the higher costs associated with purchasing one. Additionally, the low number of ENERGY STAR heat pump water heaters could be affecting sales. Nationally, 802 tankless models qualified for the ENERGY STAR rating as of October 2011[47], while only 35 heat pump water heater models qualify.

Among recent purchasers, 35 percent considered purchasing a heat pump water heater (see Table 4.11.)

[44] Source: Google Correlate. http://www.google.com/trends/correlate/search?e=heat+pump+water+heater&t=weekly#default,20. Google's Correlate service identifies search times that have similar patterns, both temporally and geographically, to a target query. Google Correlate identified the following queries as showing a strong temporal correlation with "heat pump water heater": "energy efficiency tax credit", "tax credit for energy efficiency", "energy rebates", "energy star tax credit", "star tax credit", "appliance tax credit", "water heater tax credit," and "energy tax credits." Similarly, searches for various terms associated with energy efficiency tax credits were strongly correlated with searches for efficient water heaters and water heater reviews. These correlations show that Internet users were searching for information on heat pump water heaters and energy tax credits at roughly the same times, and suggest that many searches for heat pump water heaters were motivated by an awareness of, and interest in, tax credits for efficient water heaters.

[45] See Table S-10 in Appendix E.

[46] See Table S-04 in Appendix E.

[47] http://www.energystar.gov/index.cfm?fuseaction=find_a_product.showProductGroup&pgw_code=WH

TABLE 4.11. RECENT PURCHASERS WHO CONSIDERED HEAT PUMP WATER HEATERS[48]

Table H-07: Recent Purchasers Who Considered Heat Pump Water Heaters			
	No	Yes	*Respondents (n)*
Recent (Online)	23	17	*40*
Recent (Phone)	17	5	*22*
Grand Total	40	22	62
Share	65%	35%	

HR12. Did you consider a heat pump water heater?

Forty-six percent of those who planned their purchase considered a heat pump water heater. Emergency replacements resulted in fewer purchasers considering heat pump water heaters, reducing that number to 31 percent.[49]

4.3.3 Tankless Water Heater Trends and Barriers

During the early to mid-2000s, a major advertising push boosted consumer awareness of tankless water heaters. Advertising focused on two premium features: "endless" hot water and improved energy efficiency. Both survey data and information gathered from Northwest plumbing websites suggest that tankless water heaters remain the most common "alternative" water heater in the Northwest market. Even so, tankless water heaters gained only a modest foothold in the region: according to the most recent federal data, as of 2009, only about two percent of homes in the Northwest use a tankless water heater.[50]

However, five percent of our surveyed homeowners claimed a tankless model as their primary water heater (see Figure 4.C. Roughly two percent of phone respondents reported tankless units, similar to the figures from the federal survey. But in the higher-income online survey group, six percent of households reported owning tankless units.

Home show exhibitors reported that utilities encourage customers to switch from electric to gas water heaters, further supporting the rise of tankless sales. Some installers reached by our phone survey specialized in tankless water heater installations, reporting 100 percent tankless unit installs. In-depth installer interviews suggested that installers trust Rinnai and Rheem most among tankless brands; newcomer Navien has shown a strong market presence, but installer confidence in the manufacturers' products was mixed.

In-depth interviews with homeowners, installers, and suppliers about tankless water heaters show several clear themes:

- **"Endless hot water" is a key selling point for tankless units.** Of the fifteen tankless promotional campaigns we reviewed, nine led with this message while only four led with the promise of improved efficiency. The theme of "reliable hot water" ranked 18th among the top themes discussed in all data collection modes in our study: it was mentioned 58 times. Suppliers reported that consumers, however, confused "endless" with "instant," and installers reported a high number of call backs for tankless units that suffered from long delays in producing hot water. New "hybrid" tankless units, such as Eternal's Condensing Hybrid, include a small one-to-three gallon reserve tank to bridge the gap.

[48] Also available as Table H-07 in Appendix D.
[49] See Table H-06B in Appendix D for more detail.
[50] *Residential Energy Consumption Survey*, U.S. Energy Information Administration, 2009.

- **Tankless installation requirements can increase costs.** When homeowners replace an existing electric tank water heater with a gas tankless, the installation costs are greater than for a heat pump water heater installation. Installers that we interviewed stated that a 1" to 1.5" gas line is optimal for most household uses. Gas line sizes in the average home are smaller than ¾". Tankless water heaters also require different ventilation systems than a standard gas water heater if they are installed inside. Most Rinnai tankless models we reviewed required custom ventilation piping.

4.3.4 Other High-Efficiency Water Heater Trends and Barriers

Our in-depth interviews and open-ended questions resulted in the following top ten themes that impact adoption of high efficiency water heaters (based on number of times discussed)[51]:

TABLE 4.12. TOP TEN THEMES FROM QUALITATIVE RESEARCH

Category	Theme	Score*	Rank
Supply Chain Insights	Supply-side actor processes and relationships	5.00	1
High Efficiency Barriers	The cost of heat pump water heaters is too high	4.74	2
Supply Chain Insights	Supplier education and training needed to improve market	3.90	3
Important Features	Rebates, incentives, and tax credits are important	3.47	4
Consumer Insights	Price of water heater is important	3.32	5
High Efficiency Barriers	Cost and complexity of installation	3.01	6
Water Heater Awareness	Consumers' lack of awareness of water heater	2.68	7
Marketing and Advertising	Marketing and advertising considerations	2.40	8
Fuel Type	Fuel type considerations impact the water heater market	2.09	9
Water Heater Awareness	Heat pump (or hybrid) awareness considerations	2.07	10

**Score based on a scale of 0 to 5, with 5 indicating the most talked about themes.*

This reference of all the key themes in our research revealed several overarching barriers to adoption of high efficiency water heaters:

TABLE 4.13. TOP BARRIERS TO ADOPTION OF HIGH EFFICIENCY WATER HEATERS

Theme	Score*	Overall Rank**
The cost of heat pump water heaters is too high	4.74	2
Cost and complexity of installation	3.01	6
Code complexity	1.86	11
Lack of overall education and awareness	1.25	23
Technical complexity	1.20	25
Technology and installation challenges of heat pump water heaters	1.07	28
Heat pump water heater performance	0.94	31
Unit location and location limitations	0.84	35
Space requirements for heat pump water heaters	0.82	37
Gas line pipe size is a consideration (for gas tankless installation)	0.59	44
Converting fuels is a barrier	0.56	45

***Overall ranking among the 47 top themes. These themes were discussed more than 20 times in our overall study.*

[51] See Table A-73, Most Significant Themes from All Qualitative Sources in Appendix F.

For high efficiency water heaters, both consumers and installers express skepticism about efficiency ratings. Based on in depth interviews, we found that both installers and homeowners question the accuracy of official efficiency ratings for water heaters. *Consumer Reports* reported skepticism about efficiency claims in October 2010.[52] Rinnai, Navien, and Rheem all offer 98-percent efficient models, yet real-world performance in the Northwest tends to fall short of the ratings. This shortfall stems from the relatively high temperature rise required for water heaters in the Northwest climate, which can hamper performance. Verification for this data can be seen in literature that discloses groundwater temperature performance data.

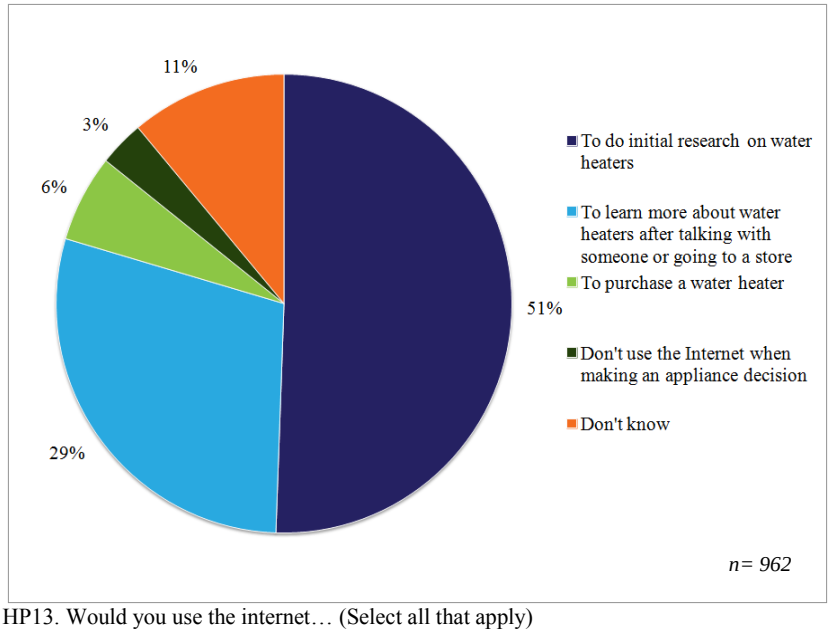
4.4 Consumer Behaviors and Attitudes

Phone and online surveys, coupled with evidence from in-depth interviews, strongly suggest that homeowners rarely think about their water heaters. More than half of survey respondents could not name their water heater brand. Even among homeowners who bought their units within the past year, 30 percent could not recall which brand of unit they had purchased. Some do not even know what fuel their water heaters use.

Similarly, our supply-side surveys show that retailers and installers believe that 30 percent of consumers start shopping for water heaters by looking for information on the Internet.[53]

Consumer surveys showed that homeowners are more likely to use the Internet to gather information about water heaters than to make water heater purchases (see Figure 4.S.)

FIGURE 4.S: WAYS POTENTIAL PURCHASERS USE THE INTERNET[54]



HP13. Would you use the internet… (Select all that apply)

Though our surveys showed that many homeowners regularly purchase common appliances

[52] "Water heaters: Cutting your hot-water bill just got easier," Consumer Reports, October 2010
[53] See Table S-23 in Appendix E.
[54] See Table H-31 in Appendix D.

and electronics online, retailers who responded to our survey report that, on average, only nine percent of water heater sales originate through retailer websites (see Table S-18, Appendix E).

4.4.1 Consumer Purchase Behaviors

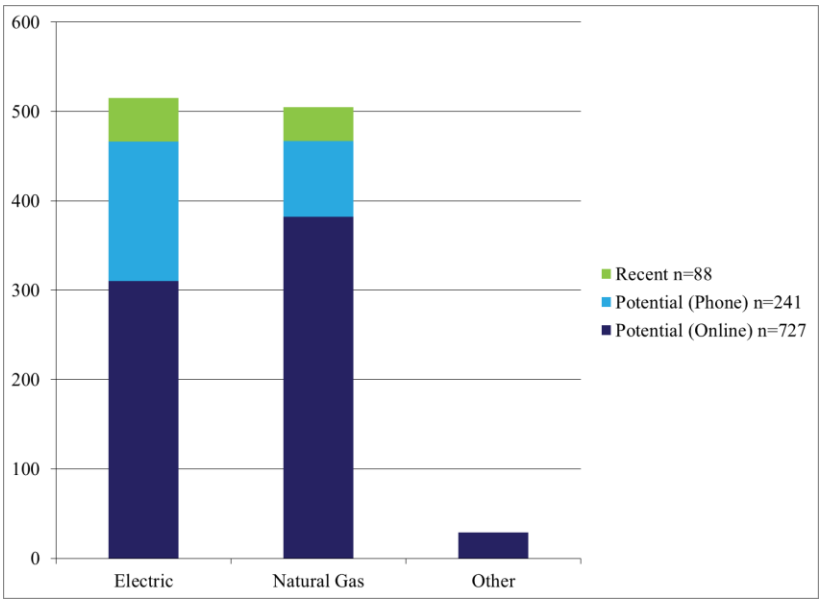
Consumer attitudes around spending and financing have changed since the onset of the 2009 recession. This change impacts water heater purchases. Although nationally 23 percent of water heater purchases are planned, this number is down from the peak of 40 percent of planned water heater purchases. The recent purchasers in this study showed a much higher percentage of planned replacements than the national average: 57 percent of their purchases were planned.[55]

The depth of the economic recession and uncertainty about job growth and credit stability created difficulty in predicting when homeowner attitudes will change.

The upcoming generation of home buyers express skepticism about homeownership and the "American dream." Homeownership is expected to drop a few percentage points in coming years.[56]

In efforts to conserve financial resources, homeowners keep their current fuel sources for their water heaters, although there is a slight growing trend for gas. Ten people in our recent purchaser surveys, roughly 10 percent, switched from electric to gas water heaters (see Figure 4.T).

FIGURE 4.T: WATER HEATER FUEL BY RESPONDENT TYPE[57]



HR9, HR7A, HP4A, HP5. What type of fuel does your water heater use now?

[55] See the Considerations section of the Appendix for further explanation See table H-06 in Appendix D for more detail.

[56] Gabriel, Stuart A. and Rosenthal, Stuart S., "Homeownership Boom and Bust 2000 to 2009: Where Will the Homeownership Rate Go from Here?" (July 14, 2011). Research Institute for Housing America Research Paper No. 11-03

[57] See Table H-01 in Appendix D.

Brand loyalty and awareness are low, except for ENERGY STAR. ENERGY STAR is the most recognizable branding. More than any manufacturer's brand, more consumers seek the ENERGY STAR label as a sign of trust and performance. In a 2010 national survey by the Consortium for Energy Efficiency (CEE), 83 percent of households recognize the ENERGY STAR label on sight. This is an increase from 77 percent in 2009.

TABLE 4.14. RECENT PURCHASER BRAND LOYALTY

Recent Purchaser Brand Loyalty		
	Total	Share
Bought Same Brand	5	15%
Switched Brand	18	55%
Don't Know	10	30%
Respondents (n)	*33*	

HR8B. Is this the same brand you had before? *Note this question was only asked on the Recent Purchaser Phone Survey.*

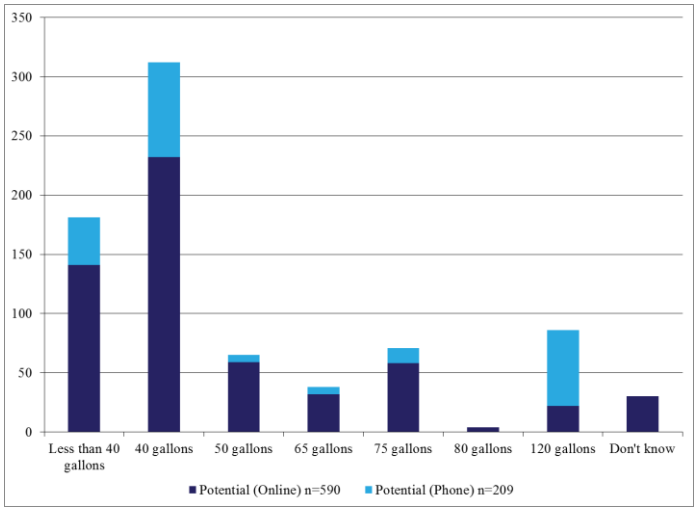
According to our expert and manufacturer interviews, when homeowners do think about their water heaters, they think of them as a plumbing fixture, not an appliance. Water heaters have been compared to stoves and refrigerators in terms of how to design and market to consumers.

Unlike refrigerators and stoves, water heaters occupy a different place in the consciousness of the consumer. The most important feature to homeowners is a hot shower. In fact, the theme appeared 147 times in conversations about other topics in qualitative data collection modes used by Verinnovation, sixty times more than the second highest theme, customer distress.

Hot water reliability becomes increasingly important with larger families. With a majority of the households in the U.S. being led by a single (unmarried) head of household[58], the size of the household, which is shrinking across the U.S., drives demands for water heating. If the market pushes more integration of water and space heating (as suggested by a number of industry experts), emphasis could shift from hot showers to consistent temperatures for whole house heating needs, changing the tank size preferences for residential water heaters (see Figure 4.U for current market tank sizes).

[58] Source: U.S. Census Bureau, 2010 Census. National statistic for households headed by singles calculated at 51.6% of the population. In the Northwest, 49.8% of households headed by singles. http://factfinder2.census.gov/

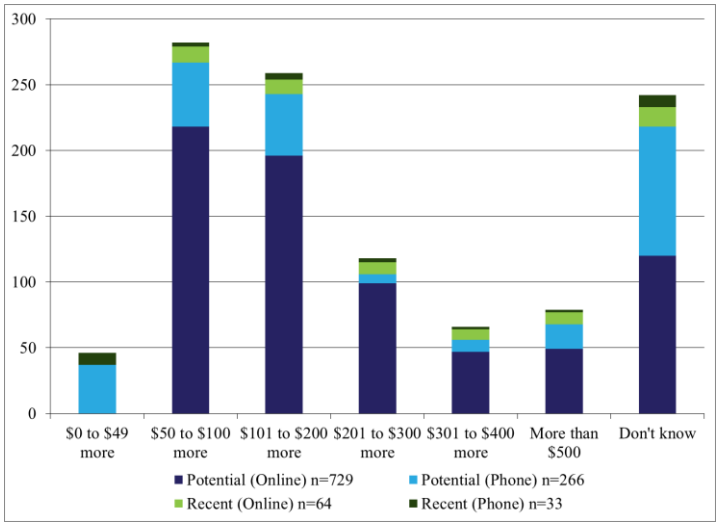
FIGURE 4.U. WATER HEATER TANK SIZE[59]



HP7B, HP4B. What is the tank size of the water heater you have now?

Consumers expressed little interest in premium features in this study. Participants reveal that the identifiable premium features they value include reliable hot water (26%) and energy efficiency (35%). Other features (11%) — programmable thermostats, vacation mode, electronic controls, smart grid and time-of–day availability — barely register as high priority items. Our survey participants rated energy efficiency an average of 4.4 on a 5-point scale, with 5 being "very important." They are, however, cautious about how they pay for higher efficiency (see Figure 4.V).

FIGURE 4.V. ADDITIONAL AMOUNT WILLING TO PAY FOR ENERGY STAR[60]

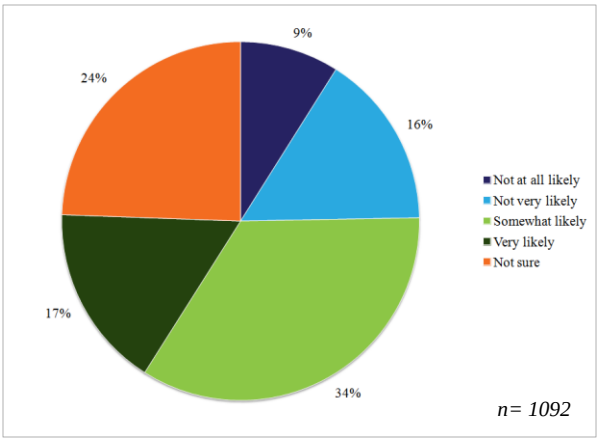


HR29, HP20. A new ENERGY STAR water heater saves you $200 every year on your annual fuel bill by heating your water more efficiently. They are manufactured by a leading water heater manufacturer and have the same tank life and warranties as your current water heater. Please tell me how much more, if anything, you would be willing to pay for the ENERGY STAR water heater I described?

[59] See Table H-03 in Appendix D.
[60] See Table H-9 in Appendix D.

Only 79 respondents (seven percent) said that they would pay an extra $500 for an ENERGY STAR water heater. When asked how likely they would be to pay $500 more for ENERGY STAR, 51% said somewhat or very likely (see Figure 4.W).

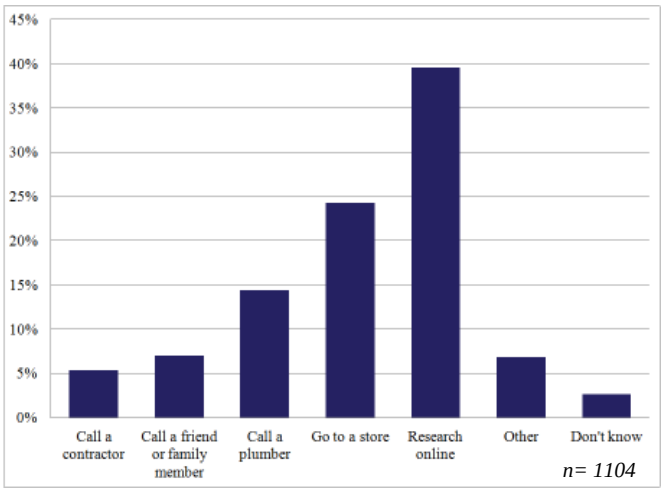
FIGURE 4.W. LIKELIHOOD OF PAYING $500 MORE FOR ENERGY STAR[61]



HR30, HP21. After taxes credits and rebates, the ENERGY STAR water heater costs $500 more than a standard water heater. If this water heater is available when you are shopping for your new water heater, how likely will you be to purchase it?

Our supply-side surveys, homeowner surveys, and reviews of Internet search metrics consistently reveal that, when considering a water heater purchase, a significant share of Northwest cconsumers research heat pump water heaters online (see Figure 4.X).

FIGURE 4.X. CONSUMER PREFERENCES FOR STARTING THE BUYING PROCESS[62]

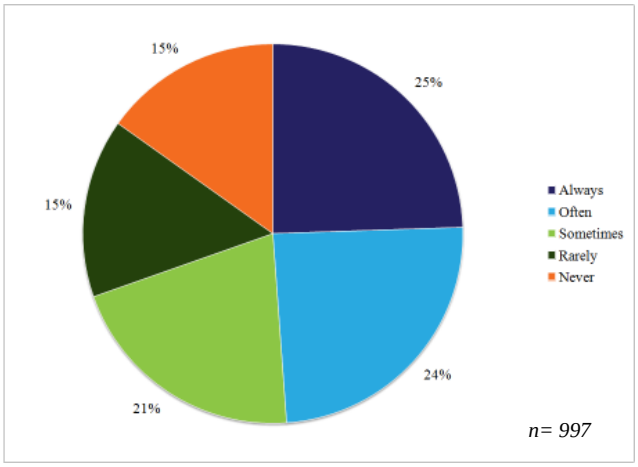


HR14, HP9. What would be the first step you would take to replace your water heater?

[61] See Table H-10 in Appendix D.
[62] See Table H-08 in Appendix D.

Homeowners do not purchase many water heaters online, but 70 percent of them research online prior to purchase (see Figure 4.Y).

FIGURE 4.Y. LIKELIHOOD OF ONLINE RESEARCH PRIOR TO PURCHASE[63]



HP14. How often do you research home appliance purchases on the internet?

The majority of recent purchasers bought their water heaters through a plumber (28%) or a national home improvement store (22%). Only three percent purchase a major appliance like a water heater online. A full 24 percent chose "other" as the place they prefer to purchase appliances. We did find, however, that older homeowners prefer shopping in stores (see Figure 4.J on page 15 and Table H-05 in Appendix D.)

4.4.2 Consumer vs. Supplier Perspectives

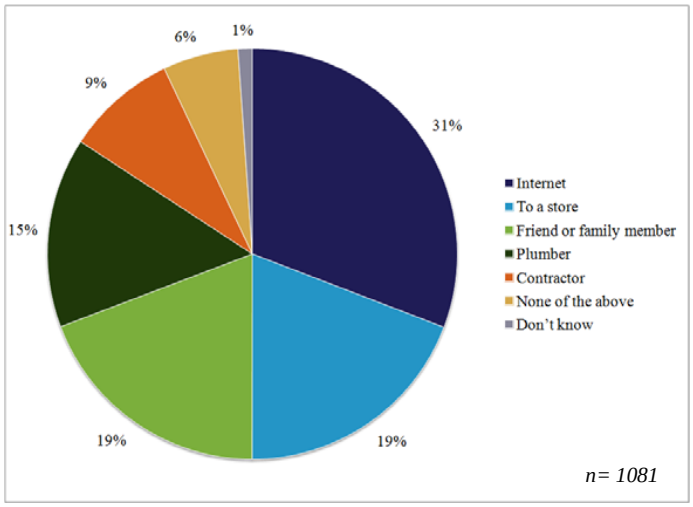
In-depth interviews with installers and suppliers revealed several themes.

- Technology choices and code compliance overwhelm many suppliers and consumers.
- Experienced installers keep pace with new technology. Many suppliers, however,reported limited time to stay abreast of ever-changing technologies and regulations.
- Consumers opt for what they know unless they conduct extensive research.

Figure 4.Z shows the resources that consumers trust when searching for purchase information.

[63] See Table H-28 in Appendix D.

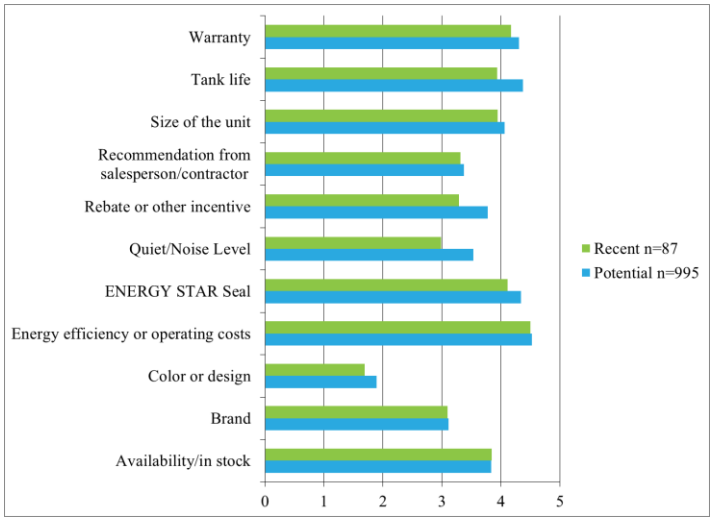
FIGURE 4.Z: TRUSTED SOURCES OF CONSUMER PURCHASE INFORMATION[64]



HR15, HP10. Would you also talk to or go to… (Please select all that apply)

The features that drive retailers and manufacturers — technology, high-tech controls, and design — often fail to translate to the concerns of the consumer. This can be attributed to a lack of consumer awareness about options and perception of the water heater as a rarely considered plumbing fixture.

FIGURE 4.AA. IMPORTANT FACTORS TO CONSUMERS WHEN CHOOSING A WATER HEATER[65]



HR22A-L, HP15A-L. Could you please tell me how important each of the following factors would be on a scale of 1 to 5 with 1 being "not at all important" and 5 being "very important".

[64] See Table H-33 in Appendix D.
[65] See Table H-11 in Appendix D.

4.5 Considerations and Recommendations to Improve Adoption

In this study, we set out to explore two sides of the market: the supply side and the consumer side. In the course of data collection and analysis, however, we revealed a third market actor: jurisdictional codes and regulations. Study participants brought up the impact of codes and regulations more than 64 times in our qualitative data collection, and survey participants cited it as a source of distress and unnecessary complexity.

Our supplier respondents stated that local and state codes drive up installation costs and increase educational prerequisites to install even a standard electric tank water heater. For example, building codes in Oregon require different clearance and seismic strapping for the various water heating technologies. As technology changes, the code requires updating and ongoing education by installers. In some cases, the code exempts parts of the requirements for like-for-like water heater replacements.[66] Others also noted that code changes impact the availability and usability of incentive programs and rebates. Supply side and consumer side responses led us to conclude that the various factors that impact water heater performance: climate zone, household size, current fuel supply, current home layout, among others, should be considered early in the sales process.

4.5.1 Promotional Considerations

Educating installers and consumers surfaced as a top priority among our research participants. Without advance information, emergency water heater replacements will continue to result in replacing a standard water heater with similar model with lower efficiency.

Though the sales of water heaters have dropped dramatically, installers and contractors who survived the economic downturn struggle to keep pace with standard tank replacements. They have taken on the workload of their former competitors. This market attrition helped 66 percent of installers sell either the same number or more water heaters in 2010 than in 2009.[67] Supply-side education consistently shows a gap for market adoption of high efficiency water heaters — its incidence occurs 72 times in qualitative interviews, ranks as one of the top 10 themes among barriers to adoption, and ranks number two among themes with suppliers. Customer distress coincided codes and regulations more than 60 times in qualitative interviews.

Supplier channels would benefit from added coordination. In some instances, we discovered that though 24 percent of consumers trust their plumbers or contractors, the installers find themselves limited regarding how much information about high efficiency and alternative water heaters they could share based on their relationship with retailers and referral partners. If consumers go to retailers first, they might miss the depth of expertise from an experienced installer for the best choice in their home situation.

In emergency situations, installers would benefit from having the flexibility to recommend higher efficiency options and carrying units on their trucks.

Advertising and online campaigns increase consumer awareness and therefore prepare the public for high efficiency solutions in emergency replacements. Consumers often don't

[66] As outlined in Chapter 5 of the Oregon Plumbing Specialty Code.
[67] See Table S-02 in Appendix E.

know what features and considerations to seek in water heaters, and they would benefit from clearer resources for quick, reliable information on best options for their region and climate. As we found in our mystery shops and in-store events, salespeople lack reliable, readily available information on incentives and rebates, product features and benefits, and how different technologies tie to consumer needs. By coordinating and consistently presenting the information, consumers receive reliable information.

4.5.2 Technology Considerations

The two most significant technology findings from this study relate to the learning curve and the cost of integration.

Approximately 71 percent of suppliers in our interviews mentioned that ever-changing technology without proper roll-out time deters adoption by both consumers and suppliers.

Often, the call-backs that installers get about high efficiency and alternative water heaters not performing as they should stem from improperly set controls and other manual tweaks that installers could have adjusted at original installation.

Research participants stated that new technology doesn't always easily plug into an existing home. One expert said that new construction, with its trend toward a smaller footprint, makes it difficult to integrate newer technologies like heat pump water heaters. These technologies not only have the unit size to consider, but also the accessories and installation requirements to meet code. Surrounding space requirements, space conditioning requirements, venting requirements, pipe sizes for incoming fuel supplies all impact the cost of the install of a high efficiency water heater.

TABLE 4.15. WATER HEATER COST COMPARISON (INCLUDING INSTALLATION)[68]

Brand	Type	Advertised Efficiency Rating	Estimated Minimum	Estimated Maximum
Navien	Tankless	98%	$4,000	$5,000
A.O. Smith	Tankless Hybrid	90%	$4,500	$5,000
Rinnai	Tankless	82%	$3,500	$4,500
A.O. Smith Vertex	Gas Water Heater	96%	$3,500	$4,500
State	Natural Vent Water Heater	58% to 67%	$1,000	$1,925
A.O. Smith Voltex	Hybrid Electric Heat Pump Water Heater	2.3 EF (230%)	$3,500*	$4,500*
State	Electric Water Heater	58% to 67%	$925	$1,575

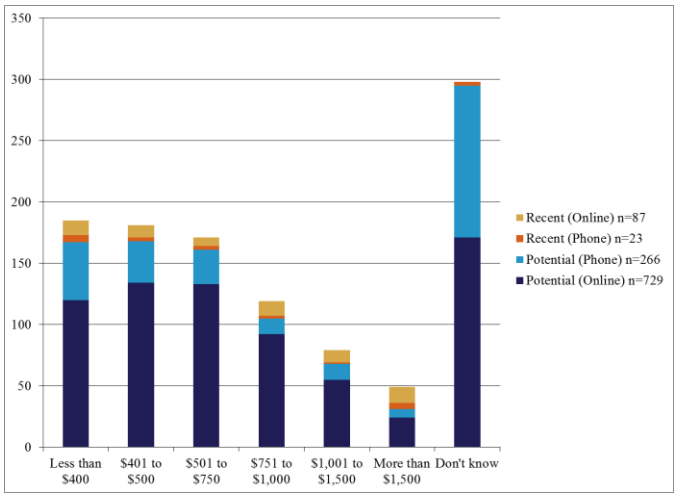
** Does not include the cost of any potential electrical upgrades*

[68] Data compiled from printed promotional materials for Northwest water heater suppliers. The brands listed include only those companies providing comparative literature at the Seattle Home Show. Suppliers representing other brands did not provide comparative literature with complete installation costs. All prices were published for comparison by consumers.

4.5.3 Pricing and Financing Considerations

Homeowners, both potential and recent purchasers, rated the importance of price as a 3.6 on a five-point scale, with 5 being most important. This finding was relatively consistent across consumer respondent groups[69]. Roughly a quarter of potential purchasers do not know what they should expect to pay for a new water heater. The majority of consumer respondents, however, expect to pay less than $1,000.

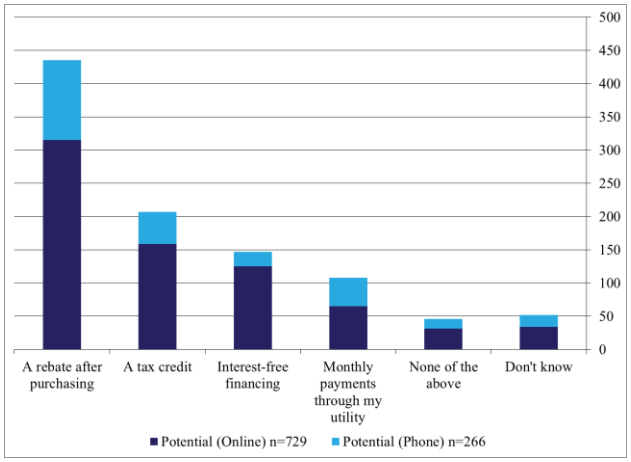
FIGURE 4.AB. COST EXPECTATIONS FOR NEW WATER HEATER (INCLUDING INSTALLATION)[70]



HP19. What do you expect to par for a new water heater unit, including any installation costs?

Homeowners prefer rebates just 2.7 percent less than all other financial incentives combined.

FIGURE 4.AC. PREFERRED FINANCIAL INCENTIVES FOR POTENTIAL PURCHASERS[71]



HP27. Of all the options available to motivate or encourage customers to purchase an energy efficient water heater, which of these is the most appealing to you?

[69] See Tables H-20 and H-20A in Appendix D.

[70] See Table H-19 in Appendix D.

[71] See Table H-22 in Appendix D.

When comparing the likelihood of applying for a rebate or tax credit against those who actually did, the potential purchasers optimistically overstated reality.

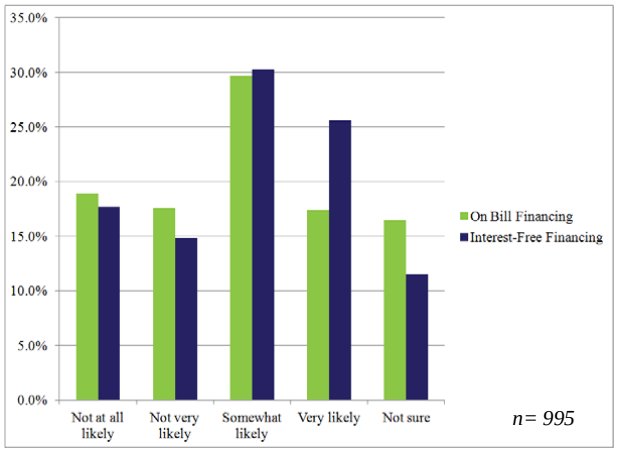
TABLE 4.16. COMPARISON OF LIKELIHOOD TO ACTUAL PARTICIPATION IN INCENTIVES[72]

	Potential Purchasers (n=995)		Recent Purchasers (n=97)	
	Would Apply	Not Sure	Did Apply	Not Sure
Rebates	93%	5%	46%	11%
Tax Credits	86%	9%	51%	8%

HP23, 24, HR26, 27. If rebates were available for a new water heater you purchased, would you apply for one? If you were to purchase a new high efficiency water heater, would you apply for a tax credit? Did you or do you intend to apply for a rebate for the new water heater? If you were to purchase a new high efficiency water heater, would you apply for a tax credit?

Though homeowners report rebates as most popular, 47 percent would consider on-bill financing, and 56 percent would consider interest-free financing.

FIGURE 4.AD. LIKELIHOOD TO CONSIDER FINANCING OPTIONS[73]



HP25, 26. If you could finance your water heater through your utility and pay a monthly charge for an energy efficient model, how likely would you be to participate in this program? If you could get interest free financing for six to 12 months on an energy efficient water heater, how likely would you be to participate in this program?

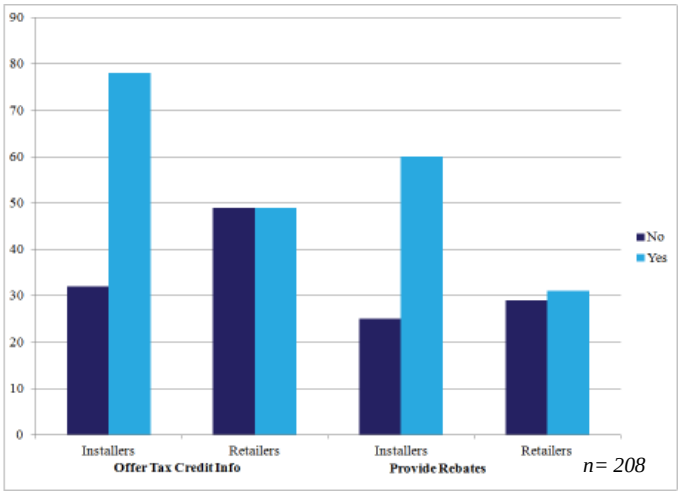
Suppliers reported that incentives and rebates reduce the costs for consumers more quickly, but manufacturers and resellers prefer the tax credits. Many of the suppliers we interviewed and mystery shopped expect that high efficiency water heater sales will drop when current tax credits expire. According to retailers that we interviewed, manufacturers dislike the incentives, as they cut into sales margins.

Retailers, installers, and distributors all mentioned that rebates cause sales to fluctuate, making predictions difficult for salespeople and interfering with traditional quota sales reward models. Of the total 214 suppliers who responded by phone and online, 43 percent offer information about rebates, and 59 percent offer information on tax credits (see Figure 4.AE).

[72] See Tables H-13, H-14, H-15, and H-16 in Appendix D.

[73] See Tables H-24 and H-25 in Appendix D.

FIGURE 4.AE. NUMBER OF SUPPLIERS OFFERING INCENTIVE INFORMATION[74]



SI31, SR26. Do you provide customers with information about efficiency tax credits?

[74] See Tables S-20 and S-27 in Appendix E.

5.0 Conclusions

Our research suggests mixed prospects for high efficiency water heater sales in the Northwest. Many trends favor increased sales of more efficient models. Our homeowner surveys, for example, consistently find that consumers value water heater efficiency, recognize the ENERGY STAR brand, and will pay a modest premium for efficient models. Likewise, manufacturers continue to expand the range of high efficiency models available to consumers — a trend that is likely to continue as technologies mature and federal water heater efficiency standards come into effect.

However, other forces act as barriers to increased sales. In particular, high first costs — including unit and installation costs — represent substantial barriers to cost-conscious homeowners. The prevalence of emergency replacements (with short timelines and constrained homeowner budgets), mixed consumer awareness of heat pump water heaters, complicated code requirements, installer reluctance, and some signs of skepticism about the performance of efficient models appear to be slowing the adoption of more efficient models.

5.1 Significant Touch Points in Supply Chain

The supply chain represents an opportunity to increase awareness and drive down price. The most influential touch point lies with installers, as they represent the supply chain group most trusted by consumers. If they have the education, training, and access to high efficiency inventory, they will effectively discuss high efficiency options with buyers.

The other significant touch point lies with manufacturers. Manufacturers must decrease the costs of high efficiency units to shorten their payback period, particularly considering northern climate requirements. This means setting standards and creating supply to meet changing consumer needs. Streamlining the number of products on the market and calling out the products best suited for our climate zone will make it easier for salespeople and installers to improve the sales and marketing of high efficiency water heaters.

5.2 Significant Touch Points in Purchase Process

The most significant touch point in the purchasing process exists early in the sale. Resellers who disclose as much information as soon as possible about the installation, operation, and maintenance of high efficiency water heater options will help consumers feel more informed and confident about choosing a high efficiency water heater. Online campaigns and consumer publication advertising facilitate consumer confidence, but relationships with utilities and installers present the greatest potential to improve consumer education and have them consider high efficiency units first.

Since ENERGY STAR carries more recognition and trust than any other “brand” in the appliance market, expansion of the program to include more heat pump water heaters will improve acceptance. This standard provides a baseline for comparison, equates synonymously with energy efficiency in the minds of the consumer, and provides a platform for supporting incentives, rebates, and tax credits.

5.3 Planned vs. Emergency Replacements

The economy determines whether consumers plan water heater purchases or not. Planned replacements drop when purse strings tighten, making planned purchases in the next five years difficult to predict. If more effort is put into encouraging developers and renovators to spec high efficiency in new construction, it will influence neighbors to look at new technologies, ask questions, and think of high efficiency water heaters when emergencies arise. As the economy rebounds and utility rates rise, awareness campaigns and new construction examples could influence Northwest homeowners to buy high efficiency water heaters before the old ones break.

5.4 Promoting High-Efficiency Water Heaters

Promoting high efficiency water heaters starts with more market standardization. Based on this study, these standardizations include:

- Influencing consistent building code standards.
- Promoting the leading technologies that move the market away from low-efficiency, tank- reliant solutions.
- Helping the supply side better coordinate messaging, homeowner education, and installer education so that installers are confident installing and servicing them.
- Improving reseller education to build the market and increase sales predictability.
- Disclosing the facts, clarifying options, and making costs, return on investment, and payback period CRYSTAL clear to the consumer.

Though homeowners are willing to pay a bit more for high efficiency, $500 more is still thousands of dollars below the average $3,000 to $4,000 it costs to purchase, install, and retrofit a heat pump water heater or tankless unit in an existing home. Combine this with a strong preference for rebates instead of financing[75], and strong financial incentives will continue to drive adoption of high efficiency water heaters.

5.5 The Future for Heat Pump Water Heaters

The future for heat pump water heaters can improve if it keeps pace with supplier and consumer needs. However, this high efficiency answer to electric water heating needs a lower profile in terms of installation impact, and a larger profile in terms of education among installers and awareness with consumers. Regulating it into existence is not enough.

Consumers require more information about heat pump water heaters so they are more familiar and trusted. The technology will have to perform at promised efficiency levels in the Northwest to instill confidence in both consumers and suppliers.

5.6 Direction of Financing and Costs

Pricing and financing considerations depend on two things: economy, and residency plans. The average American moves every nine years. Longer payback periods discourage investments by consumers who tend to move frequently. Interest-free financing on utility bills can make long-term investments in high efficiency water heater more attractive and reduce the deterrent influence of frequent moves and high up-front costs.

[75] See Table H-13, H-14, H-22, H-25, and H-26 in Appendix D.