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REPORT # E22-451

Pricing Research for Efficient Water Heaters

Prepared for: Anu Teja

Sr. MRE Scientist

Prepared by:

Jennifer Francis, Senior Vice President
Todd Amman, Associate Vice President

Lieberman Research
98 Cutter Mill Road, Suite 359
Great Neck, NY 11021

Alex Dunn, PhD., Director
Amanda Maass, Managing Consultant

ILLUME Advising, LLC
440 Scenic Drive, Suite 202
Madison, WI 53711

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Background & Objectives

BACKGROUND

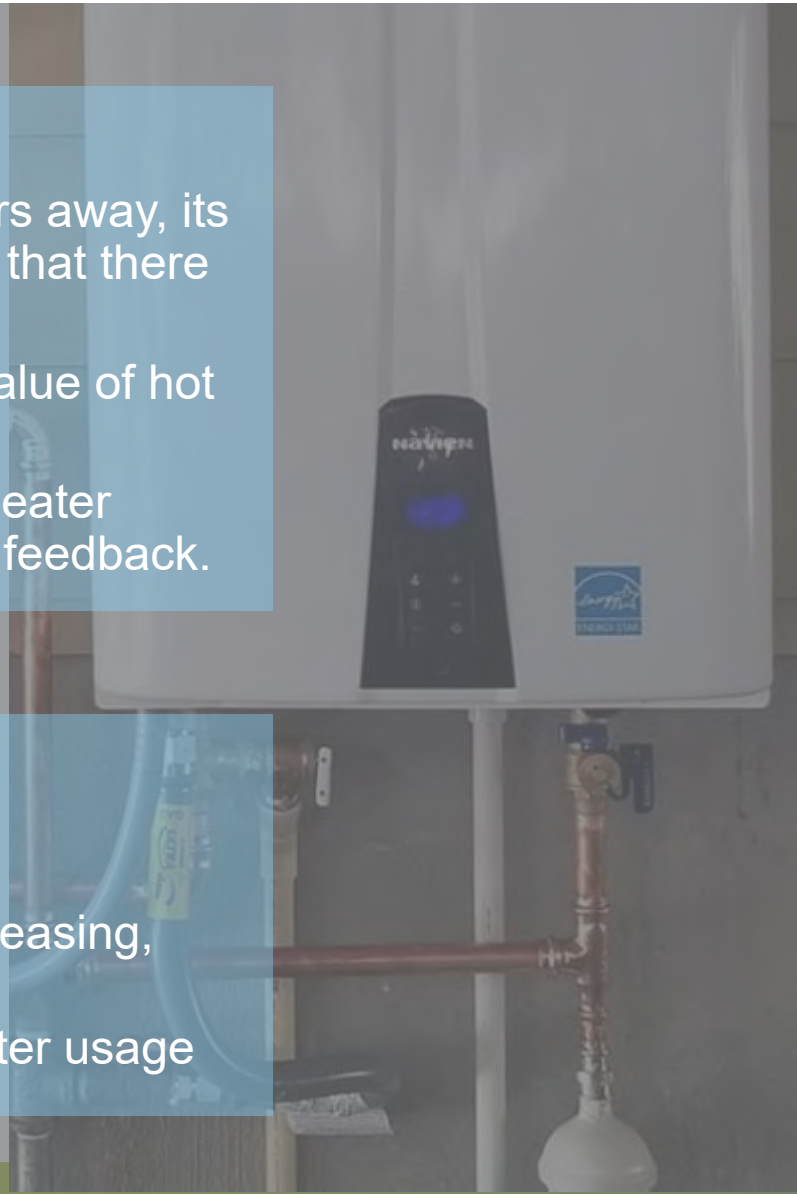
While commercialization of a gas heat pump water heater is still several years away, its Efficient Gas Water Heater program team seeks to convey to manufacturers that there is viable consumer demand for these efficient units.

An initial phase of qualitative research conducted by ILLUME explored the value of hot water and importance of water heater features to homeowners.

The second phase of research sets out to quantify the importance of water heater features and optimize pricing of EHPWHs and GHPWH based on consumer feedback.

OBJECTIVES

- Determine the optimal price range for EHPWHs and GHPWHs
- Establish the most important factors in water heater purchase decision
- Gauge consumer interest in alternatives to purchasing a water heater (leasing, financing, hot water payment service)
- Explore the different uses of hot water and quantify household's hot water usage

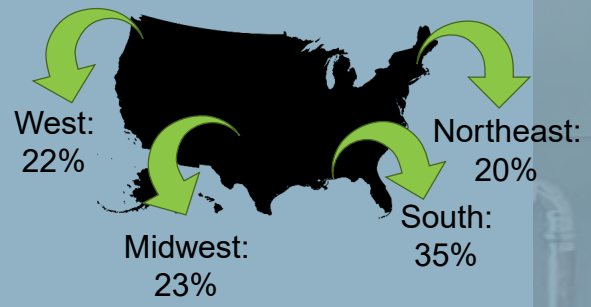


Methodology

HOW

A 30-minute online survey was conducted among 1,991 adult US homeowners – 1,497 national US random sample, 494 sub-regional over-sample

- National US (random sample):
  - Northeast: n=305
  - Midwest: n=350
  - South: n=520
  - West: n=322
- Key subregions (random + over-sample)
  - Total California: n=351
  - Total Core Northwest (ID, MT, OR, WA): n=350



WHO

Consumers who qualified for the study are age 18 or older, own their home/condo, and are responsible for the ownership and maintenance of their home's water heater.

WHEN

April 6 – April 25, 2022

Who Did We Survey?

HH Composition

1 Person 16%

2 People 38%

3+ People 47%

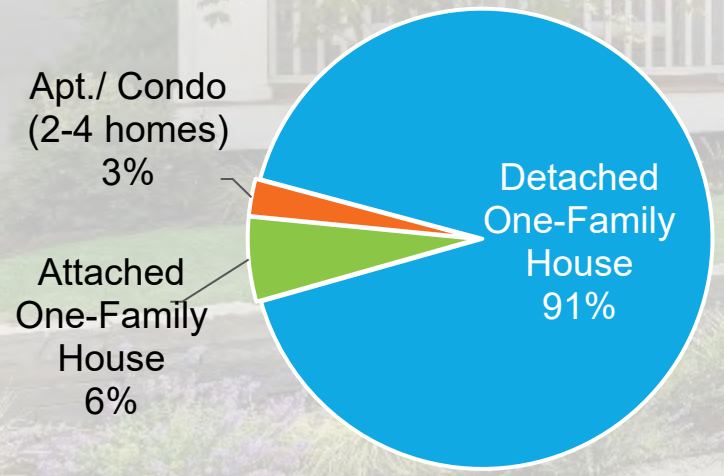
Average # of People: **3**

How Long Lived At Current Home

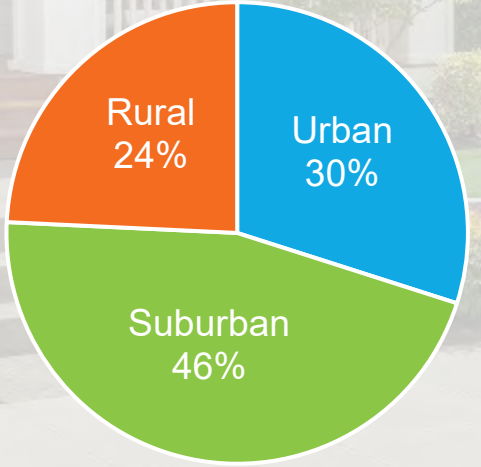
Less than a year	3%
1 to 2 years	7%
3 to 5 years	15%
6 to 10 years	18%
Over 10 years	57%

Average: **11 Years**

Home Type



Home Setting



Base: National Sample (N=1,497); National Sample and Work Full/Part Time (n=818)
Relevant Questions (See slide notes): S3, S5, S6b, S7

Key Takeaways

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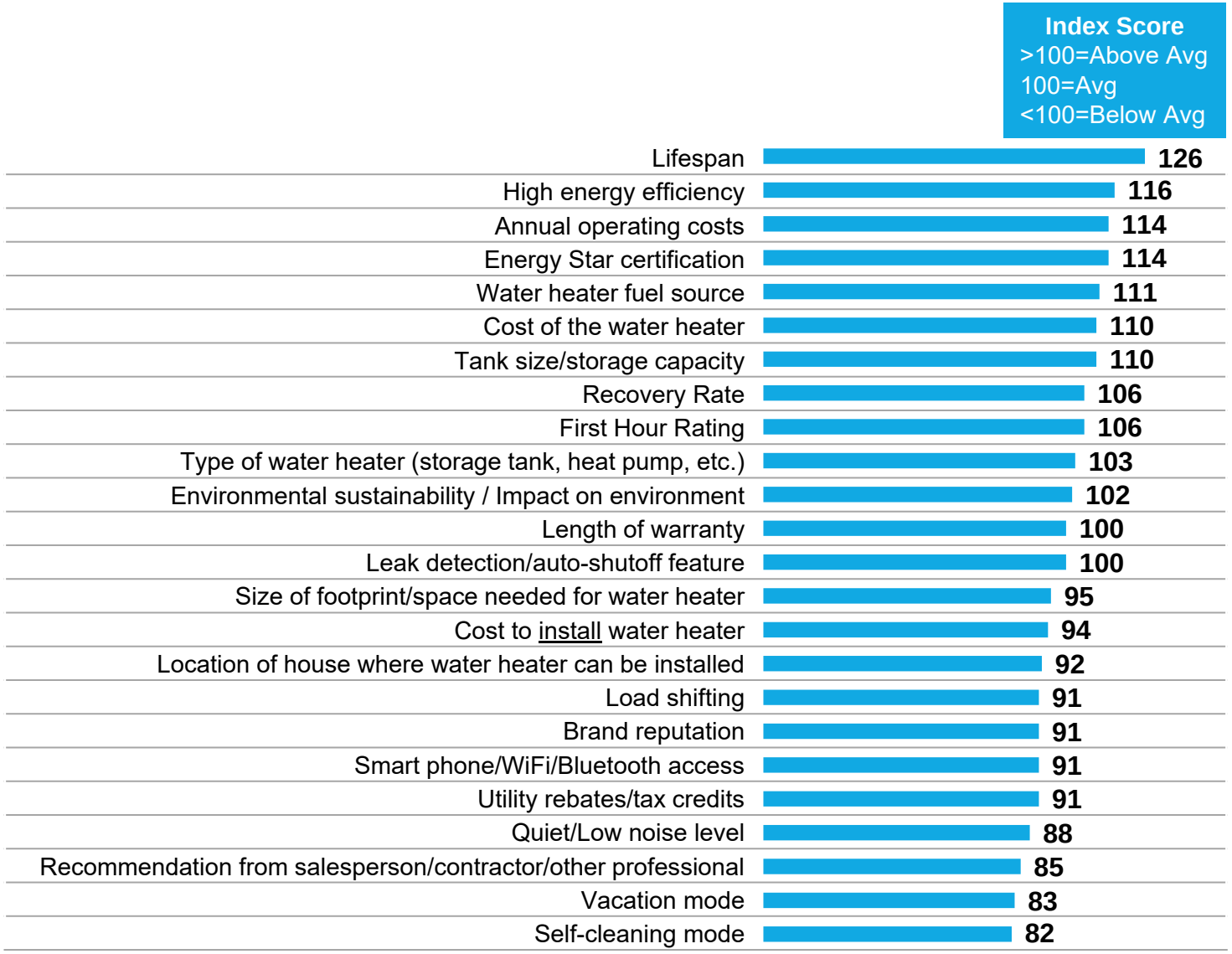
Key Takeaways

- **The *ideal price* point for EHPWHs is $1,350, but up to $1,500 is acceptable**
  - Above $1,500, homeowners require higher rebates/tax credits – but higher rebates may not always be available
  - EHPWHs are appealing even at much higher price points than Standard Electric heaters
- **The *optimal price* for GHPWHs is just under $1,900**
  - Between $1,700 and $1,975 is within homeowners' acceptable range
- **Lifespan, efficiency, cost, and fuel type are the primary drivers of the purchase decision**
  - Annual operating cost is conceptually important to homeowners, but had less impact on the purchase decision during the pricing exercise when presented in actual dollar amounts
  - Longer lifespan and warranty are important but expected features
  - Amount/speed of hot water availability and water heater size/location are secondary considerations
- **Water heater financing has more potential than leasing or loaner water heaters or hot water service plans**
- **80% of homeowners are satisfied with their current water heater**
  - Satisfaction is higher for convenience features than annual operating costs, recovery rate, environmental impact and length of warranty

Detailed Findings: Water Heater Purchase Drivers & Satisfaction

Drivers of Water Heater Purchase Decision

- Lifespan, efficiency, cost, and fuel type are the primary drivers of the water heater purchase decision.
  - Amount/speed of hot water availability and size/location are secondary considerations, while convenience and reputation are less important.



Base: National Sample (N=1,497);
Relevant Questions (See slide notes): B1

Rank Order of Drivers of Purchase Decision

By Owners of Water Heater Fuel Type

- Overall, current owners of electric and gas water heaters have similar motivations driving their purchase decision.
  - Gas owners are more likely to be motivated by utility rebates/tax credits, while electric owners are more appreciative of smart phone capabilities.

	National	Electric WH Owners	Gas WH Owners
Lifespan	1	1	1
High energy efficiency	2	2	2
Annual operating costs	3	3	4
Energy Star certification	4	6	3
Water heater fuel source	5	7	5
Cost of the water heater	6	9	6
Tank size/storage capacity	7	4	7
Recovery Rate	8	8	8
First Hour Rating	9	5	11
Type of water heater (storage tank, heat pump, etc.)	10	10	12
Environmental sustainability / Impact on environment	11	11	10
Length of warranty	12	15	9
Leak detection/auto-shutoff feature	13	12	14
Size of footprint/space needed for water heater	14	13	18
Cost to install water heater	15	19	13
Location of house where water heater can be installed	16	17	16
Load shifting	17	16	20
Brand reputation	18	18	17
Smart phone/WiFi/Bluetooth access	19	14	22
Utility rebates/tax credits	20	21	15
Quiet/Low noise level	21	20	19
Recommendation from salesperson/contractor/other professional	22	22	21
Vacation mode	23	23	23
Self-cleaning mode	24	24	24

Green/Red: Rank higher/lower +/-5 spots vs. National sample

Base: National Sample (N=1,497); Electric Owners (N=777); Gas Owners (N=623)
Relevant Questions (See slide notes): B1

Rank Order of Drivers of Purchase Decision

By Region

- Purchase drivers are mostly similar across region, but there are some nuances.
  - Homeowners in the West are more driven by environmental impact.
  - In the Northeast, brand reputation and low noise level are more important.
  - Midwestern homeowners value utility rebates/tax credits.

	National	Northeast	Midwest	South	West
Lifespan	1	1	1	1	1
High energy efficiency	2	2	2	2	3
Annual operating costs	3	4	3	3	4
Energy Star certification	4	3	5	8	2
Water heater fuel source	5	5	4	6	9
Cost of the water heater	6	6	6	5	7
Tank size/storage capacity	7	7	7	4	6
Recovery Rate	8	9	8	9	10
First Hour Rating	9	8	9	7	8
Type of water heater (storage tank, heat pump, etc.)	10	11	13	10	11
Environmental sustainability / Impact on environment	11	15	11	12	5
Length of warranty	12	10	10	13	13
Leak detection/auto-shutoff feature	13	13	14	11	12
Size of footprint/space needed for water heater	14	17	18	14	14
Cost to install water heater	15	19	12	15	18
Location in house where water heater can be installed	16	18	16	18	17
Load shifting	17	20	22	16	16
Brand reputation	18	12	17	20	19
Smart phone/WiFi/Bluetooth access	19	22	20	17	15
Utility rebates/tax credits	20	14	15	19	21
Quiet/Low noise level	21	16	19	22	23
Recommendation from salesperson/contractor/other professional	22	21	21	21	24
Vacation mode	23	23	23	24	22
Self-cleaning mode	24	24	24	23	20

Green/Red: Rank higher/lower +/-5 spots vs. National sample

Base: National Sample (N=1,497); Northeast (N=305); Midwest (N=350); South (N=520); West (N=322)
Relevant Questions (See slide notes): B1

Rank Order of Drivers of Purchase Decision

By West region

- Homeowners in the Core Northwest are driven by the same features as homeowners nationally.
- California homeowners are more likely to be motivated by environmental impact of the water heater, and smart phone capabilities.

	National	West Region	CA	Core Northwest
Lifespan	1	1	1	1
High energy efficiency	2	3	3	2
Annual operating costs	3	4	2	3
Energy Star certification	4	2	5	4
Water heater fuel source	5	9	9	5
Cost of the water heater	6	7	10	9
Tank size/storage capacity	7	6	6	6
Recovery Rate	8	10	11	7
First Hour Rating	9	8	7	11
Type of water heater (storage tank, heat pump, etc.)	10	11	14	10
Environmental sustainability / Impact on environment	11	5	4	8
Length of warranty	12	13	12	14
Leak detection/auto-shutoff feature	13	12	13	12
Size of footprint/space needed for water heater	14	14	17	13
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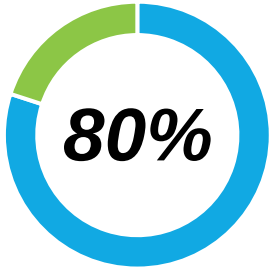
Location in house where water heater can be installed	16	17	15	19
Load shifting	17	16	16	17
Brand reputation	18	19	20	20
Smart phone/WiFi/Bluetooth access	19	15	8	15
Utility rebates/tax credits	20	21	21	16
Quiet/Low noise level	21	23	22	24
Recommendation from salesperson/contractor/other professional	22	24	24	22
Vacation mode	23	22	19	21
Self-cleaning mode	24	20	23	23

Green/Red: Rank higher/lower +/-5 spots vs. National sample

Base: National Sample (N=1,497); West (Random only, N=322) CA (Random+Over-sanple, N=351); Core NW (Random+Over-sample N=350): ID, MT, OR, WA
Relevant Questions (See slide notes): B1

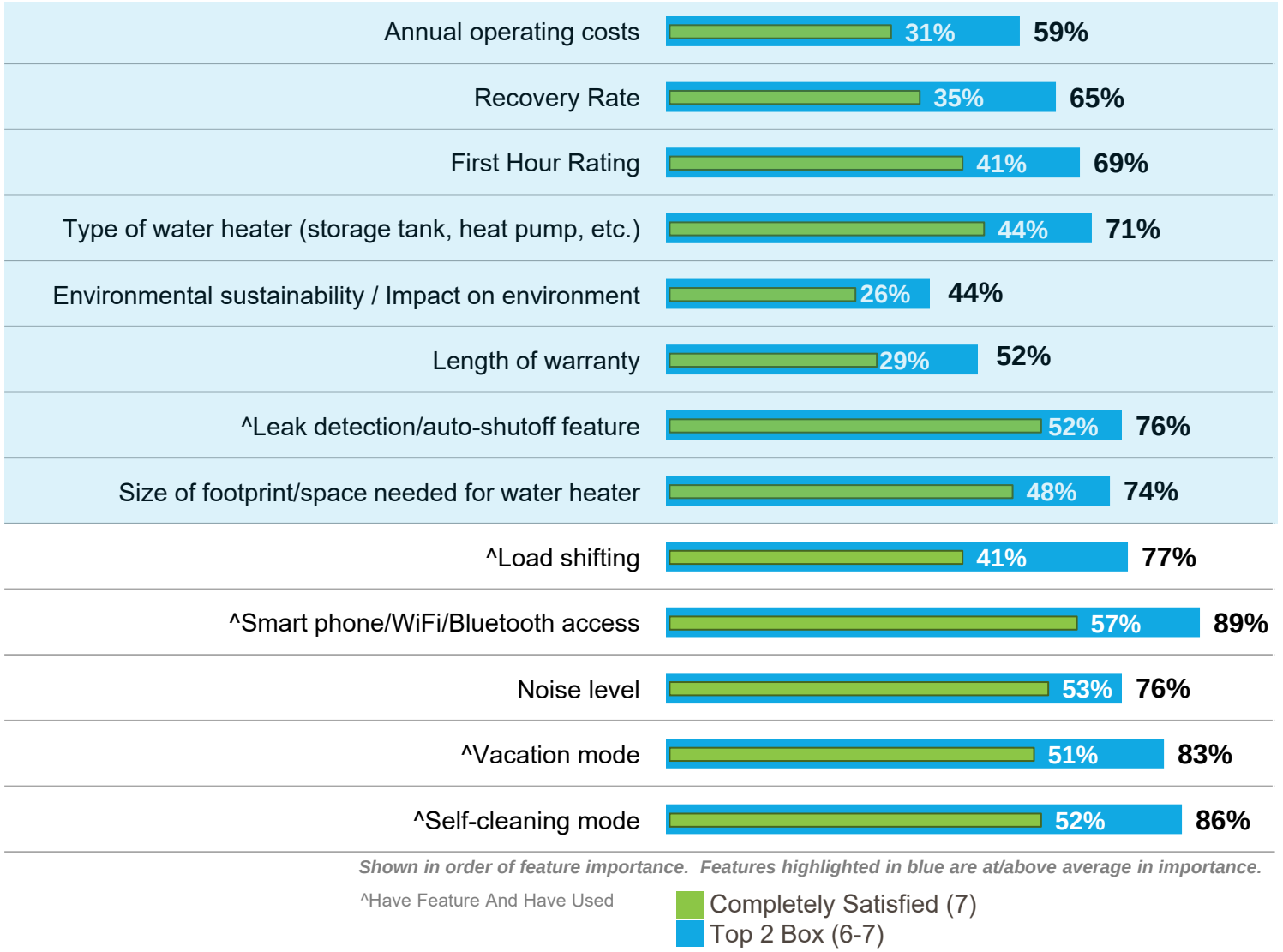
Water Heater Satisfaction

Satisfied* With Water Heater Meeting Needs



Top 2 box (6-7)

- Satisfaction is highest for convenience features, among homeowners who have them.
- For more important drivers such as annual operating costs, recovery rate, environmental impact and length of warranty, there is room for improvement.

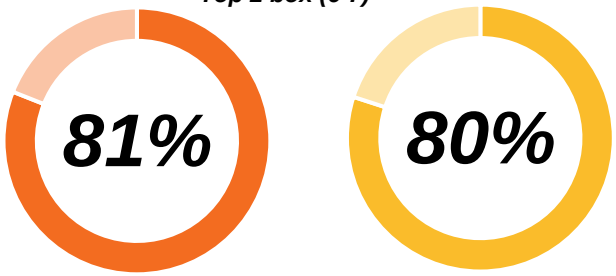


 Base: National Sample (N=1,497); ^Have/Used Feature (Bases Vary)
Relevant Questions (See slide notes): A3, B3

Water Heater Satisfaction: By Water Heater Owner Type

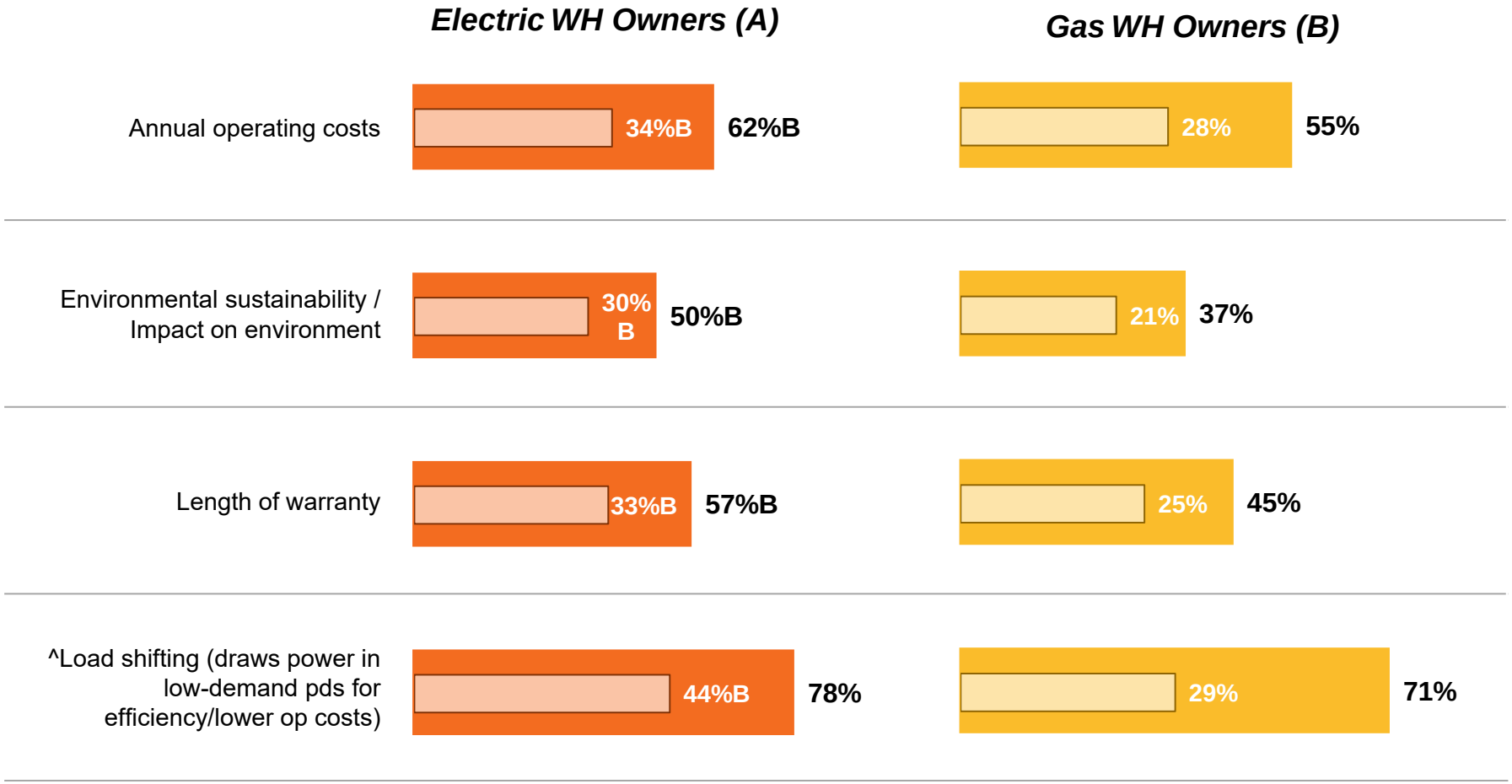
Satisfied* With Water Heater Meeting Needs

**Top 2 box (6-7)*



Electric WH Owner ***Gas WH Owner***

- Overall satisfaction is similar regardless of electric vs. gas water heater ownership.
  - However, electric owners are more satisfied than gas owners with their water heater's annual operating costs, environmental impact, warranty length, and load shifting capability.



Shown in order of feature importance. Features highlighted in blue are at/above average in importance.

^Have Feature And Have Used
Note: Only significant differences shown

Completely Satisfied (7)
Top 2 Box (6-7)

Base: National Sample and Electric WH Owner (N=777); National Sample and Gas WH Owner (N=623); ^Have/Used Feature (Bases Vary)
Relevant Questions (See slide notes): A3, B3

Detailed Findings: Electric Heat Pump Water Heater Pricing

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Electric Water Heaters - Conjoint Exercise Explanation

Example Screenshot

- Homeowners saw 1 Standard Electric and 1 Electric Heat Pump Water Heater configuration per screen, with left vs right position of water heater type randomized, for 12 screens
- Prices and features for each water heater were randomized on each screen
- Homeowners were asked which **one** of the water heaters they would buy
- Homeowners were then shown an independent subset of 8 water heater configurations, 1 per screen, and asked how likely they would be to buy each using a scale of 0 (Definitely Would Not Buy) to 10 (Definitely Would Buy).

Electric Water Heaters - Conjoint Features/Attributes & Levels

Standard Electric Water Heater

Water Heater Cost*	Annual Operating Costs	Lifespan	Warranty	Utility Rebate/ Tax Credit	Leak Detection/ Auto Shut Off	Vacation Mode	Smart Phone Access	Load Shifting
$600	$450	8 Years	6 Years	No Rebate	No	No	No	No
$750	$425	10 Years	8 Years		Yes	Yes	Yes	Yes
$900	$400	12 Years						
$1,050								
$1,200								
$1,350								
$1,500								

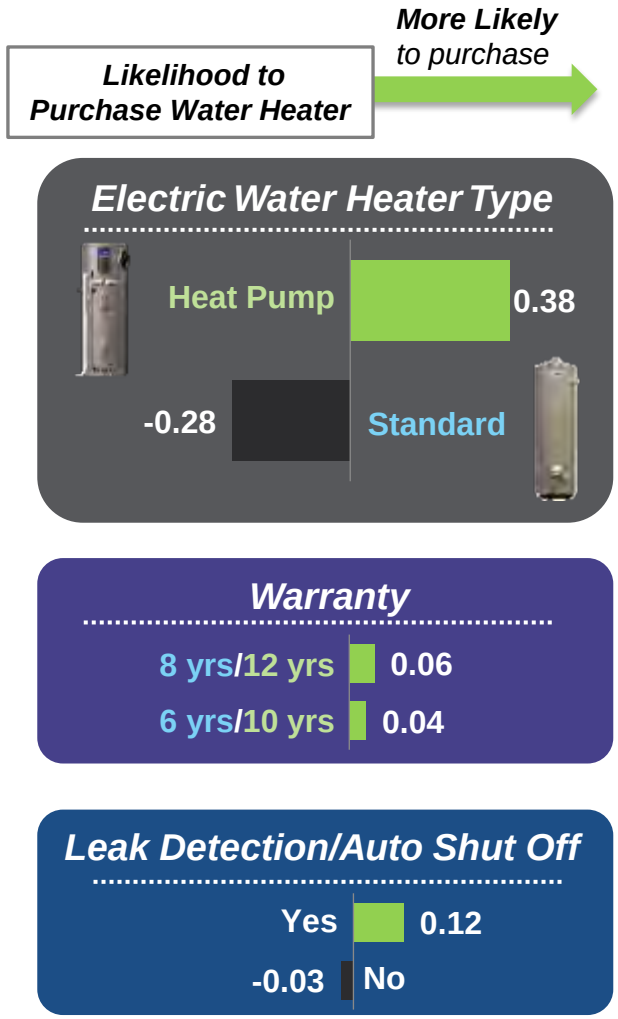
Electric Heat Pump Water Heater

Water Heater Cost*	Annual Operating Costs	Lifespan	Warranty	Utility Rebate/ Tax Credit	Leak Detection/ Auto Shut Off	Vacation Mode	Smart Phone Access	Load Shifting
$1,200	$175	12 Years	10 Years	$300 Rebate	No	No	No	No
$1,350	$150	14 Years	12 Years	$500 Rebate	Yes	Yes	Yes	Yes
$1,500	$125	18 Years		$750 Rebate				
$1,650				$1,000 Rebate				
$1,800				$1,200 Rebate				
$1,950								
$2,100								

** Not including installation cost*

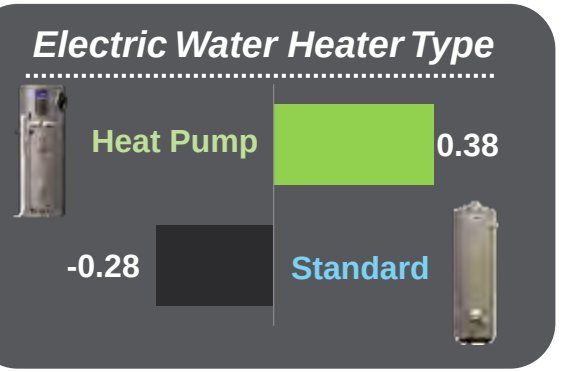
Conjoint: Interpreting the Results

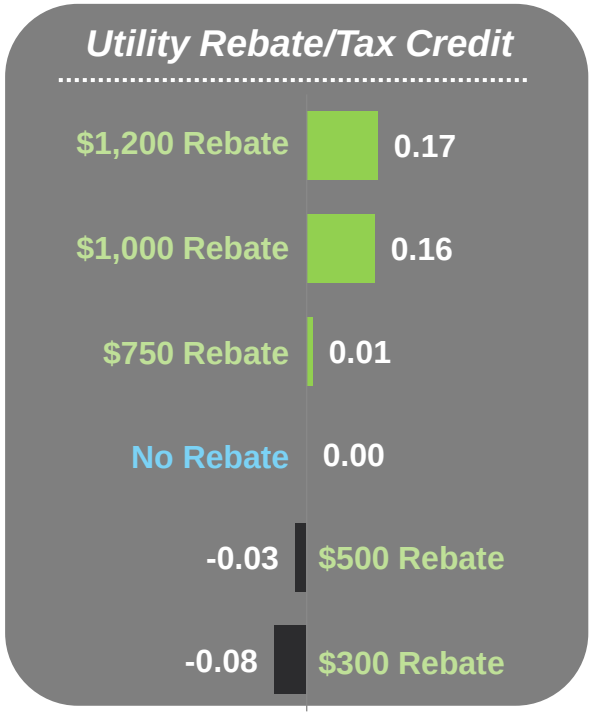
- Features listed in *blue* were shown for *standard electric* water heaters only, features in *green* were shown for *heat pump* electric water heaters only, and features in white were shown for both types of electric water heaters.
- The *longer the bar*, the *greater the impact on likelihood to purchase* the water heater.
- Features with a *green bar* have a *more positive impact* on purchase likelihood compared to similar alternative features, while those with *black bars* have *less positive impact*.
- The *longest green bars* will have the *greatest positive impact on purchase likelihood*.

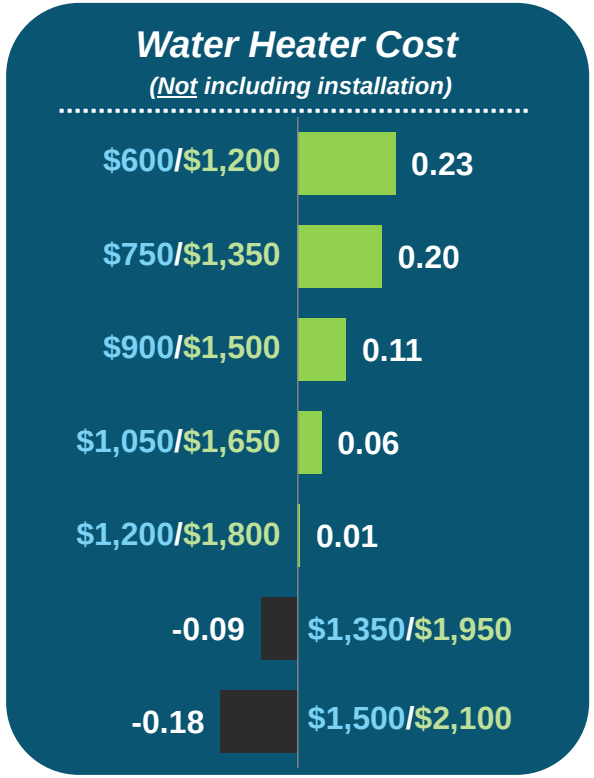


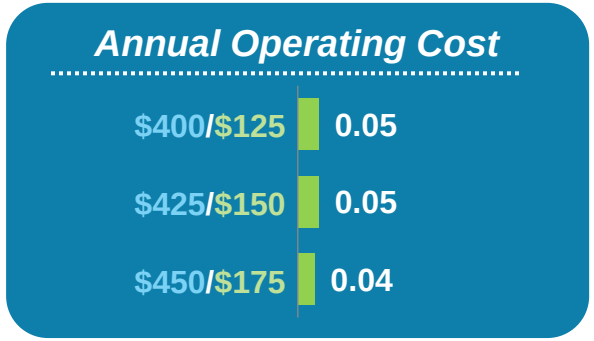
Base: National Sample (n=1,497)
Relevant Questions (See slide notes): D1

Impact On Electric Water Heater Purchase Likelihood

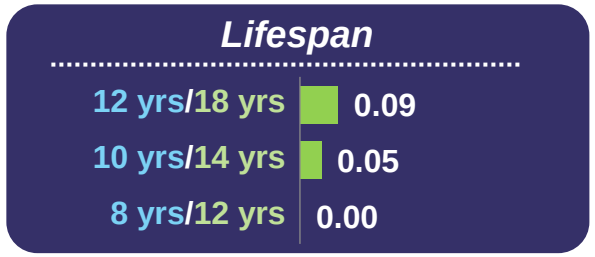


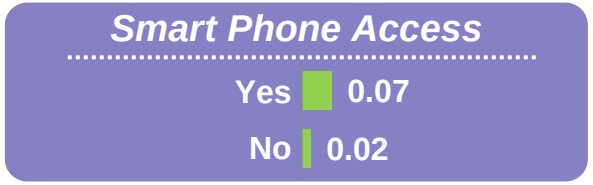


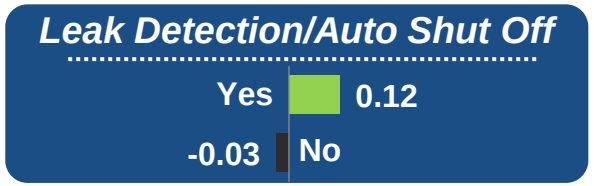


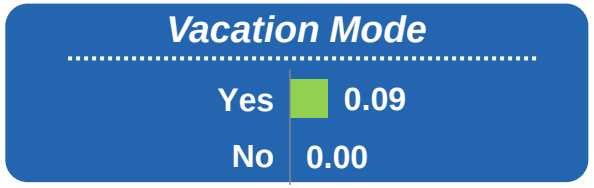


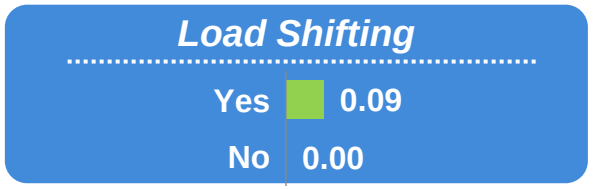
- Heat pump water heaters, heater cost under $1,500 for HP and under $900 for standard, and rebates/credits over $1K (for HP) have the greatest impact on purchase likelihood of specific electric water heaters.
- Annual operating cost had little impact, perhaps because once the heater type is decided upon, the range of potential operating cost is small.
- Longer lifespan and warranty are expected. Leak detection has the most potential among convenience features.









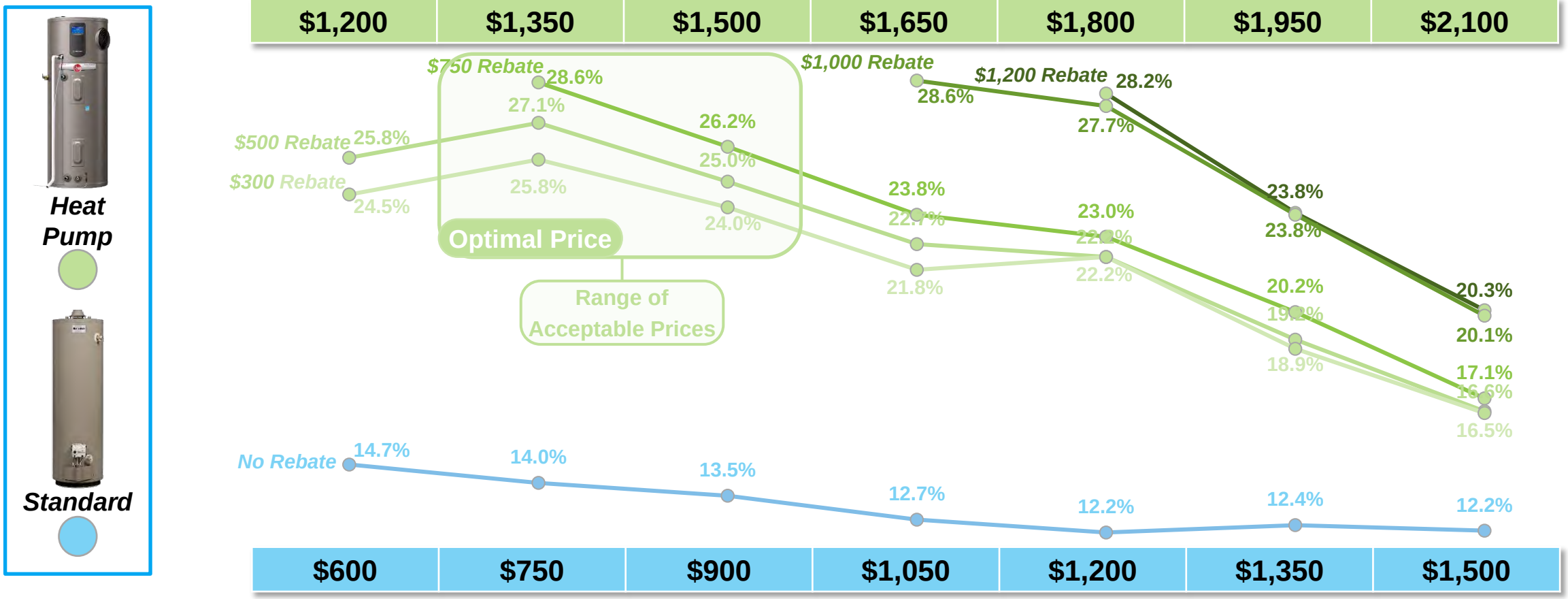


Features in Green were shown for Heat Pump only, in Blue for Standard only, and in White for both types.

Base: National Sample (n=1,497)
Relevant Questions (See slide notes): D1

Highest Purchase Likelihood by Price Point – Standard Electric vs Electric Heat Pump Water Heater

- Electric Heat Pump water heaters are very appealing to homeowners even at much higher price points than Standard Electric options, but rebates over $1,000 are needed at higher priced options.
- The *ideal price point for EHPWHs is $1,350*, but up to $1,500 is acceptable.



NOTE: DOES NOT INCLUDE INSTALLATION COST

For Heat Pump water heaters, options only shown where water heater price minus rebate equals $600 or more.

Base: National Sample (n=1,497)
Relevant Questions (See slide notes): D1

Detailed Findings: Gas Heat Pump Water Heater Pricing

Gas vs. Electric Heat Pump Water Heater Descriptions

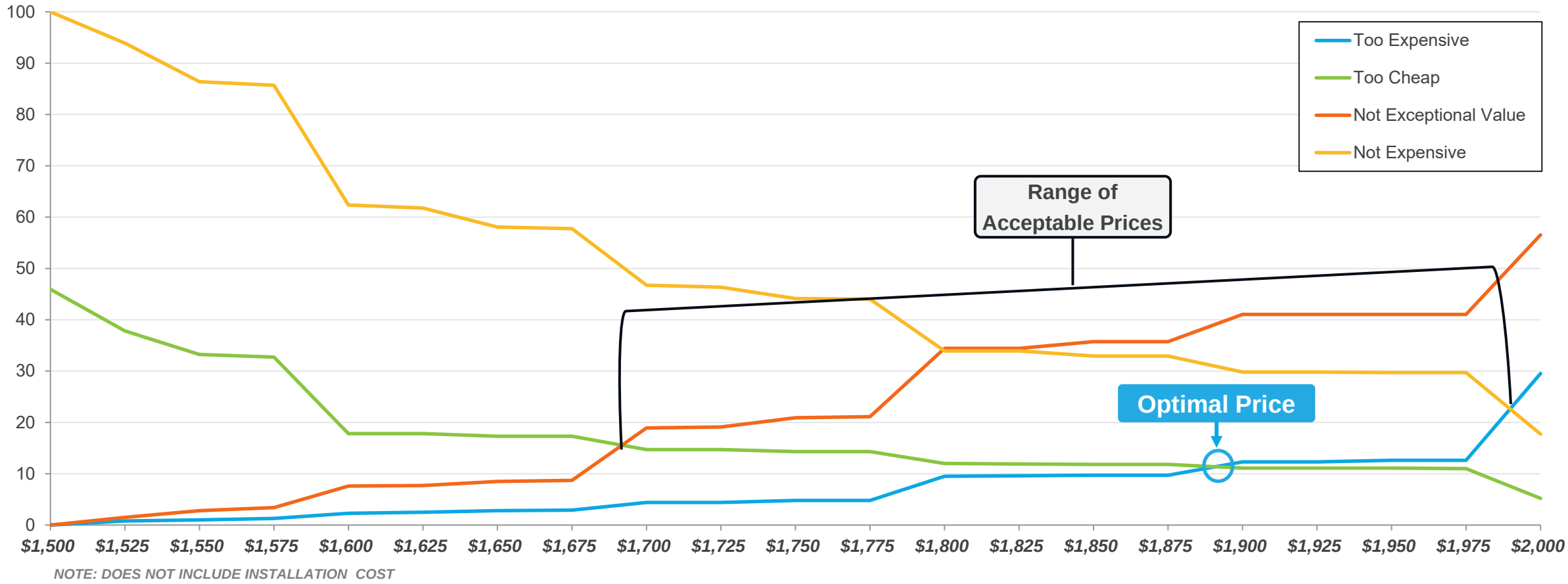
	Electric Heat Pump Water Heater	Gas Heat Pump Water Heater
Description	A standard electric water heater uses more energy than a refrigerator, dishwasher, clothes washer, and dryer combined. An electric heat pump or hybrid water heater uses electricity differently — moving heat rather than only generating it. This makes them 3-4 times more efficient than a standard electric water heater, and saves you more money over time.	Even though natural gas is cheaper than electricity, a standard gas water heater still uses a great deal of energy to heat water – up to 1/3 the energy of a typical home. A gas heat pump water heater uses energy differently — moving heat rather than generating it, so you spend around 50% less money operating it.
Energy Star Certification	Yes, heat pump water heaters are energy efficient.	
Emissions	No Emissions	Ultra-Low Emissions
Hot Water Availability	Heats water somewhat slower than the gas water heaters, meaning slightly less hot water availability compared with the GHPWH.	Heats water quicker than electric water heaters of the same tank size, meaning more hot water availability than EHPWH in general.
Includes Rebates and Tax Credits	Yes, and they are comparable.	
Warranty	10 Years	
Annual Operating Costs	About $140	About $80
Estimated Water Heater Cost	$1,500	Higher than EHPWH

NOTE: DOES NOT INCLUDE INSTALLATION COST

- Homeowners that currently have a gas water heater or natural gas available in their home completed a pricing exercise for **Gas *Heat Pump* Water Heaters,** and were shown the descriptions to the left as a point of reference for the exercise.

Gas Heat Pump Price Sensitivity Analysis

- The *optimal* price for a gas heat pump water heater is *just under $1,900*, but prices between $1,700 and $1,975 are safely within the *acceptable range* according to homeowners.



NOTE: DOES NOT INCLUDE INSTALLATION COST

Base: Currently Have Gas Water Heater or Natural Gas Utility in Home (n=999)
Relevant Questions (See slide notes): E2

Gas Heat Pump Optimal Price Ranges By Region

- The *optimal* price for a gas heat pump water heater is about $200 lower in the Midwest than in other regions, but the acceptable price range is similar regardless of region.

	Low Price:		High Price:
Total (National Sample)	$1,700	$1,900	$1,975
Northeast	$1,775	$1,975	$2,000
Midwest	$1,675	$1,775	$1,975
South	$1,700	$1,975	$2,000
West	$1,700	$1,975	$2,000
CA Subregion	$1,700	$1,975	$2,000
Core NW Subregion	$1,700	$1,975	$2,000

Base: **Currently Have Gas Water Heater or Natural Gas Utility in Home:** National Sample (n=999), Northeast (n=185), Midwest (n=275), South (n=283), West (Random only, N=322) CA (Random+Over-sanple, N=351); Core NW (Random+Over-sample N=350): ID, MT, OR, WA
Relevant Questions (See slide notes): E2

Detailed Findings: Alternative Payment Options

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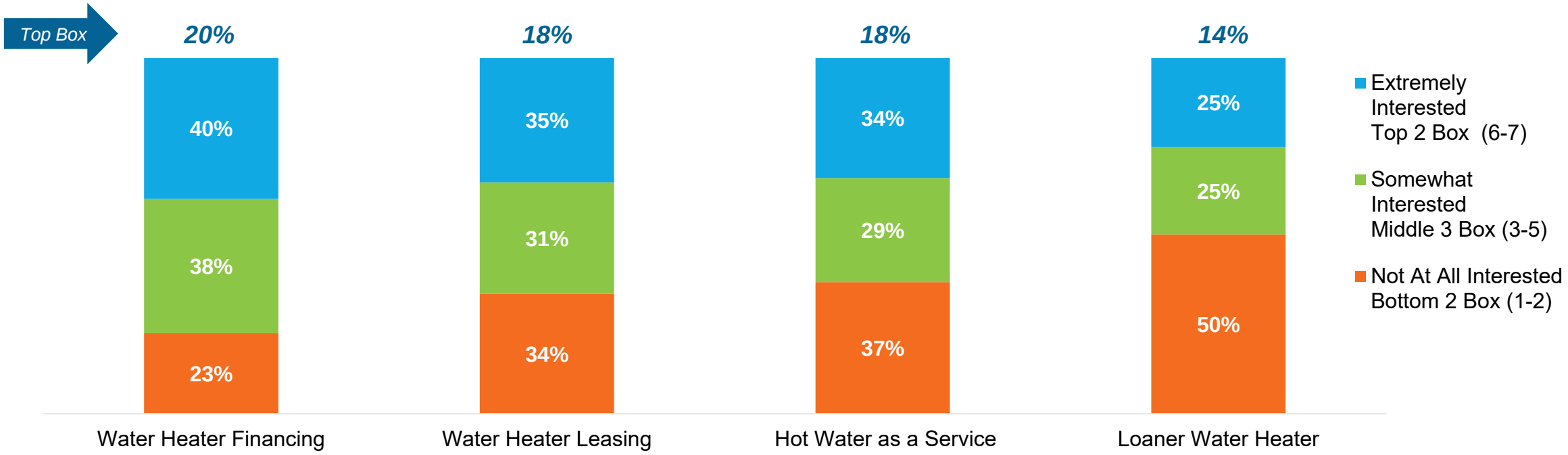
Interest in Alternative Hot Water Payment Options

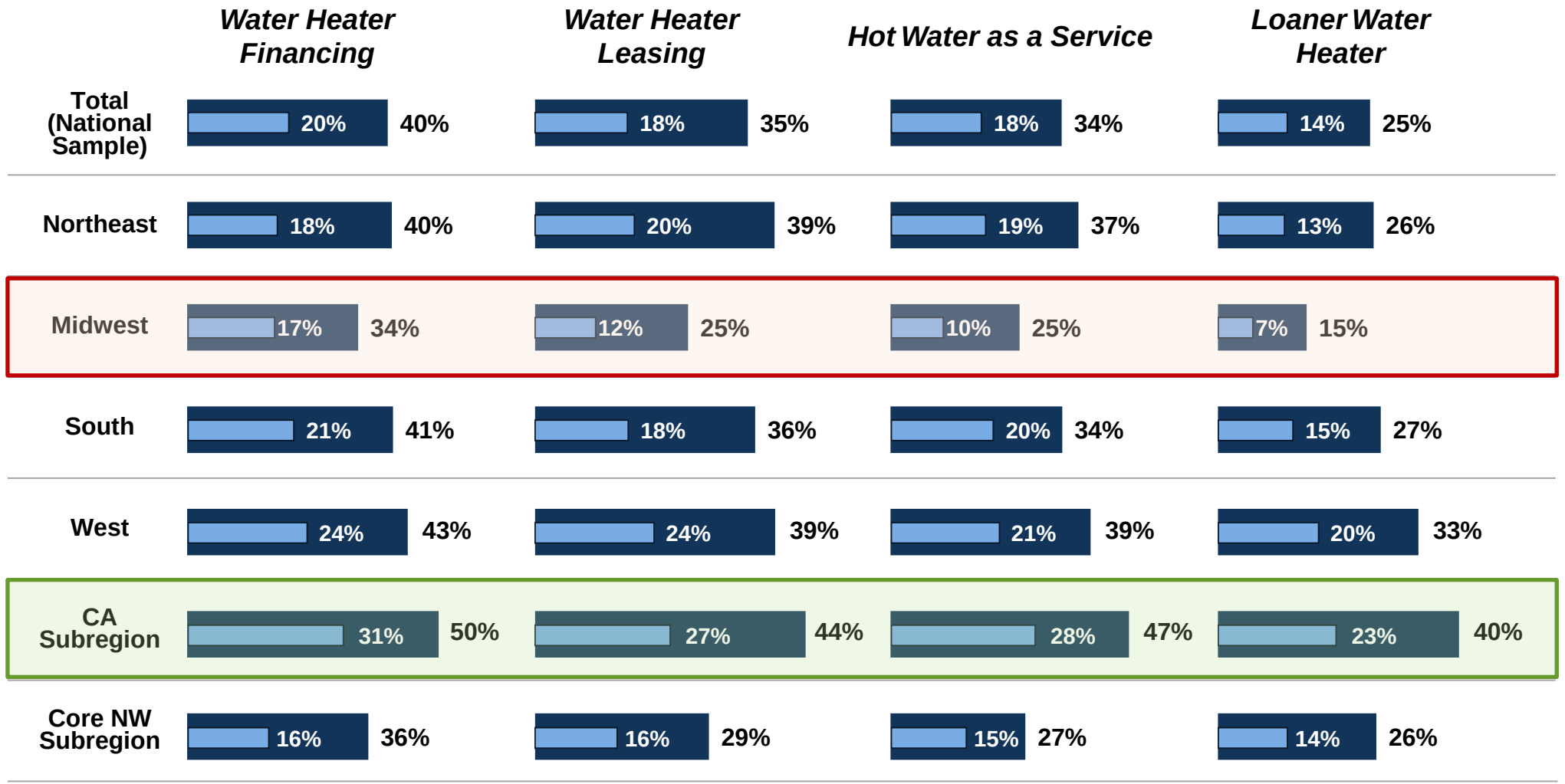
- Among alternative payment options that lessen the upfront investment to get hot water, water heater financing has the most appeal, followed by water heater leasing and hot water as a service.
  - Interest in loaner water heaters is limited.



Base: National Sample (N=1,497)
Relevant Questions (See slide notes): F1

Interest in Alternative Hot Water Payment Options By Region

- All four alternative hot water options have greater potential in California than in other areas of the country.
- Conversely, homeowners in the Midwest are less interested in alternative options.



Base: National Sample (N=1,497), Northeast (n=305), Midwest (n=350), South (n=520), West (n=322), CA Subregion (random+over-sample - n=351), Core NW Subregion (random+over-sample - n=350)
Relevant Questions (See slide notes): F1

Detailed Findings: Hot Water Importance

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Hot Water Importance and Consumption

- Homeowners' top reason for wanting hot water is to take a shower.
  - Secondarily, hot water is important for washing clothes, dishes, baths, and washing face or hands.
- Washing face or hands is the most frequent activity that hot water is used for, followed by short showers, hand washing dishes, and food preparation.

Importance of Having Hot Water For Activity (Average Score=11)

Taking showers:	29
Running the washing machine:	13
Washing the dishes by hand:	11
Taking baths:	11
Running the dishwasher:	10
Washing face or hands:	10
Washing/preparing food:	8
Shaving:	5
Wash car (with hot water hook up):	3

Hot Water Consumption During Typical Week (Average # Times/Week for Household)

Wash face or hands:	24
Take a short shower (10 minutes or less):	7
Hand wash dishes:	6
Washing/preparing food:	6
Take a long shower (more than 10 minutes):	4
Washing a load of laundry:	4
Run dishwasher:	3
Shave:	3
Take bath:	2
Wash car (with hot water hook up):	<1

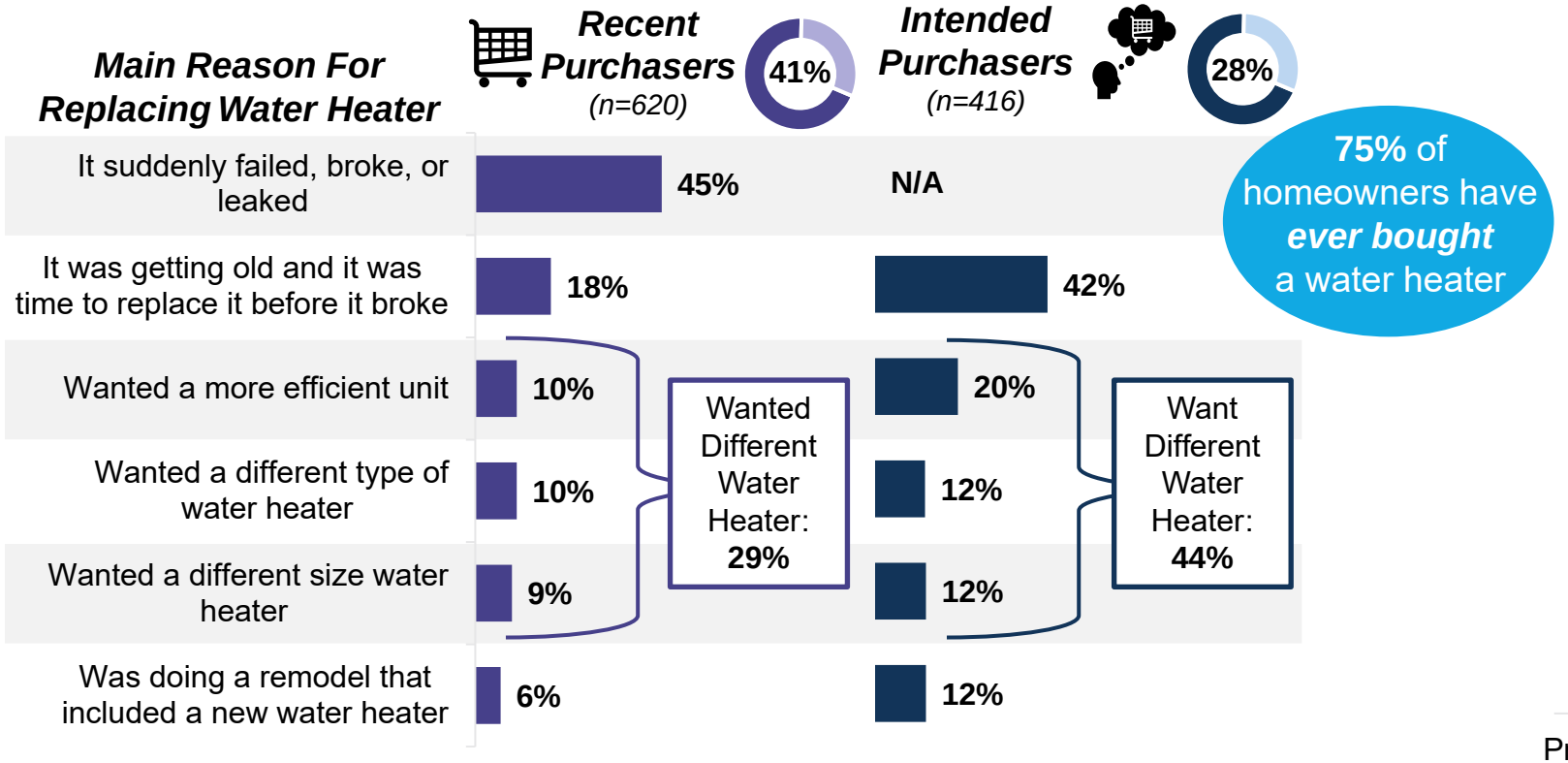
Base: National Sample (n=1,497)
Relevant Questions (See slide notes): A4, A5

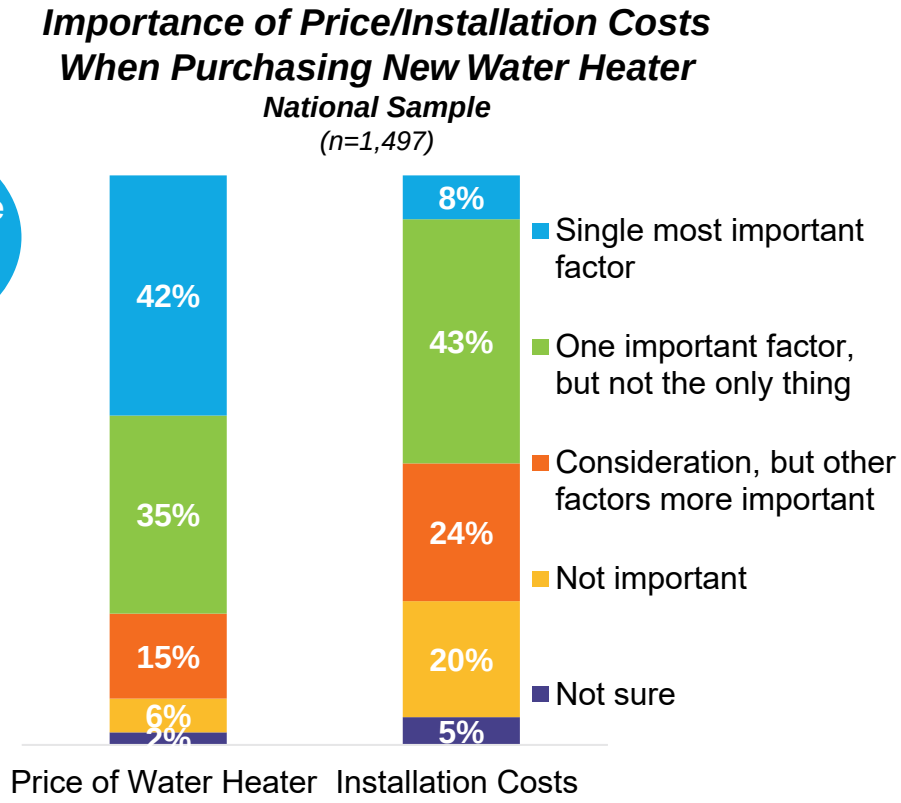
Detailed Findings: Recent and Intended Purchasers – Purchase Considerations

 |

Reasons And Considerations To Replace Water Heater

- Two-in-five homeowners surveyed replaced their water heater within the past 3 years. Additionally, about one-quarter feel they might replace their water heater in the next 12 months.
  - Nearly half of recent water heater purchasers replaced a unit that failed, broke or leaked. Intended buyers are nearly evenly split between those who expect to replace their heater due to age and those wanting something different (more efficient/different type or size).
  - Two-fifths of homeowners expect unit price to the single most important factor when buying a water heater. Installation costs are usually a secondary factor.

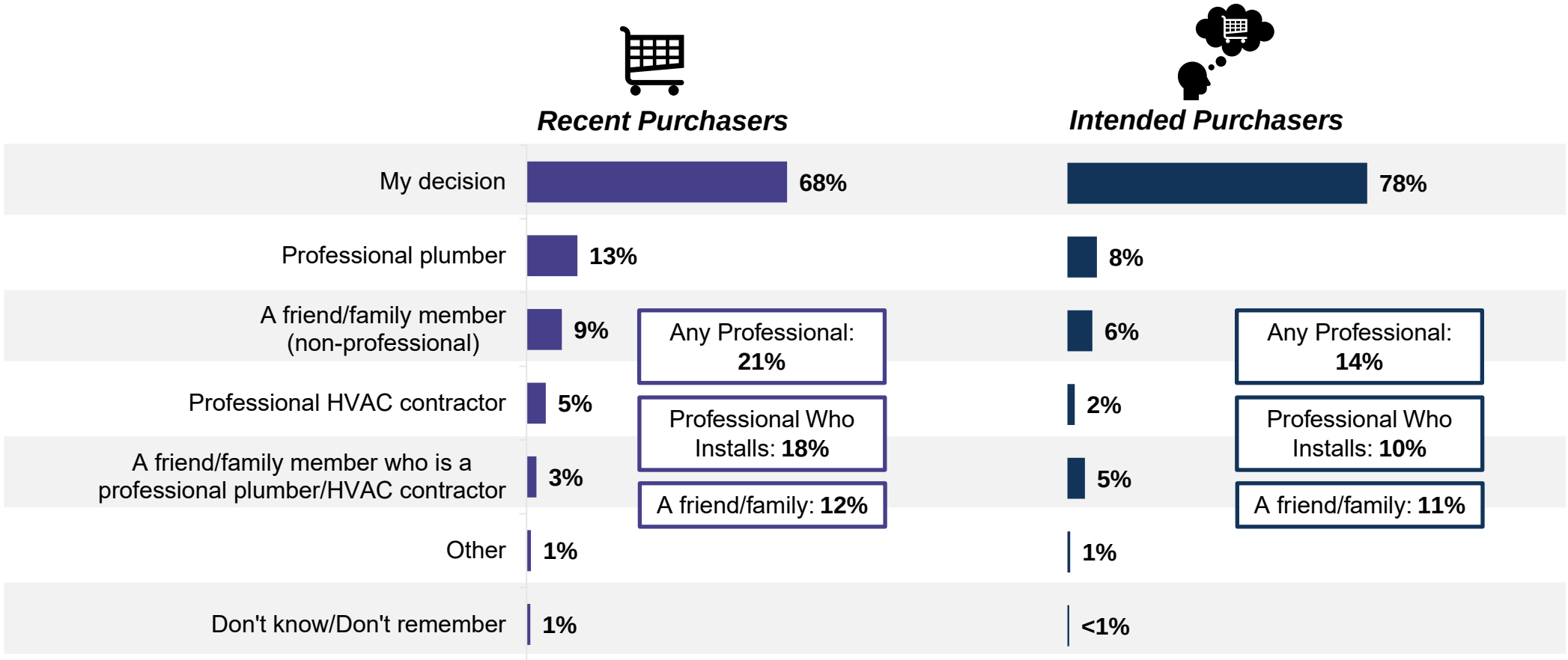




Base: National Sample, (N=1,497), Recent Purchasers (n=620) and Intender Purchasers (n=416)
Relevant Questions (See slide notes): S9a, S9b, S9c, C1a, C1b, C6

Who Makes Final Decision On Water Heater

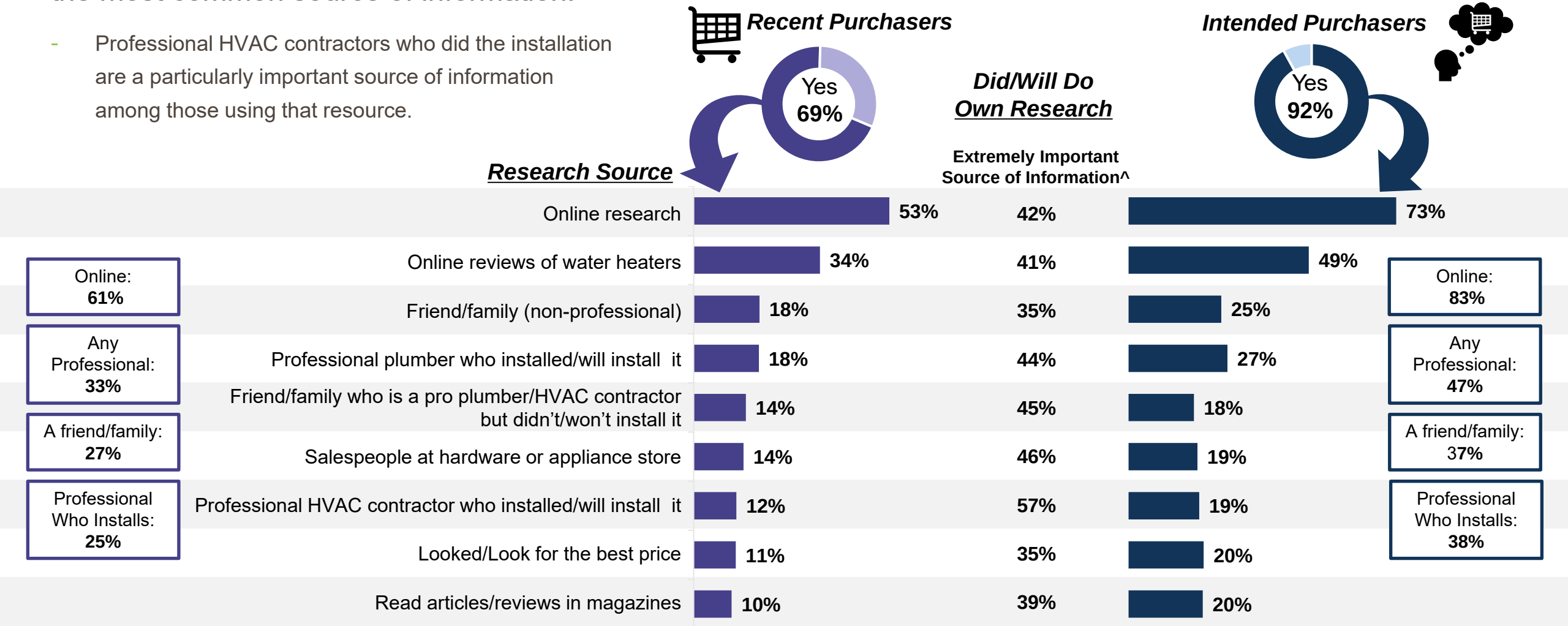
- In most cases, homeowners perceive that they ultimately make the ***final decision*** when buying a water heater.



Base: National Sample, Recent Purchasers (n=620) and Intender Purchasers (n=416)
Relevant Questions (See slide notes): C2a, C2b

Water Heater Research Prior to Purchase

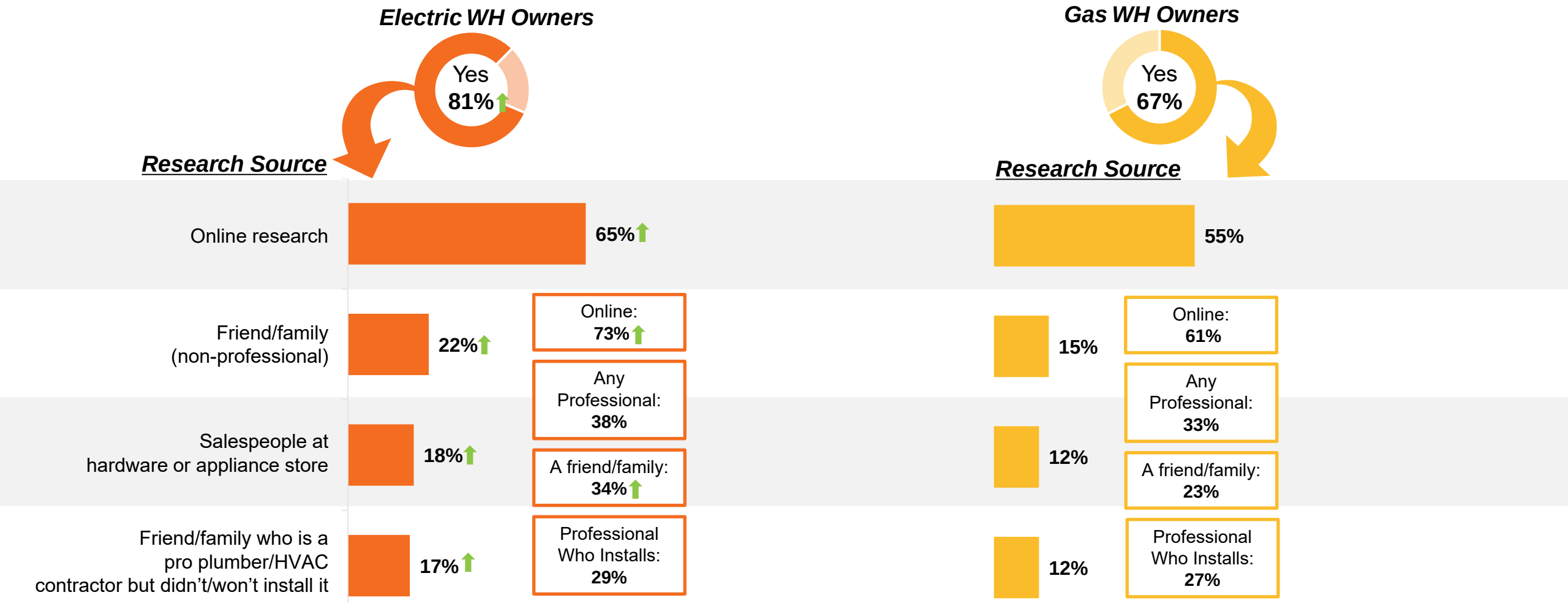
- Over two-thirds of recent buyers researched water heaters prior to purchase, with online research/reviews being the most common source of information.
  - Professional HVAC contractors who did the installation are a particularly important source of information among those using that resource.



Base: National Sample, Recent Purchasers (n=620) and Intender Purchasers (n=416); National Sample. Recent Purchaser and Did Specific Research (Base Varies)^
Relevant Questions (See slide notes): C3, C4, C5

Water Heater Research Prior to Purchase: Water Heater Owner Type

- Electric water heater owners are more likely than gas owners to do research, particularly online.



↑ indicates statistically significantly higher among Electric WH owners than Gas WH owners at 90% significance.

Base: National Sample, Electric WH Owner (n=468) and Gas WH Owner (n=335); National Sample. Recent Purchaser and Did Specific Research (Base Varies)^
Relevant Questions (See slide notes): C3, C4, C5

Appendix A – Additional Phase 2 Findings

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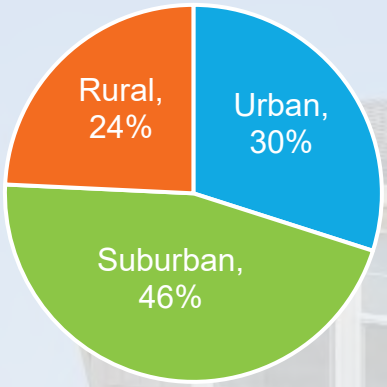
Details of Who We Surveyed

Home Setting



How Long Lived At Current Home

Less than a year	3%
1 to 2 years	7%
3 to 5 years	15%
6 to 10 years	18%
Over 10 years	57%

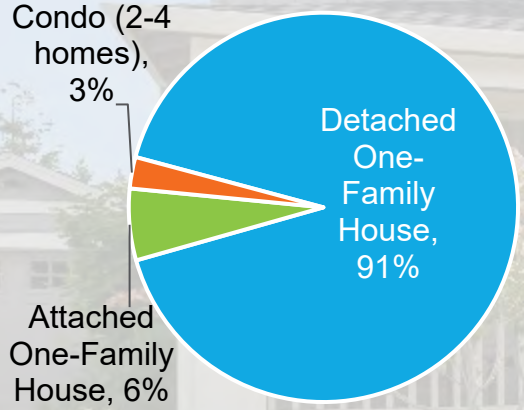
Average: **11 Years**

Bathrooms In the Home

Average # of Full: **2**

Average # of Half: **1**

Home Type



Other Fuel Sources (Other than Electricity)

Natural gas	64%
Oil	12%
Propane	11%

Water Source

Municipal service you pay for	84%
In ground well you own and maintain	15%
Other source	1%

HH Composition

1 Person	2 People	3+ People
16%	38%	47%

Average # of People: **3**

Ever Work From Home^: **73%**

Live In Cold Climate: **58%**

Region

Base: National Sample (N=1,497); National Sample and Work Full/Part Time (n=818)
Relevant Questions (See slide notes): S3, S5, S6b, S7, A7, A8, A9, G5, S4a, S4b

Rank Order of Drivers of Purchase Decision

By Owners of Water Heater Type

- Among current HP water heater owners, features such as First Hour Rating (FHR), Load shifting, smart phone capabilities, environmental impact and size of footprint are more impactful.
  - Up-front and operating costs and fuel source are less critical than to homeowners generally.

	National	Heat Pump Owners	Storage Tank Owners
Lifespan	1	5	1
High energy efficiency	2	4	2
Annual operating costs	3	11	3
Energy Star certification	4	12	4
Water heater fuel source	5	13	6
Cost of the water heater	6	15	5
Tank size/storage capacity	7	9	7
Recovery Rate	8	10	8
First Hour Rating	9	1	9
Type of water heater (storage tank, heat pump, etc.)	10	8	10
Environmental sustainability / Impact on environment	11	6	13
Length of warranty	12	21	12
Leak detection/auto-shutoff feature	13	18	11
Size of footprint/space needed for water heater	14	7	16
Cost to install water heater	15	20	14
Location in house where water heater can be installed	16	17	17
Load shifting	17	2	20
Brand reputation	18	19	18
Smart phone/WiFi/Bluetooth access	19	3	22
Utility rebates/tax credits	20	22	15
Quiet/Low noise level	21	23	19
Recommendation from salesperson/contractor/other professional	22	14	21
Vacation mode	23	16	24
Self-cleaning mode	24	24	23

Green/Red: Rank higher/lower +/-5 spots vs. National sample

Base: National Sample (N=1,497); Storage Tank Owners (N=1,111); HP Owners (N=225)
Relevant Questions (See slide notes): B1

Rank Order of Drivers of Purchase Decision

By West Region - Electric vs Gas Water Heater Owners

- Electric water heater owners in the West find first hour rating, smart phone capabilities and environmental impact more important than homeowners nationally.
- Gas water heater owners are more similar to national homeowners but find environmental impact more important.

		West Region		
	National	Total	Electric WH Owners	Gas WH Owners
Lifespan	1	1	1	1
High energy efficiency	2	3	7	3
Annual operating costs	3	4	5	4
Energy Star certification	4	2	8	2
Water heater fuel source	5	9	12	8
Cost of the water heater	6	7	13	5
Tank size/storage capacity	7	6	6	7
Recovery Rate	8	10	9	9
First Hour Rating	9	8	3	13
Type of water heater (storage tank, heat pump, etc.)	10	11	11	10
Environmental sustainability / Impact on environment	11	5	4	6
Length of warranty	12	13	17	11
Leak detection/auto-shutoff feature	13	12	14	12
Size of footprint/space needed for water heater	14	14	10	15
Cost to install water heater	15	18	22	14
Location in house where water heater can be installed	16	17	15	20
Load shifting	17	16	16	16
Brand reputation	18	19	19	19
Smart phone/WiFi/Bluetooth access	19	15	2	24
Utility rebates/tax credits	20	21	21	17
Quiet/Low noise level	21	23	23	18
Recommendation from salesperson/contractor/other professional	22	24	24	23
Vacation mode	23	22	18	22
Self-cleaning mode	24	20	20	21

Green/Red: Rank higher/lower +/-5 spots vs. National sample

Base: National Sample (N=1,497); West (Random only, N=322) West-Electric WH Owners (N=149); West-Gas WH Owners (N=163)
Relevant Questions (See slide notes): B1

Rank Order of Drivers of Purchase Decision

By California Subregion - Electric vs Gas Water Heater Owners

- Electric water heater owners in California find smart phone capabilities, environmental impact, first hour rating, load shifting and location where heater can be installed to be more important than homeowners nationally.
- Gas water heater owners in California are similar to national homeowners, but do find vacation mode to be a more important driver to water heater purchase.

		California Subregion		
	National	Total	Electric WH Owners	Gas WH Owners
Lifespan	1	1	8	1
High energy efficiency	2	3	5	4
Annual operating costs	3	2	4	3
Energy Star certification	4	5	14	2
Water heater fuel source	5	9	12	9
Cost of the water heater	6	10	19	6
Tank size/storage capacity	7	6	10	5
Recovery Rate	8	11	6	12
First Hour Rating	9	7	3	13
Type of water heater (storage tank, heat pump, etc.)	10	14	13	11
Environmental sustainability / Impact on environment	11	4	2	7
Length of warranty	12	12	21	8
Leak detection/auto-shutoff feature	13	13	17	10
Size of footprint/space needed for water heater	14	17	11	21
Cost to install water heater	15	18	24	14
Location in house where water heater can be installed	16	15	9	15
Load shifting	17	16	7	20
Brand reputation	18	20	15	23
Smart phone/WiFi/Bluetooth access	19	8	1	16
Utility rebates/tax credits	20	21	23	18
Quiet/Low noise level	21	22	22	19
Recommendation from salesperson/contractor/other professional	22	24	18	24
Vacation mode	23	19	16	17
Self-cleaning mode	24	23	20	22

Green/Red: Rank higher/lower +/-5 spots vs. National sample

Base: National Sample (N=1,497); California subregion (Random+Over-sample, N=351) CA-Electric WH Owners (N=130); CA-Gas WH Owners (N=208)
Relevant Questions (See slide notes): B1

Rank Order of Drivers of Purchase Decision

By Core Northwest Subregion - Electric vs Gas Water Heater Owners

- Electric water heater owners in the Core Northwest are more likely than homeowners nationally to find smart phone capabilities to be more important.
- Gas water heater owners in the Core Northwest are more likely to find utility rebates/tax credits and self-cleaning mode more important than homeowners nationally.

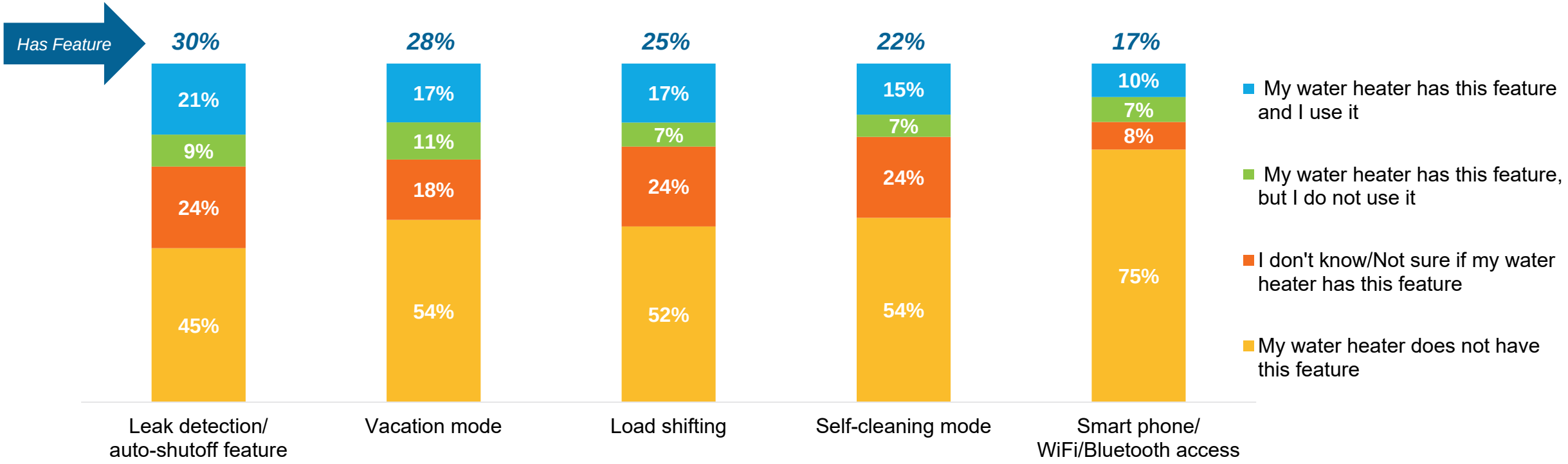
		Core Northwest Subregion		
	National	Total	Electric WH Owners	Gas WH Owners
Lifespan	1	1	1	1
High energy efficiency	2	3	3	2
Annual operating costs	3	2	2	5
Energy Star certification	4	5	4	3
Water heater fuel source	5	9	7	4
Cost of the water heater	6	10	12	7
Tank size/storage capacity	7	6	5	6
Recovery Rate	8	11	6	9
First Hour Rating	9	7	9	12
Type of water heater (storage tank, heat pump, etc.)	10	14	11	11
Environmental sustainability / Impact on environment	11	4	8	8
Length of warranty	12	12	15	13
Leak detection/auto-shutoff feature	13	13	13	10
Size of footprint/space needed for water heater	14	17	10	22
Cost to install water heater	15	18	20	14
Location in house where water heater can be installed	16	15	18	16
Load shifting	17	16	16	20
Brand reputation	18	20	21	17
Smart phone/WiFi/Bluetooth access	19	8	14	21
Utility rebates/tax credits	20	21	17	15
Quiet/Low noise level	21	22	22	23
Recommendation from salesperson/contractor/other professional	22	24	23	19
Vacation mode	23	19	19	24
Self-cleaning mode	24	23	24	18

Green/Red: Rank higher/lower +/-5 spots vs. National sample

Base: National Sample (N=1,497); Core Northwest subregion (Random+Over-sample, N=350) ID, MT, OR, WA; Core NW-Electric WH Owners (N=207); Core NW-Gas WH Owners (N=129)
Relevant Questions (See slide notes): B1

Water Heater Features

- Leak detection/auto-shutoff is the most common feature used among homeowners, still only about one-in-five have and use this feature.
  - Homeowners generally do not have, or are unaware if they have, features such as leak detection, vacation or self-cleaning mode and load shifting.

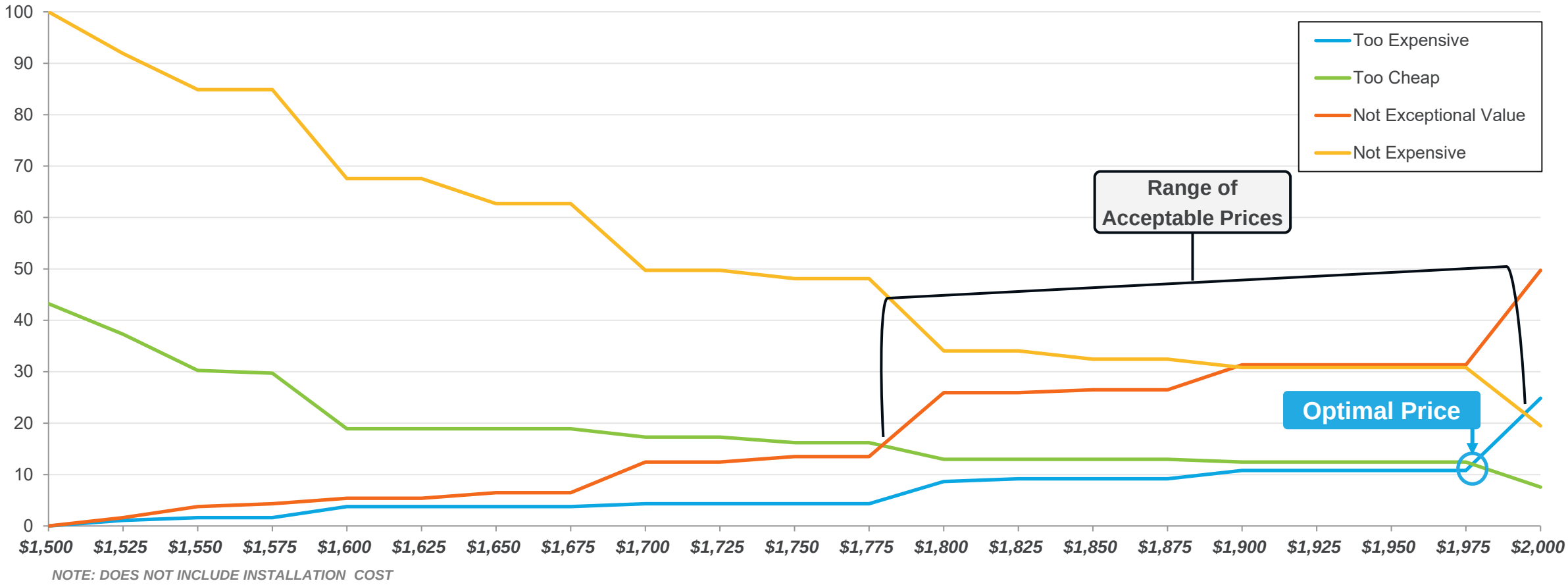


Base: National Sample (N=1,497);
Relevant Questions (See slide notes): B2

Gas Heat Pump Price Sensitivity Analysis

By Northeast Region

- In the Northeast, the *optimal* price for a gas heat pump water heater is *$1,975*, but prices between $1,775 to $2,000 are within the *acceptable range*.

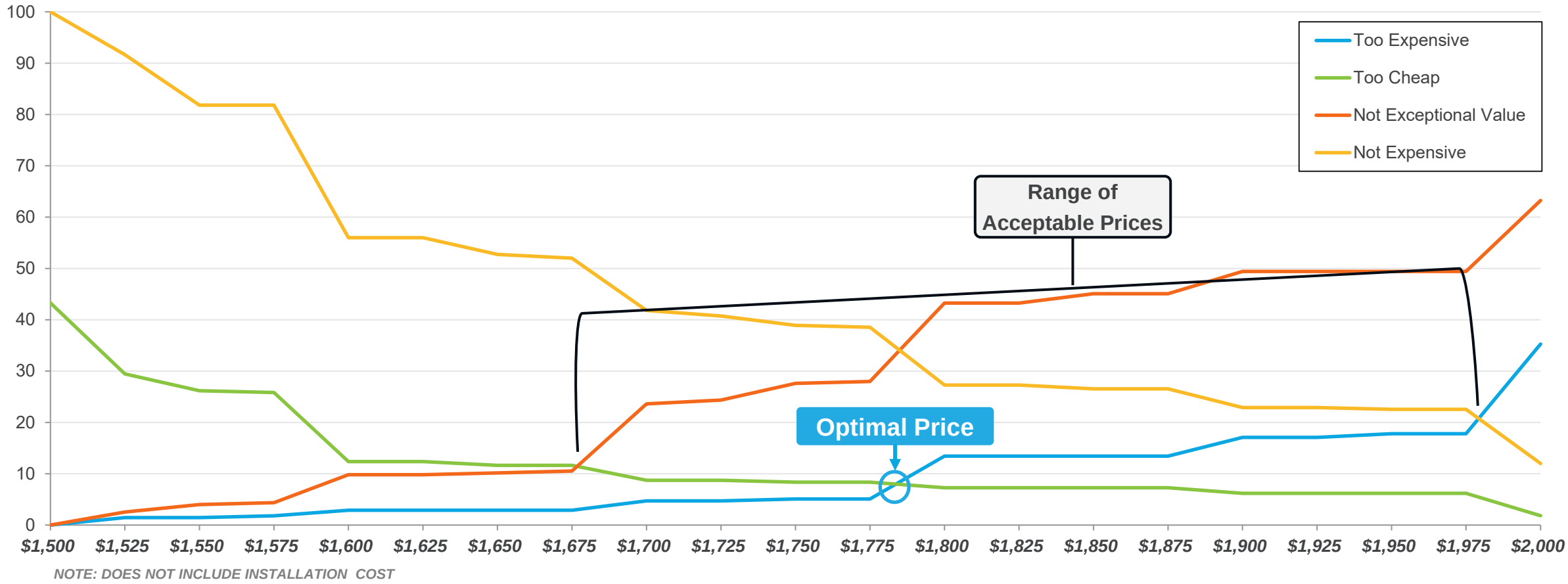


NOTE: DOES NOT INCLUDE INSTALLATION COST

Base: Northeast Region, Currently Have Gas Water Heater or Natural Gas Utility in Home (n=185)
Relevant Questions (See slide notes): E2

Gas Heat Pump Price Sensitivity Analysis
By Midwest Region

- In the Midwest, the *optimal* price for a gas heat pump water heater is *just over $1,775*, but prices between $1,675 to $1,975 are within the *acceptable range*.

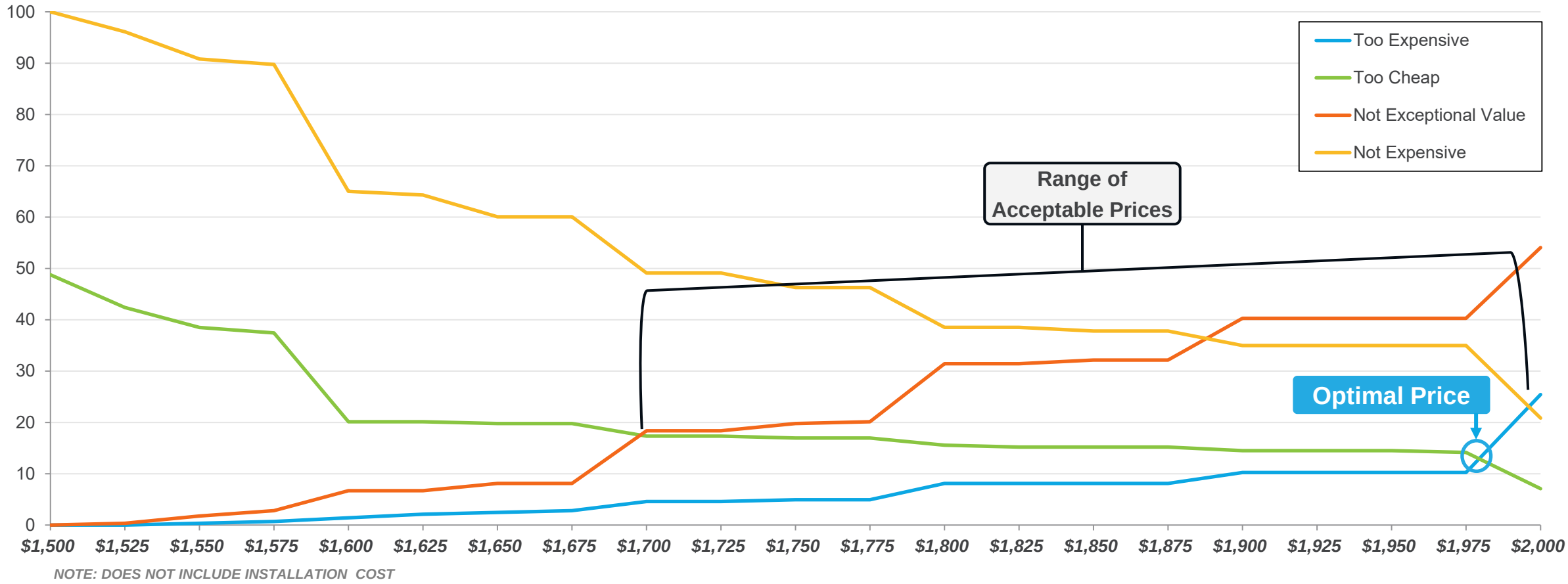


NOTE: DOES NOT INCLUDE INSTALLATION COST

Base: Midwest Region, Currently Have Gas Water Heater or Natural Gas Utility in Home (n=275)
Relevant Questions (See slide notes): E2

Gas Heat Pump Price Sensitivity Analysis
By South Region

- In the South, the *optimal* price for a gas heat pump water heater is *just over $1,975*, but prices between $1,700 to $2,000 are within the *acceptable range*.

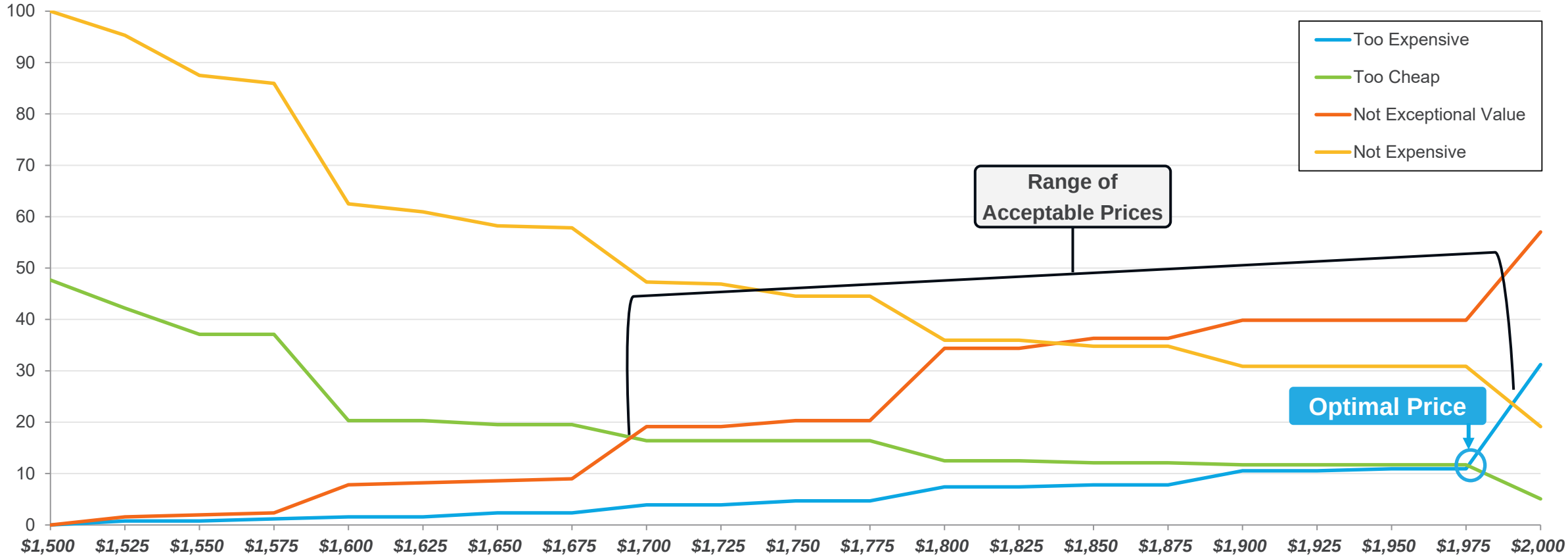


NOTE: DOES NOT INCLUDE INSTALLATION COST

Base: South Region, Currently Have Gas Water Heater or Natural Gas Utility in Home (n=283)
Relevant Questions (See slide notes): E2

Gas Heat Pump Price Sensitivity Analysis
By West Region

- In the West, the *optimal* price for a gas heat pump water heater is *$1,975*, but prices just under $1,700 to under $2,000 are within the *acceptable range*.

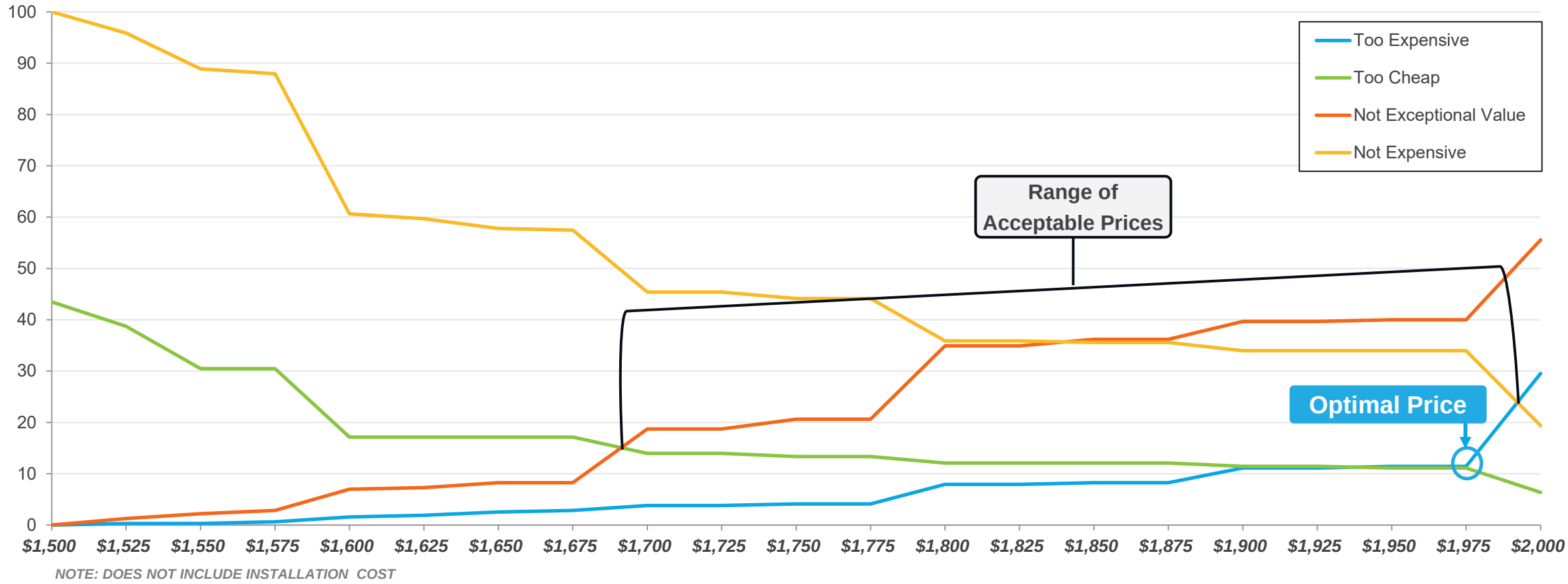


NOTE: DOES NOT INCLUDE INSTALLATION COST

Base: West Region, Currently Have Gas Water Heater or Natural Gas Utility in Home (n=256)
Relevant Questions (See slide notes): E2

Gas Heat Pump Price Sensitivity Analysis
By California Subregion

- In California, the *optimal* price for a gas heat pump water heater is *$1,975*, but prices just under $1,700 to under $2,000 are within the *acceptable range*.



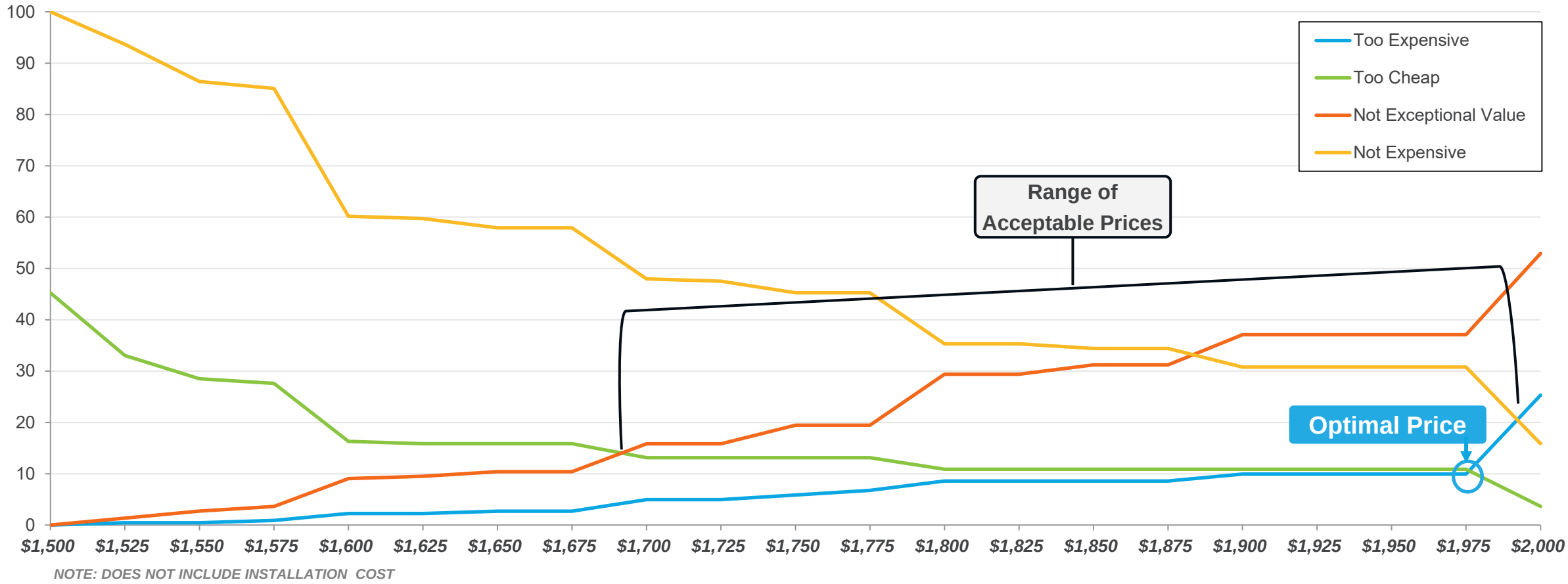
NOTE: DOES NOT INCLUDE INSTALLATION COST

Base: California Subregion (Random+Over-sample), Currently Have Gas Water Heater or Natural Gas Utility in Home (n=315)
Relevant Questions (See slide notes): E2

Gas Heat Pump Price Sensitivity Analysis

By Core Northwest Subregion

- In the Core Northwest, the *optimal* price for a gas heat pump water heater is *$1,975*, but prices just under $1,700 to under $2,000 are within the *acceptable range*.



NOTE: DOES NOT INCLUDE INSTALLATION COST

Base: Core Northwest Subregion (Random+Over-sample), Currently Have Gas Water Heater or Natural Gas Utility in Home (n=221)
Relevant Questions (See slide notes): E2

Hot Water Importance and Consumption

- Homeowners' top reason for wanting hot water is to take a shower.
  - Secondarily, hot water is important for washing clothes, dishes, baths, and washing face or hands.
- Washing face or hands is the most frequent activity that hot water is used for, followed by short showers, hand washing dishes, and food preparation.

Importance of Having Hot Water For Activity (Average Index Score=100)

Taking showers:	261
Running the washing machine:	117
Washing the dishes by hand:	99
Taking baths:	99
Running the dishwasher:	90
Washing face or hands:	90
Washing/preparing food:	72
Shaving:	45
Wash car (with hot water hook up):	27

Hot Water Consumption During Typical Week (Average # Times/Week for Household)

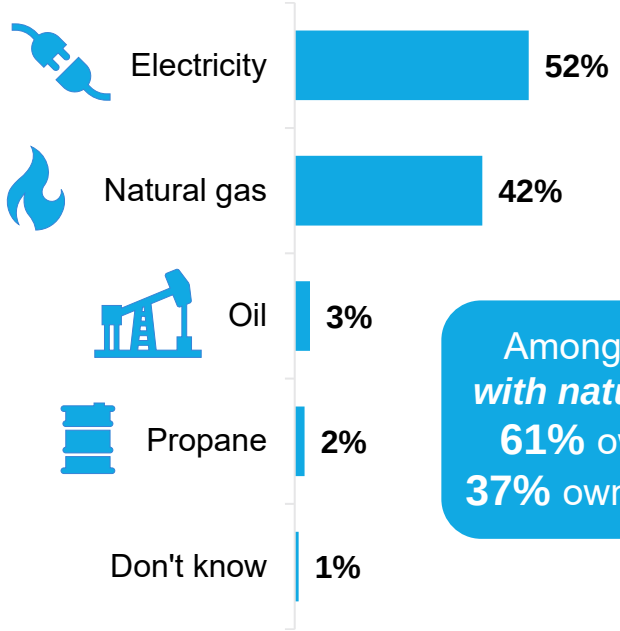
Wash face or hands:	24
Take a short shower (10 minutes or less):	7
Hand wash dishes:	6
Washing/preparing food:	6
Take a long shower (more than 10 minutes):	4
Washing a load of laundry:	4
Run dishwasher:	3
Shave:	3
Take bath:	2
Wash car (with hot water hook up):	<1

Base: National Sample (n=1,497)
Relevant Questions (See slide notes): A4, A5

Current Water Heater Ownership

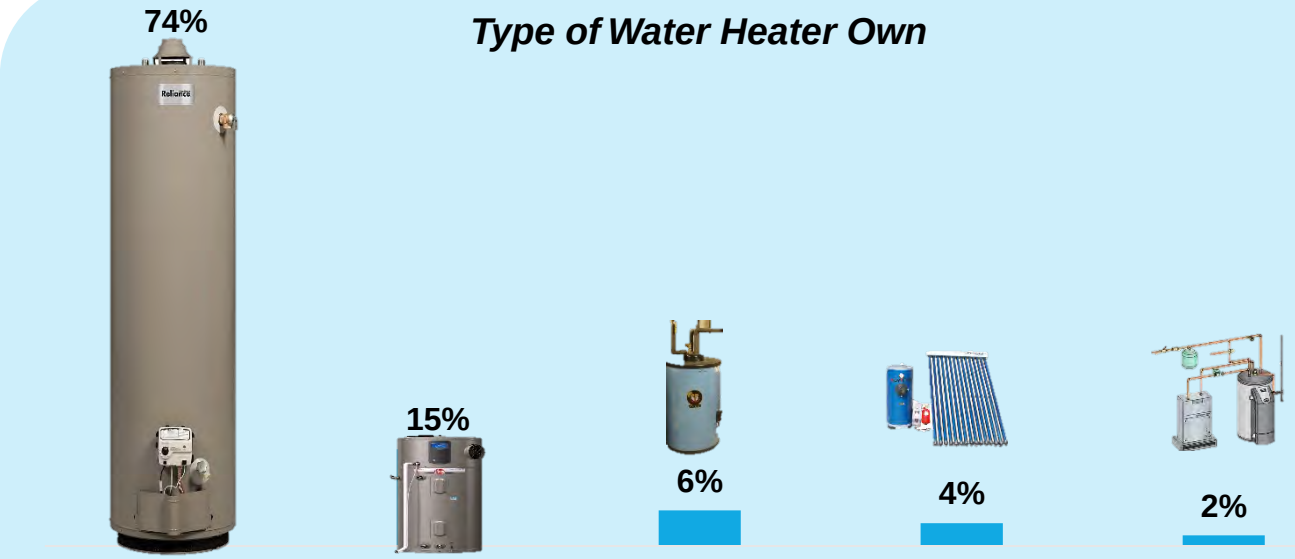
- Just over half of homeowners currently own an electric water heater, while two-in-five own gas.
- About three-quarters have a storage tank heater, and 15% own a heat pump water heater.

Water Heater Fuel



Among homeowners ***with natural gas utility***, **61%** own a *gas* WH, **37%** own an *electric* WH

Type of Water Heater Own



NOTE: Tankless owners not included in survey.

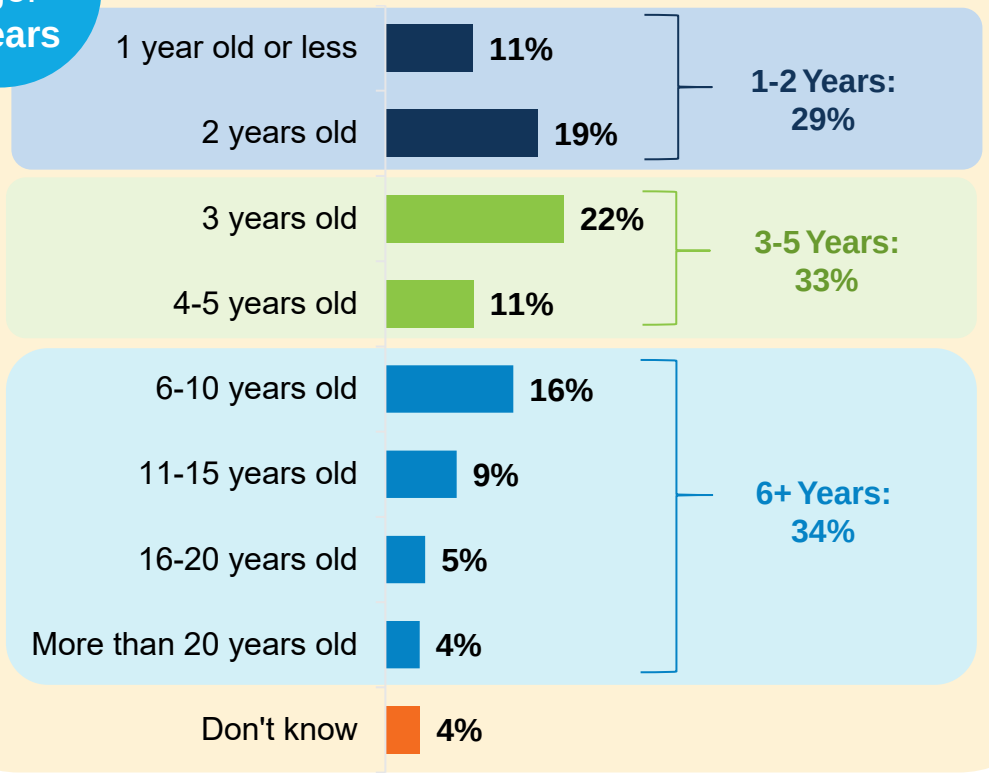
Base: National Sample (n=1,497); Have Gas Utility (n=962)
Relevant Questions (See slide notes): S11, S10, A8

Current Water Heater Ownership

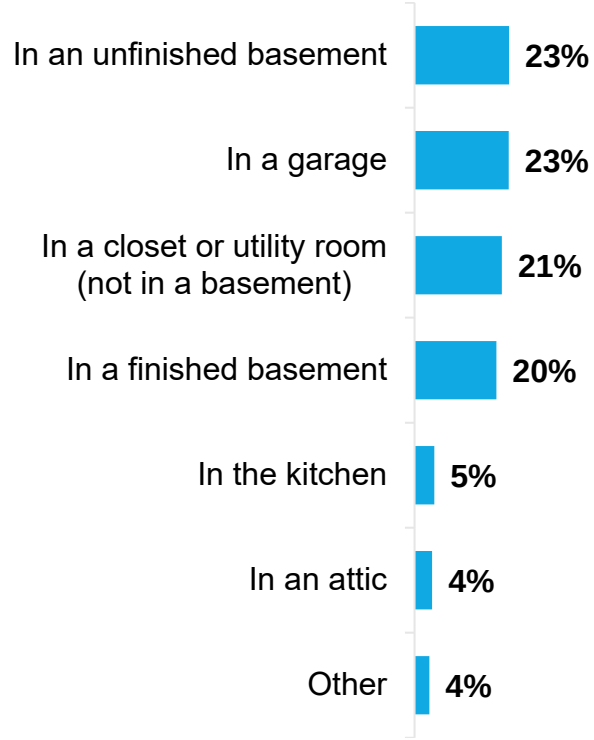
- On average, homeowners' have a water heater that is 6 years old.
- Water heaters are most commonly located in a basement, garage or closet/utility room.

Average Age: **6 Years**

Age of Water Heater



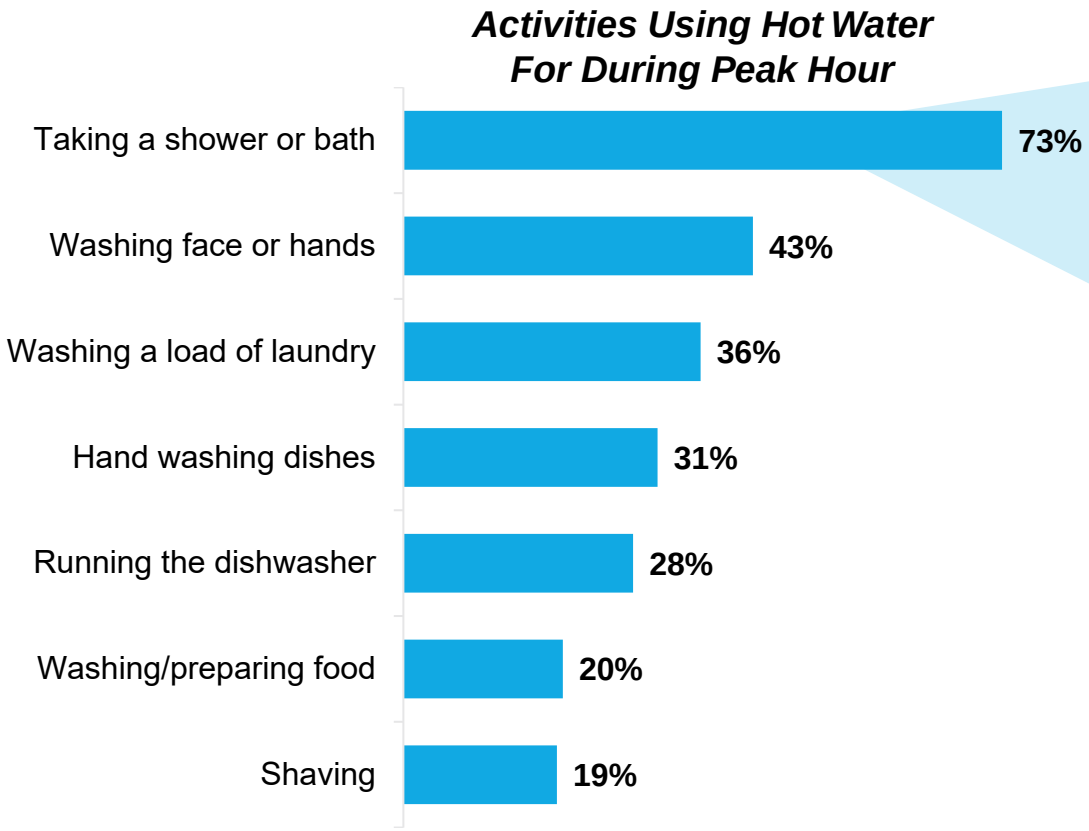
Where Water Heater Is Located

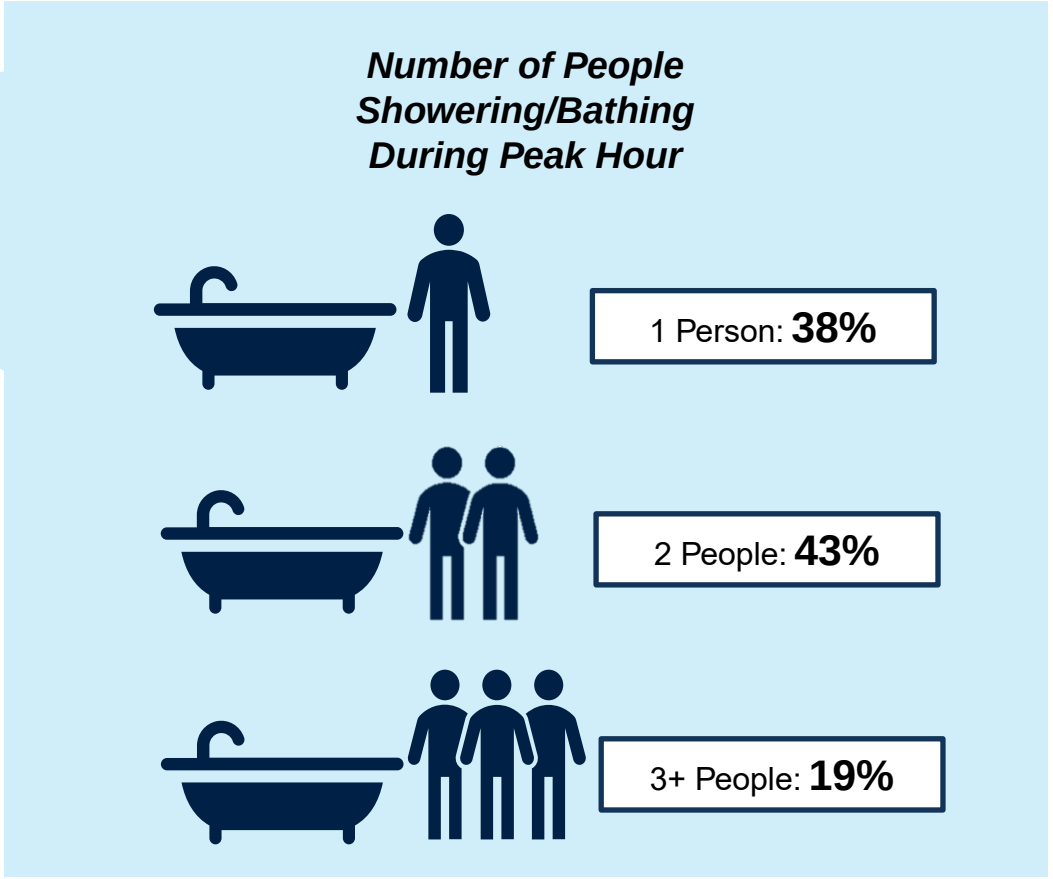


Base: National Sample (n=1,497)
Relevant Questions (See slide notes): A1, A2

Water Usage During Peak Use Time

- Taking a shower or bath is the top use of hot water during peak use time, and nearly two-thirds of households have multiple members showering during this time.





Peak use time defined as an hour during a typical day when the most hot water is used in household.

Base: National Sample (n=1,497)
Relevant Questions (See slide notes): A6, A6B

Appendix B – Phase 1 Results of Focus Groups with Water Heater Owners. Research conducted by ILLUME Advising LLC

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CONTENTS

RESEARCH GOALS AND OVERVIEW

Bigger Picture Context

Project Overview

Two components to this research:

1) Four focus groups (ILLUME Advising)
2) Survey (Lieberman Research)

Goals of the focus groups:

- Understand the value of hot water to consumers
- Get general reactions to different ways to pay for hot water
- Start to identify which features consumers value most
- How much they might be willing to pay for those features

Who We Spoke With

Project Overview

21 from higher-income households. About one-third reported a household income that's $60,000 or less, two of which reported earning between $30,000 - $40,000.

5 respondents were from rural areas (city population of about 20,000 people or fewer).

Gen Xers were the main generational cohort represented. Boomers and Millennials were equally represented.

21 use natural gas for their water heating.

16 have a standard storage water heater, 10 reported having a tankless water heater, and three reported having a HPWH.

State	# of Homeowners
Washington	19
Idaho	7
Oregon	5
Montana	1
Total	**32**

Research Goals & High-level Takeaways

Gain an understanding of consumers' relationship to and dependence on hot water in their daily lives, identify the different uses of hot water in the home, and rank their value to consumers.

> **Hot water is so important to people's daily lives that 'if [their] house did not have it, [they] wouldn't have purchased the house.' It's a non-negotiable, inherent part of their home.**

Establish consumers' likelihood to consider potential alternatives to the purchase of a water heater, including paying for hot water as a service, equipment leasing, and special financing programs.

> **Consumers are willing to consider more familiar payment strategies, like financing, but generally want to pay for their water heater in full. Hot water as a service was better received than leasing but people had many questions.**

For several specific (and realistic) features sets, determine a price range that consumers would be willing to pay. And determine the ideal price increment (or incremental cost) that consumers would be willing to pay for an efficient WH over a standard water heater.

> **Consumers are willing to pay more for features related to energy efficiency, hot water delivery, and longevity/durability of the product but noted that they needed more context about prices to decide.**

VALUE OF HOT WATER

Hot water is essential to people's lives

"Hot water is huge. It's pretty important. 12 hours [without it] and you start freaking out."

– Allison, Tankless Water Heater Owner

"Because [hot water is] something that you just take for granted and you're just like 'there's hot water.'"

– Jenna, Storage Water Heater Owner

Hot water was almost unanimously seen as **essential** in participants' lives and was ranked high on the list of **important things to have** in their day-to-day lives.

Hot water is considered **'inherent'** to their homes **rather than a feature ('something unique')**, the thought of spending an extended period without hot water was **upsetting** for most participants.

Most thought it would be a **great inconvenience** to spend time without hot water in the homes.

People said they would look for **alternative ways** such as going to the laundromat and showering in the gym or at a friend's home. Regardless, it would be a **considerable disruption** to their daily routines.

Main Hot Water Uses

#1 Taking Showers/Bathing #2 Washing Dishes #3 Doing Laundry

We heard from participants that **showers were the most critical hot water end use** for their household. It was also the hot water activity that they enjoyed the most.

People **described hot showers as a source of comfort**, a way to start/end their days, and in the colder months, showers are **an important way for people to warm up**.

While **hand washing or dish washing** with hot water was considered important to some (for sanitation reasons), others seemed **more flexible about whether they needed hot water** for those activities.

Most agreed that they **did not need hot water for laundry**.

"Nothing beats a nice bath or having a shower to start the day."

– George, Heat Pump Water Heater Owner

"In the winter I get cold, so I use a hot bath to get warm instead of using the heat."

– Penelope, Storage Water Heater Owner

People want their hot water back sooner, but there is some flexibility

Everyone wanted their hot water restored ASAP. However, despite hot water being very important to people, there is **some flexibility in how immediately** people needed it restored, **especially if there's an 'urgency convenience fee'** for getting it restored sooner.

People were cognizant that there might be delays because of the supply chain issues and labor shortage among the trades. Accordingly, there was a level of acceptance that this wouldn't be an immediate fix.

People's flexibility had an expiration date. Within **two or three days seemed to be the sweet spot** for how long people were willing to wait – it was a 'reasonable' wait period. However, **their patience and flexibility seemed to fizzle if it was going to take a week or longer** to replace.

Some will pay a premium to get hot water back sooner, some won't

"Two, three days of quick five-minute showers in the morning, I can deal with that ok. I'm not going to pay a bunch of extra money to get it faster."

– Dave, Storage Tank Owner

Responses varied when asked how much they would pay to get their hot water back in a scenario where their water heater failed.

Most people were willing to pay something extra to get their hot water back sooner. There were two main ways participants described what they were willing to pay to restore their hot water sooner: 1) they would pay some portion (typically 10 - 15%) of the total equipment cost, or 2) they would pay between $50 and $200 extra.

There were **a few participants who were not willing to pay a premium for faster replacement.** These participants **did not like the idea of paying more for the same piece of equipment** – one person characterized it as 'price gouging.' Some of these participants stated they would rather put that money toward temporary workarounds – e.g., housing their less colder water tolerant partner in a hotel – rather than paying it to the contractor for the same product.

Paying to get hot water sooner is contingent on timing and the season

Willingness to pay to get their hot water restored was contingent on the following factors:

- **How much sooner?** Most people wouldn't pay more to get it a day or two days sooner (they could figure out workarounds) but willingness to pay an ‘urgency convenience fee’ kicked in when the 'sooner' meant they would get it a week or multiple weeks sooner.

- **What season is it?** People seemed to feel that they could wait longer in the summer than colder months because it's easier to take a cold shower in the summer than winter.

Follow-up questions opened up possibilities for some people

Immediately after people were situated in the scenario where their water heater unexpectedly failed, **the urgency to restore their hot water was high, but for most this diminished overtime with additional questions/discussion**.

Aside from one person who opted for the 'off the truck' model, partly because it's what she has done in the past, the additional questions seemed to **cause people to think through the situation more tactically and slightly reduced their initial urgency**.

Two thought processes emerged through these questions/discussions:

- Some people recalled that they can and have lived without hot water (e.g., camping, power outages, past equipment failures), which prompted some to start thinking of **plans for how they could make do without hot water for up to a week**.
- Some **people's urgency to restore their hot water diminished when a premium to do so was introduced** because they were not willing to incur significant financial costs to get it restored sooner.

Competing priorities led people to different water heater decisions

While it's unclear whether the following decision journeys hold up when people are in the thick of an emergency replacement and as noted, it took a series of questions to get *some* people away from the 'I need hot water now' reaction, people generally landed in these two decision camps:

- Some were **willing to wait to get the water heater they wanted**, which might indicate that these consumers value features like high-efficiency, product quality/lifespan, etc. over getting their hot water back a few days sooner.

- Others were **still not willing to wait (opting for the quickest model – off the truck or from a store)**, which might indicate that these consumers value getting their hot water back sooner than the 'better/best' features.

"In that scenario [where you have to replace your heater] probably would purchase something straight away. I wouldn't want to wait – a couple of days is maximum and even that is probably pushing it... My husband's a mechanical engineer. We're pretty handy at installing stuff, so I would probably head down to Lowes or somewhere and check out what's there and install ourselves."

– Bernice, Tankless water heater owner

"I would rather spend a couple hundred dollars and send my wife to go visit her sister in Florida, and she could stay with her for a bit [rather than pay more money to get it replaced sooner]. I'll hang out for the week or two weeks it takes to get the one we want."

– Doug, Tankless water heater owner

WATER HEATER PERCEPTIONS

Water heaters are invisible systems

Since hot water is inherent to people's homes, **they do not spend a lot of time thinking about the piece of equipment that (thanklessly) delivers them hot water**.

People explained that they are **not top of mind** and are typically hidden in the garage or utility room – **it only becomes top of mind when it isn't working well, or it breaks**.

Accordingly, it was **difficult for people to discuss what features they want in their water heater**. When asked what features they imagined were associated with the 'good, better, best' options, several confessed they had **no idea what to care about with a water heater**.

Many noted that they would need to **do research** and/or would need to **rely on their contractor** to provide such information.

Participants had little idea of what to care about when it comes to their water heater

"I don't have a list of wishes for my next hot water heater. ***I feel if you asked me 'what stove do you want next' or 'what fridge do you want next,' I definitely have a list of the features that I want, but not when it comes to hot water heater.***

We recently just had to replace ours unexpectedly, and ***when [the contractor] said, 'well, what do you want', I said 'I don't care. Just give me the hot water heater; I've got eight people in my family.' And that day it was put in****…I just want hot water heater, but it might be ignorance too…maybe there's some really great hot water heater I don't know about that I should be wishing for."*

– Dani, Storage Tank Owner

"It's not anything you sit around and kind of pine 'oh, I really want a 'woo woo' hot water heater.' Maybe I should be, but I don't."

– Jenna, Storage Tank Owner

Consumers have little idea of what water heaters cost

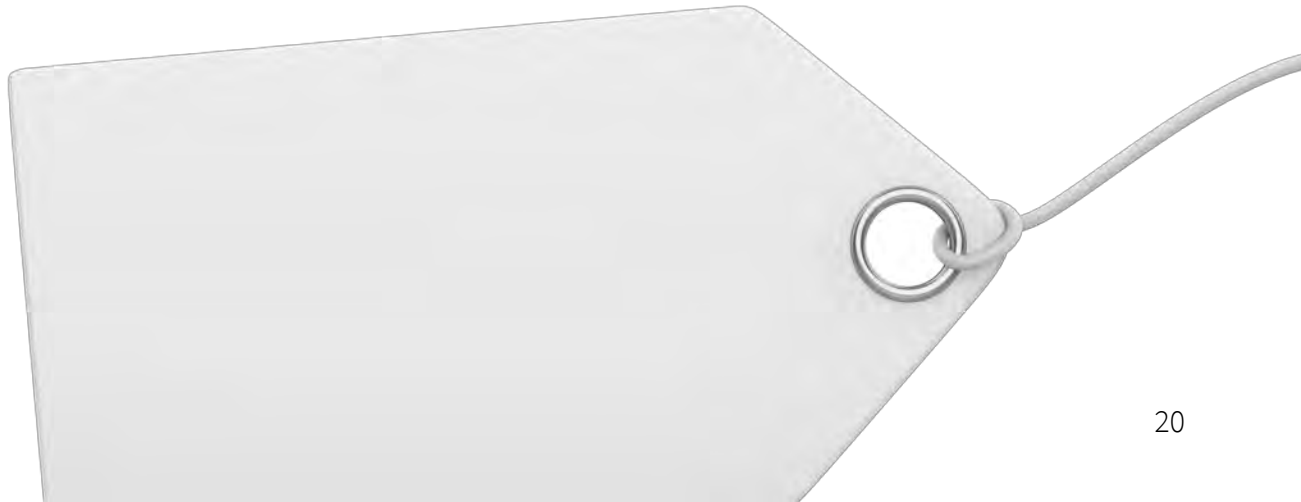
People don't have an anchor to conceptualize water heater prices.

The invisibility of water heaters also meant that some people did not have a good sense of how much water heaters typically cost – **they did not have a reference point or range to anchor their response**. Those who had a better sense of their cost typically had gone through a water heater replacement recently.

People who struggled to provide a price range explained that **they made guesses based on the cost of other equipment in their homes** (e.g., their HVAC system). One participant applied simple heuristics thinking and stated that 'anything that breaks in [their] home, [they] just assume it will be about $2,000.'

Prices for water heaters varied:

- The range was anywhere between $800 and $5,000
- The average was around $2,000



People gravitate toward ‘better/best’ options, with caveats

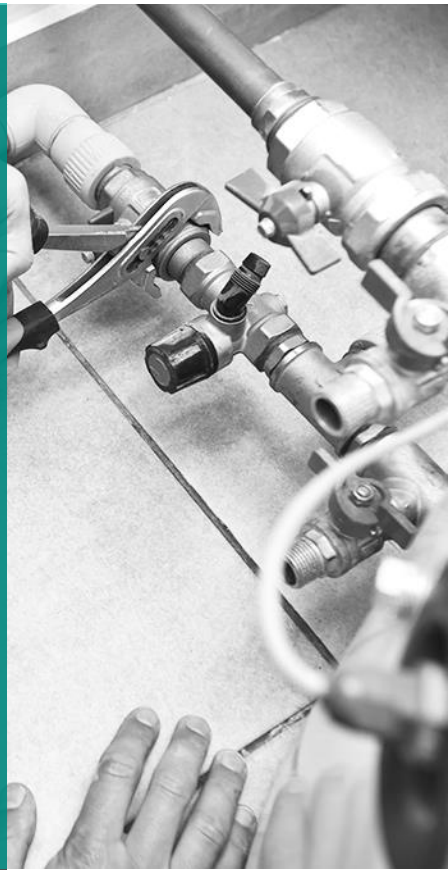
People want to make a sound decision on their water heater purchase and tended to gravitate toward the ‘better’ and ‘best’ options; though, with **caveats about needing to know the differences in prices and features** (e.g., what’s the warranty, cost to operate over the product’s lifetime). Their **decision typically came down to the incremental cost** between the ‘better’ and ‘best’ options, **rather than the ‘incremental features**.’

Several noted that if the ‘better/best’ models meant **a longer warranty and/or longer lifespan of the water heater**, then they’d be **willing to wait a few days longer** – one did caveat though that if it cost an ‘extra grand’ then they’d rethink their decision. Some explained that they were willing to wait a bit longer for a ‘better/best’ models because they expect to live in their home for years to come and **want to prolong replacing it again**.

People seemed to **disqualify the ‘off the truck model’ because they assumed it would be lower quality** – though, one person did think the opposite: if it’s carried on the truck, it must be popular and therefore better.

*“For me, I'm always thinking ‘if I'm staying in this house, how long would I be willing to live with something?’ Or, **‘how long am I going to be here before replacing it again.’** So, if I know I'm going to be here for another five or six years or 10 years, then I'm going to replace it with something better; I'll wait a week or two to find exactly what I want (that's not always with everything I do), but if I'm thinking about it, that's what I do.”*

– Cheryl, Storage Tank Owner



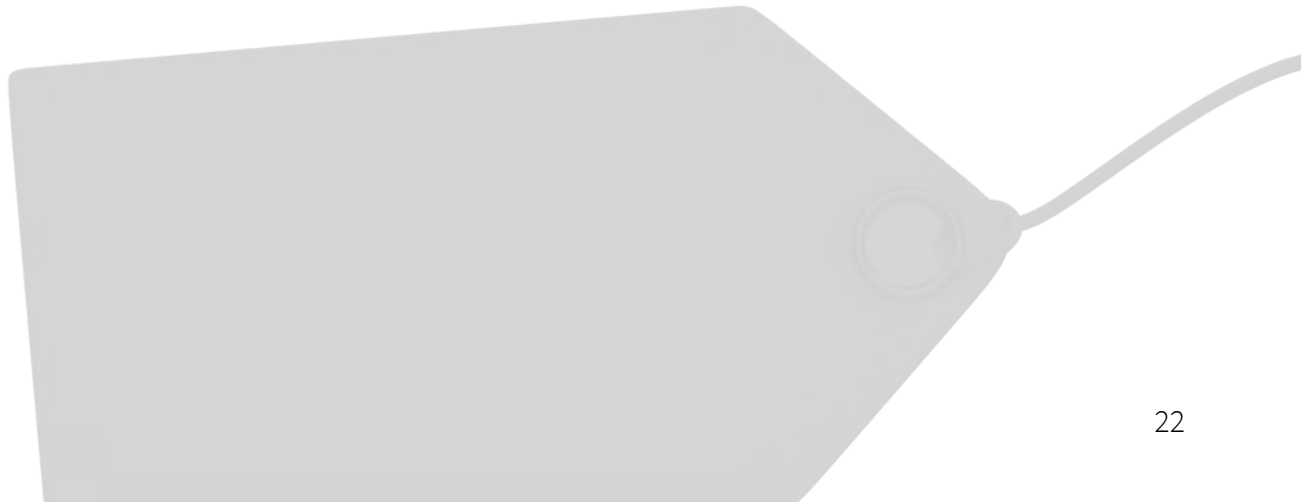
Price context matters because people ‘don’t know the cost of a water heater’

“I don't know the cost of a water heater. I wish I was more knowledgeable. ***$2,500 seems reasonable to me with a warranty and, like all the bells and whistles. But I just I don't know what the low end looks like. Like what's the cheapest models at $600 or $1800?*** *I don't know it doesn't seem like that much…*

We veer on the side of quality, we do our homework, we do a lot of research before we purchase anything, and we like the idea that we are getting a quality product versus ‘we just need to fix this’… ***if $2,500 was like a moderate price and they went up to $10,000 that influences kind of what I'm thinking about. If the highest model on the market is upwards of 8, 9, 10 thousand dollars, $2500 seems like a better deal.”***

– Abby, Storage Tank Owner

Although people are willing to pay more for a better product, we also heard that **price context matters and will influence *what* they are willing to pay** – i.e., if the water heater presented to them is $2,500 and they learn they could get something else for $800 then they might be less willing to pay the $2,500, even if it seemed reasonable initially.



People overwhelmingly chose tankless when building their ideal water heater

The way in which **tankless units are energy efficient seemed more accessible/comprehensible/intuitive** to people (water is only heated when needed) than HPWH.

People thought **a storage tank** (either HPWH or standard) would **deliver them hot water more instantly** than a tankless.

#1 Tankless

Benefits Highlighted

- Endless hot water
- Small footprint
- No risk of major leaks
- Energy efficient
- Familiar

#2 HPWH

Benefits Highlighted

- Energy efficient
- Hot water instantly

#3 Standard

Benefits Highlighted

- Familiar
- Hot water instantly

Water Heater Features

What is important and what is not

The most important features to people related to energy efficiency/bill savings, the equipment's lifespan/durability, and the ability to get hot water faster.

Interestingly, people commonly selected features that were inherent to the type of water heater they selected. This could signal the importance of those features to people and/or that they don't necessarily connect the inherent water heater features to the water heater type, which could be an educational opportunity.

Commonly Selected

Energy efficiency

Extended warranty

Fast recharge rate

Leak detection

"I think that reliability and warranty are directly related. They're not going to put a warranty on the equipment for five years when the typical lifespan of that is three years because they'd be losing money, so I think there is a direct correlation between reliability and warranty."

– Nathalia, Tankless Water Heater Owner

Water Heater Features

What's important and what is not

The 'fluffy' features, like smart technology and color options, were uniformly less important to people.

Given that water heaters are 'invisible systems,' features that didn't really relate to the base function of a water heater – deliver hot water – were generally not prioritized in the features they selected. People did not understand why they would need those features on a product that's typically out-of-sight, out-of-mind in their mechanical room.

Less Commonly Selected

Smart/Wi-Fi/Bluetooth

Color options

Vacation mode

Self-cleaning

"Color options, who cares, and smart Bluetooth, who's going to be having a conversation with their water heater?"

– Kris, Storage Tank Owner

RECEPTIVITY TO PAYMENT METHODS

Consumers want to pay in full, or use financing

Most people wanted to (if they could) **pay for their water heater in full using their bank account or credit card** (to get the points). This preference seemed driven by their **familiarity with this payment method** and because they **didn't want the expense lingering around**.

When we introduced three ways to pay for a hot water/water heater – leasing, financing, and hot water as a service – **most favored financing, especially if it was zero-interest for a period**.

Their proclivity for financing was driven by their **familiarity with the model, which meant they had fewer questions** about it, and some also noted that they **valued owning the water heater in the end** because they saw it as an investment in their home.

Hot water as service was received better than leasing

Participants generally received hot water as a service better than leasing but **in the end, only two people selected the hot water as a service during the 'build your ideal water heater' activity**.

Leasing was the least favored option of the three. People make remarks like 'leasing is never a good idea' because of the **perception that you'll end up paying more for the equipment in the end**.

For both payment models, some **liked that they would not be responsible for repairs or replacing the unit**.

Common questions about leasing and hot water as a service:

- *What is the rate per month?*
- *Will the rate change and by how much?*
- *How does the rate price out over the lifespan of the equipment?*
- *How much hot water do they currently use monthly?**
- *From whom would they be leasing or getting hot water as a service?*
- *What happens if you sold your home? Does the contract transfer to the new homeowner? Would this arrangement impact the sell-ability of their home?*
- *Could you have 'hot water outages' just as there are power outages?**

*Questions specific to hot water as a service.

Hot Water as a Service

Overview of Reactions

Receptive

Some people liked the hot water as a service concept because they thought it would **encourage them to waste less hot water**. Others, typically those with **smaller households**, thought this payment method **could save them money** over time since they already don't use a lot of hot water.

Skeptical

Participants who were skeptical had **a lot of questions** (as noted, many of which also applied to leasing) about hot water as a service. A few in one group noted that **'it would have to be a very small rate to make it attractive'** – in the range of $5 and $20 per month. It was also seen by some as **another bill they would have to manage**. A few in one group thought that this model **could make budgeting more challenging** if their usage varied between months.

Hot Water as a Service

Overview of Reactions

Opposed

There were also some who strongly opposed the hot water as a service concept. For example:

- One – a self-proclaimed environmentalist – appreciated the potential impact of conserving water but did not like this option at all. She thought **it seemed 'controlling' and was concerned about rate changes**. This perspective was shared with another participant in that group.
- Another person thought that hot water as a service was **like 'triple dipping**.' He explained that he is 'already paying for the water, then [he] would have to pay for hot water' and the fuel to heat the water. In other words, he was **concerned that he would essentially be paying for the water delivery and fuel to heat it twice**: once to the water company and gas/electric utility and another time to the hot water as service company.
- Another person who did not like the hot water as a service compared it to unlimited cell phone data '**you don't want limits**.'

> *"I don't want to think about how much water I'm using and being charged for each gallon. It's like the unlimited data in internet, you don't want limits."*
>
> – Jenna, Storage Tank Owner

CONSIDERATIONS FOR NEEA AND LIEBERMAN

Key Takeaways

Hot water is very important to people's lives; and they (naturally) **want their hot water back ASAP**. However, **most aren't willing to overextend themselves financially to make that happen**. The notion that 'people just want something in as quick as possible' because they need to have hot water is not wrong, but it does not seem to be the entire story. **People are willing and interested to pay more for a water heater that is more efficient and higher quality**.

Although people are willing to pay more for a better product, we also heard that **price context matters and will influence *what* they are willing to pay** – i.e., if the water heater presented to them is $2,500 and they learn they could get something else for $800 then they might be less willing to pay the $2,500, even if it seemed reasonable initially.

In an emergency replacement scenario, **follow-up questions and discussion *might* be able to move some consumers to 'wait for the water heater they want' even if it takes a bit longer**. This signals that some people could possibly be persuaded into a more efficient and/or higher quality water heater if it doesn't take too much longer. However, in our focus groups, **there were still those who seemed to value having hot water a few days sooner than the water heater (features) they wanted,** even after such discussions.

Marketing **the 'cool' and 'flashy' features** (e.g., wi-fi connectivity, vacation mode) **of efficient water heaters does not seem very compelling to consumers** because they care more that it is reliable, high-quality, and efficient – i.e., the functional features.

What we knew and now know

This research reinforced and expanded upon many findings from past ILLUME-NEEA projects.

Refined/Reinforced Findings:

- Consumer **knowledge** of water heaters' prices, features, and options are **low**.
- Consumers are **willing to pay more** for reliable/long-lasting and efficient water heaters.
- Some consumers *might* do their own research during an emergency replacement and/or opt for something 'better,' but that **willingness diminishes if it means they'll be without hot water for more than a few days**.
- Many consumers would **primarily rely on their contractor's recommendation** when deciding what to purchase.

Relevant Past Findings:

- Based on past research, contractors **tend to suggest like-for-like replacements** (especially in emergency replacement cases).
- Based on past research, contractors will generally **install whatever the consumers asks them to** – the market is driven by their demand.
- Based on past research, contractors **don't like to 'upsell'** customers. Selling their customers something they don't need **feels 'icky' to contractors**.
- Based on past research, contractors **don't like 'callbacks' or multiple trips.**
- Based on past research, contractors can successfully push more efficient water heaters, **if they invest in trainings and develop a sales team. However, this is challenging** for many contractors **given the high market demand and labor shortage**.

Education alone won’t cut it

Considerations for NEEA

Working with contractors so that their recommendation at the point-of-sale is a more efficient water heater seems like it would lead more consumers to purchase these products; however, **persistent and deep barriers such as contractor culture, business models, and the labor shortage** will impact the effectiveness of this type of intervention. Furthermore, this approach typically requires multiple visits from the contractor – 1) the technician confirms the equipment needs to be replaced, 2) the salesperson visits to lay out the options, 3) the technician returns to complete the installation – and neither consumers nor contractors want multiple visits. Overcoming these barriers will likely take a long time and this intervention may not effectively move the market in the near-term.

Intervening with the consumer before their water heater fails by educating them about water heaters could also increase the uptake of more efficient water heaters; however, based on these discussions, **customer interest in greater education seems limited** (i.e., if they don't care, why are they going to listen), and given that NEEA and utilities have been trying to educate (increase consumer demand) through efforts like 'Hot Water Solutions NW', this intervention may not effectively move the market in the near-term.

Next level interventions

Considerations for NEEA

Reconceptualize consumers' relationship with water heaters to focus on their deep relationship with hot water. Focusing on the importance of hot water in people's daily lives (rather than the equipment) could possibly help drive the adoption of efficient water heaters – presenting them as products whose quality and cost lives up to the importance that people place in hot water. However, household income would be a barrier for this intervention; it might make more people willing to wait/pay for an efficient water heater, but it doesn't necessarily solve for what people can afford.

Heavily incentivizing efficient water heaters so that they are effectively the same price (or cheaper since installation costs can drive up the overall cost of more efficient water heaters) as standard storage tanks and marketing those incentives to consumers, could prompt them to replace their water heaters before it's an emergency, since time to install can still be a barrier, with a more efficient product. This would generate the demand by consumers that contractors say they respond to and could alleviate the 'icky' feeling contractors get when they upsell to their customers. To understand how effective this intervention might be in shifting the broader market, it would be **important to explore** 1) the extent that incentives drive early replacements and/or how often incentives are used in emergency replacement situations, and 2) whether people's 'rainy-day funds' have enough cushion so that they are able to risk a planned replacement (or do they need to save that money for an unexpected expense, like medical bills or car repairs).

Remove inefficient water heaters from the market through regulatory changes. If behavioral and financial interventions are not effecting change at the desired pace because of 'persistent and deep barriers,' then the industry may need to refocus resources to changing the baseline of what manufacturers can produce and what suppliers can distribute.

Considerations for Lieberman

Things to test

The value of a water heater's lifespan: what are consumers willing to pay for a longer lifespan? What other features might they 'sacrifice' for a longer lifespan? Does their willingness to pay for a longer lasting water heater differ from their willingness to pay for a warranty?

The value of water heater realistic features sets: most valued features were longer warranty, energy efficiency, fast recharge rate and leak detection while the least valued features were Bluetooth features, color options, vacation mode, and self-cleaning. What are consumers willing to pay for each of these features? How does household income factor in decisions about features?

The way price anchors impact decisions: Customers don't have an anchor for what a water heater costs. Their estimates ranged from $800 to $5,000. How might price comparisons to other household systems/appliances impact decisions? How do changes to the lower/upper bounds impact decisions and preferences for features?

The impact of consumer education on decisions: When consumers are equipped with more information about water heaters going into an emergency replacement scenario, how, if at all, is their purchase decision impacted? Does more information make them more willing to wait for the product they want? How does their contractor's 'sales pitch' and/or recommendation factor in these scenarios?

See Appendix for more ideas.

Questions?

Amanda Maass

Senior Consultant

amaass@illumeadvising.com

APPENDIX

Considerations for Lieberman

Things to test – *Features*

For several specific (and realistic) features sets, determine a price range that consumers would be willing to pay. And determine the incremental cost that consumers would be willing to pay for an efficient WH over a standard water heater.

- The most popular features were longer warranty, energy efficiency, and fast recharge rate. The least popular features were Bluetooth features, color options, vacation mode, and self-cleaning. What are customers willing to pay for each of these features?
- The 'good' model when presented with options that were good, better, and best was not popular. In a new set of models, if there was an option that was least expensive with the most desired features, would people choose it? Or do you always need a least desired option for people to throw out?
- Move away from "good, better and best" descriptions in favor of shelf-like descriptions. How do customers' selections change?
- Because people generally eliminated the 'good' model, they were ultimately weighing the incremental cost of the best option against its features' incremental value. For some the 'best model' signaled it was the best, for others it signaled it had 'extra fluff' that was unnecessary. But what price jump is too high for people to consider extra features?

Considerations for Lieberman

Things to test – *Words*

Customers interchanged words to describe the features they needed. Map their definitions to industry definitions.

- Warranty seemed to mean long-lasting, longevity, free or stress-free replacement, or peace of mind to respondents. Do they really value a warranty or a long-lasting product? (See lifetime costs section below.)
- Respondents seemed to use ‘demand response’ like having hot water on demand. Test out other ways to present the opportunity to enroll in demand response programs to understand if that feature would be important to them.
- Energy efficiency to respondents was used similarly to a high energy rating, energy savings and bill savings, or environmentally friendly. Which term is most helpful to the customer in their decision?

Considerations for Lieberman

Things to test – *Anchoring*

Customers don't have an anchor for what a water heater costs. Their estimates ranged from $800 to $5,000. Try out different price anchors to understand the impact on willingness to pay.

- Benchmark against other home appliances, like stoves, air conditioning, or a furnace, which respondents used as bounds in the focus groups, rather than a range of water heaters. What have they paid for other things in their home?
- Does knowledge of water heaters drive budgets/willingness to pay up or down?
- Participants often rely on contractor knowledge and internet research, but they want to trust their information. Does a price bound that was initiated by a contractor move budgets up or down? From internet research?
- When people learned from other participants that they could get a cheaper water heater, it did influence the range they are willing to pay. Does a lower bound affect overall budget? With a lower budget, what features would be eliminated?

Considerations for Lieberman

Things to test – *Lifetime costs*

Multiple respondents talked about not wanting to deal with maintenance or extra contractor visits and wanted a long warranty. Explore how the expected total lifetime cost of a water heater impacts the up-front willingness to pay.

- Participants associated a longer warranty with better quality. What is their willingness to pay for different durations of warranties?
- We did not hear a clear expectation of the lifespan of a water heater. How long do people think a water heater should last? Does their willingness to pay for a longer lasting water heater differ from their willingness to pay for a warranty? Do customers have different expectations of lifespans by type of water heater?
- Participants were averse to maintenance and contractor visits. How much do they expect maintenance and a contractor visit to cost? How much more are they willing to pay upfront to avoid 1 visit or more?
- Participants wanted clarity on how much maintenance costs were built into the different payment models. If customers understood water heater lifetime maintenance costs, do they prefer to pay for maintenance spread out over time (as in hot water as a service or leasing), or would they rather pay it in lump-sum moments as needed?
- Participants valued energy efficiency (or other terms for energy savings, as noted previously). How much do customers expect to save on their monthly bill with an efficient water heater in the winter? In a year? How does that compare to the incremental cost of an efficient feature?
- When do customers upgrade their water heaters? In what years is there the greatest opportunity to educate customers?

Considerations for Lieberman

Things to test – Hot water as a service

There was some interest in the service model, but people had a lot of questions on rates and their own consumption. Figure out how to present the payment model with the information people need to make an informed decision to enroll.

- Participants didn't have a good benchmark for their water usage. Align on how much water an average house uses versus how much water people think they use.
- In Group 3, two participants estimated what they would pay for hot water as a service, ranging from $5 to $20 per month. What are the bounds that customers are willing to pay for a hot water bill? How does that change if the rate changes seasonally? Annually?
- Establish a range of how much customers spend on their regular water bills to use as an anchor. When contextualizing the cost of hot water with people's water bills, how does customer willingness to pay change?

Considerations for Lieberman

Things to test – Payment models

With several different options for payment models, participants gravitated towards financing and paying in full, the most traditional. How does more information and different comparison scenarios impact interest in a particular model?

- Participants weighed many different factors with each model. Create scenarios with monthly payments to lease, finance, and hot water as a service where each one shows metrics that are competitive with the others in the short term or long term. When the metrics are competitive, or equal in cost, which model do people choose?
- Financing was a common option but there were dependencies on the interest rate. How does consumers' interest in financing change, if at all, with different interest rates?
- Participants asked from whom they would be leasing or getting the service, and how much that party makes. If expectations were clearer about a 3rd party and their costs, how would customers choose their model?
- Participants asked what happens if you sell your home (does the contract transfer to the new homeowner), and how might that impact the sell-ability of their home. Test this factor on how customers would choose between payment models.
- No participants chose to lease their water heater. Further investigate willingness to lease a water heater.

Considerations for Lieberman

Things to test – Decision making journey

Characterize people by decision-making pathways and styles and identify how significant of a decision choosing a water heater is for customers.

- One participants had firmly decided that they would get the most readily available water heater, regardless of its features, because they didn't have flexibility with their hot water needs. However, others took a bit more time with their decision, even if they ultimately landed in the same place. What percentage of people would make this immediate decision?

- Even people who knew they can survive (and have survived) without hot water ultimately decided they would get the most readily available water heater rather than wait for the one they wanted. Is this because they value hot water more than those water heater features?

- We asked people a lot of questions about water heaters, prices they would pay, features they wanted, etc., which led to some people state that they were willing to wait for what they wanted. Did they make that decision because of the probing questions? And if so, what information/questions is most influential?

Who We Spoke With

Project Overview

	NATURAL GAS	ELECTRIC	BOTH	TOTAL
Boomer				
Storage Tank Water Heater	4	1		**5**
Tankless Water Heater	3			**3**
Heat Pump Water Heater			1	**1**
Gen X				
Storage Tank Water Heater	6	1		**7**
Tankless Water Heater	3	2		**5**
Water heater type not provided	1	1		**2**
Gen Y				
Storage Tank Water Heater	2	2		**4**
Tankless Water Heater		1	1	**2**
Heat Pump Water Heater	1		1	**2**
Water heater type not provided	1			**1**
TOTAL	**21**	**8**	**3**	**32**

Who We Spoke With

Project Overview

By state

State	Total participants
WA	19
ID	7
OR	5
MT	1
Grand Total	**32**

State	Natural Gas	Electric	Both/DK	Total participants
WA	11	6	2	19
ID	5	2		7
OR	4		1	5
MT	1			1
Grand Total	**21**	**8**	**3**	**32**

State	Storage Tank Water Heater	Tankless Water Heater	Heat Pump Water Heater	Type not provided	Total participants
WA	8	6	3	2	19
ID	4	2		1	7
OR	3	2			5
MT	1				1
Total participants	**16**	**10**	**3**	**3**	**32**

Who We Spoke With

Project Overview

By income bands

Income	Total Participants
$30-$40K	2
$50-$60K	8
$60-$70K	1
$80-$90K	6
>$90K	15
Total Participants	**32**

Income	Storage Tank Water Heater	Tankless Water Heater	Heat Pump Water Heater	Water heater type not provided	Total Participants
$30-$40K	1		1		2
$50-$60K	5	2		1	8
$60-$70K		1			1
$80-$90K	5			1	6
>$90K	5	7	2	1	15
Total Participants	**16**	**10**	**3**	**3**	**32**

Who We Spoke With

Project Overview

By age

Age	Total Participants
Boomer	9
Gen X	14
Gen Y	9
Grand Total	**32**

Age	Storage Tank Water Heater	Tankless Water Heater	Heat Pump Water Heater	Water heater type not provided	Total Participants
Boomer	5	3	1		9
Gen X	7	5		2	14
Gen Y	4	2	2	1	9
Total Participants	**16**	**10**	**3**	**3**	**32**