ENERGY STAR® Products
Partner Meeting 2020
Heat Pump Water Heater Program Design and Implementation
Heat Pump Water Heater
Program Design and Implementation

Session Overview

Nate Jutras, U.S. Environmental Protection Agency
Ryan Crews, Energy Trust of Oregon
Ryan Kiscaden, Bradford White Corporation
Panama Bartholomy, Building Decarbonization Coalition

October 2020
Heat Pump Water Heater Technical Advisory Committee

- Contact us at midstreamdistributor@ energystar.gov to set up a call with ENERGY STAR and the Technical Advisory Group. The group includes:
Agenda

- Background
- Challenges
- Lessons Learned
- Results
Background
Supply Chain

Upstream

Manufacturer

Midstream

Retailers

Regional Sales Reps

Distributors

End-User

Contractors

Downstream

Home
Water Heater Program History

Customer Incentive Form
Efficient Gas Tank Water Heaters

2010

Customer Incentive Form
Heat Pump Water Heaters

2014

Midstream - Retail
Instant Discounts at POS

May 2017

Midstream - Distributor
Instant Discounts at POS

June 2017

Eliminated Customer Incentive Form

Oct 2017

1st Limited-Time Promotion
DIY Focused

Dec 2019

2nd Limited-Time Promotion
DIY & Installers

Aug 2020
Midstream Program Basics

• Incentives:
  – $500 per unit

• Incentives provided to distributors and retailers
  – Retailers must:
    • Report # of units, model, SKU, store location, date of sale
    • Pass incentive through to customers
  – Distributors must:
    • Report # of units, make, model, serial #, branch location, purchaser name, sales date, housing type, install zip code
    • Pass incentive through to contractors (mostly)
Current Participation

• Retailers:
  – Lowe’s
  – Home Depot
  – Grover Electric and Plumbing Supply
  – Perry’s Electric & Plumbing
  – Ace Hardware
  – George Morlan Plumbing

• Distributors:
  – Ferguson
  – Keller Supply Co.
  – General Pacific
  – Consolidated Supply Co.
  – Fast Water Heater
  – NW Natural Appliance Center
  – Standard Supply
  – Plumbing Materials Supply
Special Promotions

- Began with a focus on do-it-yourself customers:
  - $50 bonus, plus $200+ of layered incentives (mfg., NEEA, supplier)
  - 35,000 targeted direct mail pieces
  - Online direct-to-customer fulfillment site

- 2nd promotion just launching
  - Adding installer options
  - Increasing marketing efforts
Income Qualified Offers

• $270 incentive for income qualified customers
  – Very little uptake

• Free units installed through partnership with community-based organization
  – Qualified and co-funded by Community Energy Project
  – Installed by Great NW Installations
  – 30-40 units per year
Challenges & Lessons
Distributor Challenges

- Unfamiliar with utility programs
- Difficult coordinating all branch locations
- Data reporting:
  - Difficulty providing installation zip code & housing type
    - Purchaser doesn’t always know this information at the POS
    - Sales staff might forget to ask for it
    - May need to get creative:
      - Contractor credit system
      - Administration payment
  - Administratively burdensome
- Eligibility requirements can be confusing
  - “Only these models, installed in these zip codes, into this type of home, during this period of time, get this discount amount.”
Retail Challenges

- Stocking and pricing can be inconsistent
- Mixed success with marketing efforts

Contractor Challenges

- Don’t always know how to sell or install HPWHs
- HVAC contractors vs. plumbing contractors
- Sold as a premium item with premium price
- Consumer demand is low
- Bigger and take longer to install
Lessons Learned

• Visit retailers and distributors often
• Keep it simple for distributors
  – Keep eligibility/reporting requirements minimal (i.e. accept some of the risk)
  – Require pass-through of incentives, or don’t
• Create special promotions to drive consumer demand
  – Get the price down
  – Ask for commitment from contractor and distributor partners
  – Support with targeted marketing
• Leverage new construction market demand
• Direct mail marketing
Results
Retail Channel

Limited-time promotion in December

Retail HPWH Units by Quarter

Midstream Units
Downstream Units
Distributor Channel

Distributor HPWH Units by Quarter

- Midstream Units
- Downstream Units

Graph shows the distribution of HPWH units by quarter, with peaks in Q2 and Q4 and lows in Q1 of each year from 2016 to 2020.
Thank you

Ryan Crews
Program Manager
ryan.crews@energytrust.org
The Power of Plumbing Professionals
Educating Homeowners

ENERGY STAR® PARTNERS MEETING

October 29th, 2020
Ryan Kiscaden, Senior Strategic Marketing Manager

BRADFORD WHITE
WATER HEATERS
The Power of the Plumbing Professionals
Educating Homeowners

• We will:

  • Emphasize how contractors are trusted advisers already in 3-5 homes each day for non-water heating service issues – Proactive sales opportunity for HPWH to replace current low efficiency product
  • Discuss the distinction between offering good, better, best selling for water heater replacement calls
  • Detail personal experiences which creates a more passionate approach to education
  • Show examples of how integrated marketing concepts help grow the heat pump water heater market
  • Demonstrate these principles in action with the Monterey Power and 2021 rebate program
Our Philosophy

We Believe in the **Professional Specification and Installation** of Water Heating and Water Storage products sold through **Wholesale Distribution**.
ENERGY STAR®
For You and Your Customers

Bradford White Wins ENERGY STAR® 2020 Partner of the Year Award
AeroTherm® Series
Heat Pump Water Heaters
One of the most advanced and efficient water heaters on the planet.
Thanks again for donating the Aerotherm water heater to [Name]. This lowered their HERS score by 5 points and enabled them to qualify for DOE Zero Energy Ready Home certification (see attached). I promoted your equipment at the North Carolina Habitat State Conference in Black.

---

**Home Energy Rating Certificate**

**Final Report**

**HERS Index Score:**

44

**Annual Savings:**

$1,031

*Relative to an average U.S. home

**This home meets or exceeds the criteria of the following:**

- Energy Star v3
- Energy Star v3.1
- 2009 International Energy Conservation Code

**Your Home’s Estimated Energy Use:**

<table>
<thead>
<tr>
<th>Use (MBtu)</th>
<th>Annual Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heating</td>
<td>$207</td>
</tr>
<tr>
<td>Cooling</td>
<td>$80</td>
</tr>
<tr>
<td>Hot Water</td>
<td>$49</td>
</tr>
<tr>
<td>Lights/Appliances</td>
<td>$566</td>
</tr>
<tr>
<td>Service Charge</td>
<td>$142</td>
</tr>
<tr>
<td>Generation (e.g. Solar)</td>
<td>$50</td>
</tr>
<tr>
<td>Total</td>
<td>$5816</td>
</tr>
</tbody>
</table>
How HPWH Works

Heat pump
- Evaporator draws in ambient heat using a fan
- Evaporator absorbs the heat and the compressor increases the temperature and pressure of the 134A refrigerant

External condenser coils
- Heated refrigerant flows through the coils to heat water in the tank
- Coils are external and surround the porcelain lined tank to prevent corrosion and calcium build-up
- Can take tank temp up to 140 degrees

Tank and electric elements
- If tank is depleted, HP cycles off and upper element (4500w) activates to recover top half of tank.
- Then upper element goes off and lower element comes on (4000w) AND the HP comes on (550W) to recover bottom half. Unit then returns to Hybrid mode.
Learning to tell the heat pump water heater story...
SEE THE LIGHT about Heat Pump Water Heaters!

• AeroTherm® uses the same energy as 5 ½ incandescent 100 watt light bulbs while in heat pump mode.

• Standard electric heating elements use the energy of 45 bulbs!
The Uniform Energy Factor (UEF) measures efficiency. The higher the UEF, the greater the efficiency – and the more money you save!

### AeroTherm®

**Saves $304 a Year vs. Electric!**

- **Standard Electric** .93 UEF: $419
- **AeroTherm® 3.39 UEF**: $115

**Saves $181 Per Year vs. Gas!**

- **Standard gas tank** .63 UEF: $296
- **AeroTherm® 3.39 UEF**: $115

**Saves $55 Per Year vs. Tankless!**

- **Gas tankless** .90 UEF: $170
- **AeroTherm® 3.39 UEF**: $115
Facebook – Did You Know series
Trademarking Initiatives

How You Heat Your Water Matters™
Integrated Heat Pump Water Heater Marketing
Which “Stream” Rebate Models Work?

- **Downstream** – Utility rebate offered directly to Consumer (traditionally mail-in rebates).
- **Midstream** – Instant utility rebate offered to Distributor or Contractor.
- **Upstream** – Instant utility rebate offered to manufacturer.
- **Markdown** – Price reduction available to ALL consumers shopping at that store or online.
- **Validated Instant** – Utility instant rebate offered to consumer after electronic validation that consumer is an account holder of the utility.

*Unrelated to connectivity/DRM*
Utility Engagement:
California Community Choice Agencies (CCA)

• **CCA (Community Choice Aggregation)**
  • Birthed from 2001 Energy Crisis (AB. 117)
  • Community Choice Aggregation (CCA) is a model that allows communities to purchase power to meet their electricity needs, offering an alternative in the market. CCAs can provide the communities they serve with competitively priced, clean energy choices while reinvesting revenues into projects and programs, supporting the local economy.

• CCAs are offering rebates/incentives for existing retrofit and new construction residential HPWH installations.

• Currently available CCA Incentive programs:
  • Sonoma Clean Power – Grid Savvy Program
    • Load shifting incentive program
  • Marin Clean Energy – Heat Pump Water Heater Contractor Rebate
    • $1000 in cash to participating contractors to install HPWH
  • Peninsula Clean Energy – Design Technical Assistance Program
    • All-electric building technical assistance program
  • Central Coast Community Energy – Residential Electrification Program (coming 2021)
    • Midstream installer incentives for HPWH installations in existing homes

• California CCA’s are and continue to pursue climate action and GHG reductions through clean energy development and novel decarbonization & electrification programs.
On behalf of Bradford White Water Heaters, thank you for your time.

Ryan Kiscaden
(P) 215-941-2124
(E) rkiscaden@bradfordwhite.com
Making Heat Pump Water Heaters the Right Fit for California

Panama Bartholomy
Director
California’s Climate Goals

**By 2030**
40% below 1990 levels *(SB 32, 2015)*

**By 2050**
80% below 1990 levels *(EO’s B-30-15 & S-3-05)*

**By 2045**
100% zero-carbon electricity *(SB 100)* &
*carbon neutral economy-wide* *(EO B-55-18)*
California’s GHG emissions today – Buildings 24%
Up to 60% GHG emission reductions can be achieved in the near term by electrifying a whole home in California.

Greenhouse Gas Savings
1990s vintage Single-Family Home (Sacramento)

- 45% reduction in 2020
- 61% reduction in 2030
- 82% reduction in 2050

California prepares to shift away from natural gas, while keeping power reliable and affordable

By Liane Randolph, Special to CalMatters
**Figure 1: Decarbonization Targets Within the Building Sector**

<table>
<thead>
<tr>
<th></th>
<th>Residential</th>
<th>Commercial</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Retrofits</strong></td>
<td>% GHG reduction below 1990 levels from the overall building stock:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2025: 20% GHG reductions from building sector</td>
<td>2030: 40% GHG reductions from building sector</td>
</tr>
<tr>
<td></td>
<td>2045: 100% GHG reductions from building sector</td>
<td></td>
</tr>
</tbody>
</table>

- Increase the share of high efficiency heat pumps for space heating from 5% of sales in 2018, to 50% in 2025 and 100% in 2030.
- Increase the share of high efficiency heat pumps for water heating from 1% of sales in 2018, to 50% in 2030.
Conceptual Market Transformation Pathway from Gas and Propane to Electric and Heat Pump Water Heaters

- Electric and Heat Pump Water Heaters
- Combustion Water Heaters

Year:
- 2020
- 2025
- 2030
- 2035
- 2040
- 2045

Water Heater Market Share (%):
- 0
- 20
- 40
- 60
- 80
- 100
NATURAL GAS USE IN HOMES
(% SITE ENERGY)

- Clothes Drying: 51%
- Cooking: 75%
- Water Heating: 95%
- Heating: 96%
Emergency
Average Installed Cost of Gas WH and HPWH

Gas Home

- **Gas Storage (existing buildings)**: $1,000-$1,600
  - 0.63 UEF
- **Gas Tankless (new construction)**: $3,700-$5,700
  - 0.81 UEF

Electric Home

- **Heat Pump**: $2,100 to $7,900
  - 3.0 UEF
Contractor Value Proposition

• Cost at distributor or retail
• Ease of program use
“So why would [a plumber] want to learn something like that when he can put in his normal water heater he's always put in, and get several done in a day if he wanted to?”
Panel Upgrades and Wiring

Panels: $3,000-$4,000
220V Wiring: $300-$1,000
Customer Awareness and Value Proposition

Fuel-switching is a leap of faith.
• Need broad-based and specific education
  • ENERGY STAR Helps here!
• Need the finances to be clearly better than a gas model, a no-brainer
Recommendations

Support rebates and incentives for fuel switching and for upgrading to efficient electric equipment.

Bringing down upfront costs motivates end-users to pursue those options and will help contractors sell this equipment more frequently.
GOAL 1: Customers, contractors and policymakers are aware of and demand building decarbonization measures.

GOAL 2: Customers receive a good value from adopting building decarbonization measures.

GOAL 3: Building decarbonization provides a better value to contractors than fossil-fuels.

GOAL 4: Supply-chains and delivery agents are able to meet rising demand for carbon-free building technologies with a quality product.

GOAL 5: Policies are aligned to maximize customer awareness of and interest in building decarbonization, the customer, builder and contractor value proposition, and the industry’s ability to meet rising demand.
Developed with input from broad industry and climate advocates coalition
Program Design Proposal

• Long-term (10 Year) State vision for water heating transition and investment plan
• Programs that can lower HPWH unit and installed cost below that of gas alternatives
  • Instant rebates to give customers the carrot they need to switch fuels
  • Avoid incentive to undersize, encourage right-sizing to maximize efficiency and flexibility benefit
• Programs that are easy for installers and customers to use
  • Pre-approved product list
    • ENERGY STAR!
  • Mid-stream, instant rebates
  • Simple and fast application and eligibility verification
  • Load shifting controls adder built into the retail price with incentive for load shifting
• Downstream panel upgrade and wiring assistance
Cost Case Studies

Total cost for each install will vary greatly based on:

- Product Cost (size and equipment type)
- Load Shifting Product Cost (hardware/software)
- Installation Cost (basic install/wiring/ducting)
- Energy Source Conversion Cost (panel upgrade)
## Classifications of HPWH Systems

<table>
<thead>
<tr>
<th>HPWH Type</th>
<th>Application Process</th>
<th>Definition</th>
<th>Eligibility</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Unitary</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Residential</td>
<td>Midstream Instant Rebate + Mail-In for Additional Costs</td>
<td>Heat pump water heater with a total nominal compressor output power of 6 kW or less, including integrated heat pumps with storage as shipped from the point of manufacture and split-system heat pumps that consist of a separate heat pump and storage tank that are designed and marketed to operate together.</td>
<td>NEEA Tier 3-compliant + JA13-compliant for load shifting adder</td>
</tr>
<tr>
<td>Commercial</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Residential</td>
<td>Midstream Instant Rebate + Mail-In for Additional Costs</td>
<td>Heat pump water heater with a total nominal compressor output power greater than 6 kW with integrated storage as shipped from the point of manufacture, including skid systems that are pre-plumbed and wired.</td>
<td>ENERGY STAR-certified + Appendix A-compliant for load shifting adder</td>
</tr>
<tr>
<td>Commercial</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Residential</td>
<td>2-Step Reservation Process</td>
<td>Heat pump water heater(s) without integrated storage as shipped from the manufacturer, and designed for residential, single and multi-family applications.</td>
<td>Approval in CEC Title 24 CBECC software + Appendix A-compliant for load shifting adder</td>
</tr>
<tr>
<td>Commercial</td>
<td>2-Step Reservation Process</td>
<td>Heat pump water heater(s), without integrated storage as shipped from the manufacturer, and designed for commercial applications.</td>
<td>Approval in CEC Title 24 CBECC software + Appendix A-compliant for load shifting adder</td>
</tr>
</tbody>
</table>
## Unitary Residential – Cost Samples

<table>
<thead>
<tr>
<th>50 gallons</th>
<th>Description</th>
<th>Cost</th>
<th>Cost with load shifting</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>No load shifting</strong></td>
<td><strong>With load shifting</strong></td>
<td></td>
</tr>
<tr>
<td>Unit</td>
<td></td>
<td>$1,100</td>
<td>$1,500</td>
</tr>
<tr>
<td>Wiring</td>
<td>From unit to panel</td>
<td>$300-$1,000</td>
<td>$300-$1,000</td>
</tr>
<tr>
<td>Other installation labor (plumbing)</td>
<td></td>
<td>$700-$1,000</td>
<td>$700-$1,000</td>
</tr>
<tr>
<td>Panel upgrade</td>
<td></td>
<td>$3,000-$4,000</td>
<td>$3,000-$4,000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Total pre-incentive</th>
<th>Unit price</th>
<th>Installed cost (w/o panel)</th>
<th>Installed cost (w/ panel)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$1,100</td>
<td>$2,100-$3,100</td>
<td>$2,500-$3,500</td>
</tr>
<tr>
<td></td>
<td>$5,100-$7,100</td>
<td>$5,500-$7,500</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Incentive</th>
<th>Base incentive</th>
<th>Load shifting adder</th>
<th>Installation</th>
<th>Panel upgrade</th>
<th>Max</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$800</td>
<td>up to $800</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$400</td>
<td>up to $800</td>
<td>$2,500</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$1,600-$4,100</td>
<td>$2,000-$4,500</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Total Cost to Customer</th>
<th>Retail price</th>
<th>Installed cost (w/o panel)</th>
<th>Installed cost (w/ panel)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$300</td>
<td>$500-$1,500</td>
<td>$500-$1,500</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$1,000-$3,000</td>
<td>$1,000-$3,000</td>
</tr>
</tbody>
</table>
A.O. Smith Signature Premier 50-Gallon Tall 10-year Limited 4500-Watt Double Element Electric Water Heater with Hybrid Heat Pump

- ENERGY STAR® certified, reduces water heating costs up to 72%, annual operating costs as low as $14 dollars
- Saves an average 3,000 dollars in standard projected operating expenses over 10 years versus a comparable standard storage water heater
- Two back-up 4,500-watt booster heating elements deliver when fast recovery is needed

Add to Cart

Free Store Pickup
Ready for pickup. Estimated by Jul 27
LeHomes

Delivery
Ready for Delivery. Estimated on Jul 26

Need this water heater installed? Lowe's can help. Simply call 1-877-GO-LOWES prior to purchase. In use/lifestyle images - accessories not included.
Incentive programs

~$450 Million
Retrofit-Ready Heat Pump Hot Water Heater Summit
October 22-23, 2018
San Francisco, CA

Demand-side
• Policy Makers
• Program administrators
• Permitting agencies
• Installers

Supply-side
• OEMs

• Size
• Amperage
• Voltage
• Grid-interactivity

• Technical Spec Group
• Program Framework Group

Thanks
<table>
<thead>
<tr>
<th>Category</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrical Constraints</td>
<td>Unit shall be able to operate on a shared 120 Volt / 15 Amp circuit.</td>
</tr>
<tr>
<td>Electrical Connections</td>
<td>Unit shall have a cord allowing plug in to standard 120V receptacle.</td>
</tr>
<tr>
<td>Space Constraints</td>
<td>To qualify as a “space constrained” product, the unit shall</td>
</tr>
<tr>
<td></td>
<td>• fit within a space of 24” x 26” x 72” inclusive of drain pan and all plumbing connections and</td>
</tr>
<tr>
<td></td>
<td>• be able to fit through an opening of minimum size as specified by the manufacturer and listed on the Qualified Products List.</td>
</tr>
<tr>
<td></td>
<td>If larger than these dimensions, the product will be listed without the space constrained mark.</td>
</tr>
<tr>
<td>Energy Performance</td>
<td>If First Hour Rating ≥ 51 gallons: Cool Climate Efficiency CCE ≥ 2.6</td>
</tr>
<tr>
<td></td>
<td>If First Hour Rating &lt; 51 gallons: Cool Climate Efficiency CCE ≥ 2.4</td>
</tr>
<tr>
<td>Sound Level</td>
<td>dBA &lt; 55</td>
</tr>
<tr>
<td>Warranty</td>
<td>10 year parts. 1 year labor.</td>
</tr>
<tr>
<td>Demand Response Connectivity</td>
<td>Optional – CTA-2045, or equivalent, and complying with the proposed California 2019 Title 24 requirements, JA-13, for electric water heater demand management. To be revisited on next specification revision.</td>
</tr>
<tr>
<td>Documentation</td>
<td>Installation manual shall contain necessary references to NEC, UPC, and describe a list of approved installation locations and electrical connection scenarios. It is strongly recommended that manufacturers create technical bulletins, or similar, to assist with installations in various installation locations and housing stock.</td>
</tr>
</tbody>
</table>
We know. You didn’t expect a water heater to make headlines.

New electric heaters. 75% less energy. No unhealthy emissions.

Switchison.org

Put your gas water heater out of our misery.


LEARN MORE
Thank you!
panama@buildingdecarb.org

buildingdecarb.org