

In accordance with the Department of Labor and Industry's statute 326.0981, Subd. 11,

“This educational offering is recognized by the Minnesota Department of Labor and Industry as satisfying 1.5 code/energy hours of credit toward Building Officials and Residential Contractors continuing education requirements.”

For additional continuing education approvals, please see the continuing education credit section in the conference agenda booklet.

February 2023

FEELING HOT, HOT, HOT...WATER!

Energy Design Conference and Expo 2023

Dan Wildenhaus

Sr Technical Manager - Decarbonization



Agenda

- Dan Wildenhaus – overview and how we got to where we are now!
- Francois Lebrasseur, A. O. Smith
- Gregg Holladay, Bradford White Water Heaters
- Tim Gaughan, Rheem Manufacturing Company

- Open Q and A session with YOU!



CEE's nonprofit mission

The Center for Energy and Environment discovers and deploys the most effective energy solutions that strengthen the economy and improve the environment.

We provide practical energy solutions for homes, businesses, and communities.

WE STAND FOR

- ✓ Collaboration
- ✓ Expertise
- ✓ Science
- ✓ Community
- ✓ Integrity
- ✓ Equity



Dan Wildenhaus
Sr Technical Manager
Decarbonization Training
and Consulting Services



At our core



PROGRAMS

We cut energy waste and improve comfort in homes, buildings, and communities.



RESEARCH

We identify cost-effective, efficient technologies through analysis, modeling, and engagement.



CONSULTING

We help building owners and entire communities achieve long-term, energy-saving solutions.



LENDING

We empower people to make upgrades on energy efficiency and comfort in homes or businesses.



POLICY

We strive for high-impact, pragmatic solutions guided by a public interest ethic.

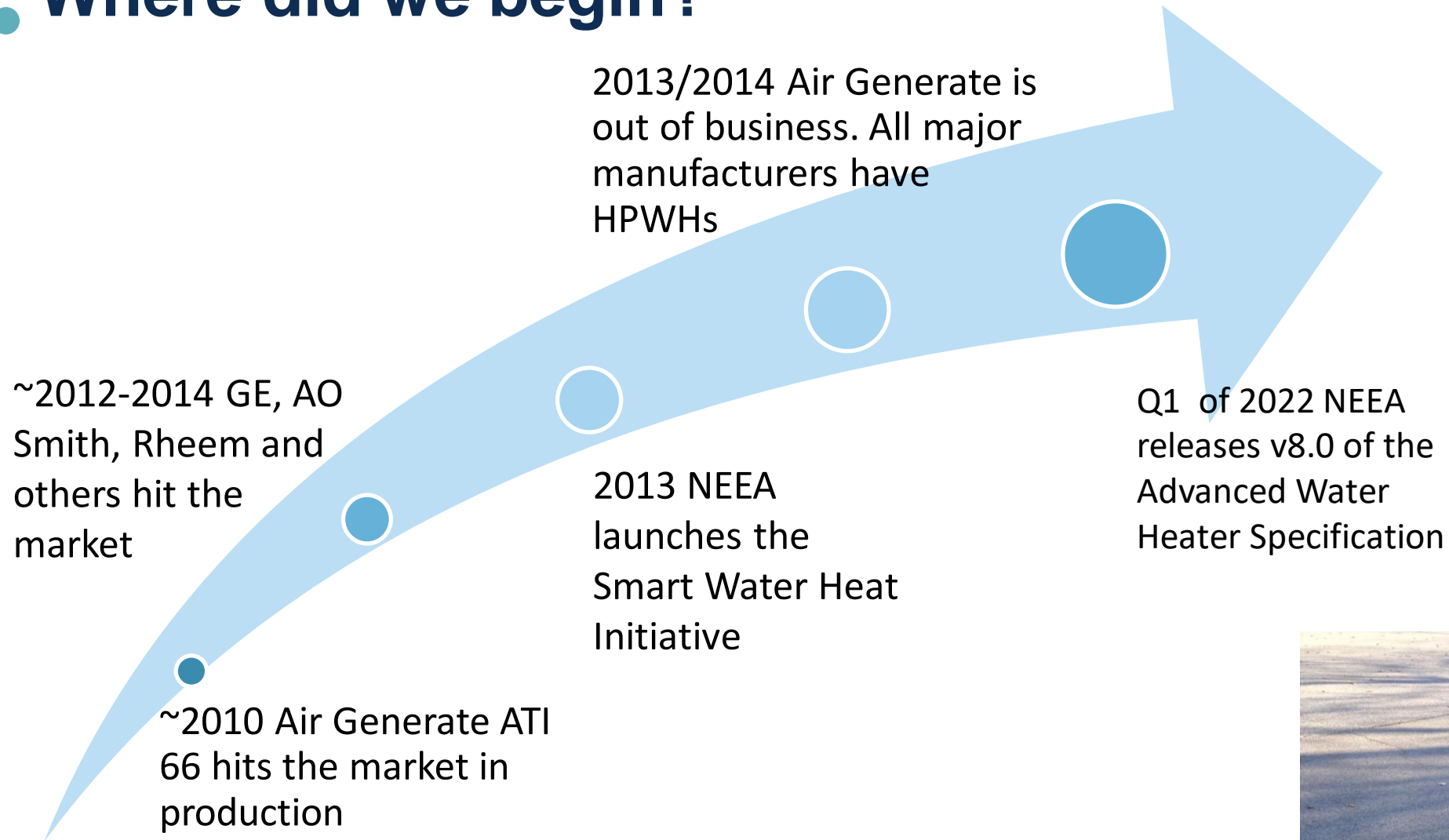


MARKET TRANSFORMATION

We accelerate adoption of promising technologies through early market engagement.

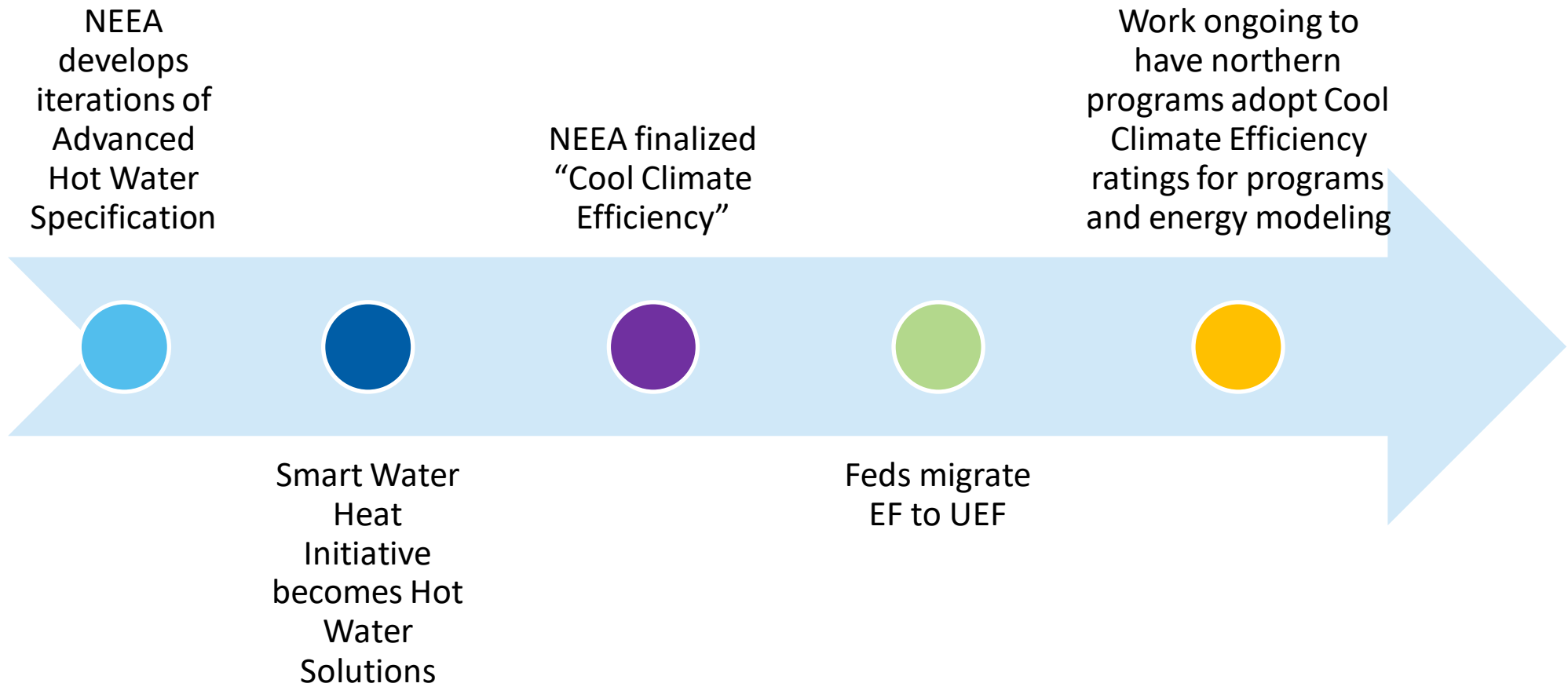


Where did we begin?





Along the way



•• The New Standard





Product Tier Overview

<https://neea.org/img/documents/Advanced-Water-Heating-Specification.pdf>

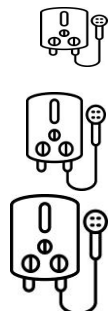
<https://hotwatersolutionsnw.org/partners/news/user-guide-qualified-products-list-explained>

		TIER 3			TIER 4	TIER 5
		Demand response capable			Limited use of resistance element	NO use of resistance element
		Air filter management dBA <55			Air filter management dBA <50	Air filter management dBA <50
		Intake and exhaust ducting			Intake and exhaust ducting	Intake and exhaust ducting
		Manage condensation	Manage condensation	Manage condensation	Manage condensation	Manage condensation
		Conditioned installations	Conditioned installations	Conditioned installations	Conditioned installations	Conditioned installations
TIER 1	ENERGY STAR compliant	ENERGY STAR compliant	ENERGY STAR compliant	ENERGY STAR compliant	ENERGY STAR compliant	ENERGY STAR compliant
	Semi-conditioned installations	Semi-conditioned installations	Semi-conditioned installations	Semi-conditioned installations	Semi-conditioned installations	Semi-conditioned installations
	Unconditioned installations	Unconditioned installations	Unconditioned installations	Unconditioned installations	Unconditioned installations	Unconditioned installations



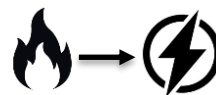
General recommendations for success!

Rough sizing guestimator



Tank Size (gallons)	# or Occupants
50	2-3
65/66	2-4
80	3-6

Consider going up a size when...



Going from gas
storage unit to
a HPWH



House includes
children or
teenagers



Occupancy
likely to change
within 5 years

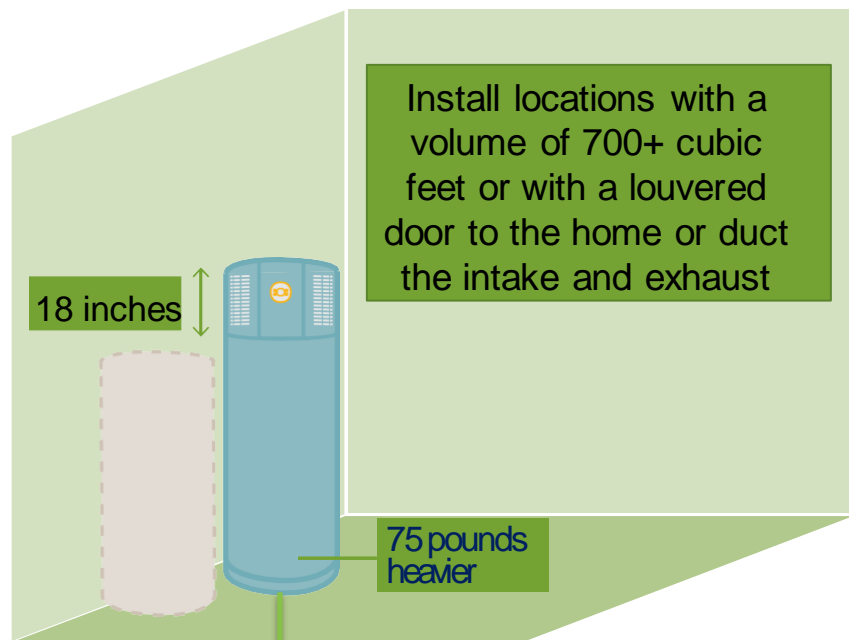
Setting expectations through estimations

	HPWH	Gas tank	ER tank
Showers - # consecutive showers delivered	2.75 – 3.25	3.5	3.25
Efficiency (UEF) – The higher the better!	2.9+	0.61 – 0.70	0.92 – 0.95
First Hour Rating - # of gallons hot water delivered in first hour	67	67	66
Recovery Rate – Gallons a heater can raise by 90°F in one hour	29	40	22
Average Warranty in Years	10-12	6-10	6-10



General recommendations for success!

Location, location, location...



Consider installing a foam pad between HPWH and cement floor

A la modes...

Hybrid or Auto mode: This is typically the best combination of efficiency and performance. The heat pump does most of the heating with small boosts from resistance elements when needed.

Heat Pump or Efficiency mode: For homes with two people or fewer, or less than average water use. This mode relies solely on the heat pump.



And for the real deals...



cee^{••}



Voltex[®] AL Hybrid Electric Heat Pump Water Heaters

HPWH Market Transformation

	IA, MN, ND, SD
Water Heating	
Total Homes.....	3.9
Fuel Used by Main Water Heater	
Natural Gas.....	2.2
Electricity.....	1.4
Propane/LPG.....	0.3

<https://www.eia.gov/consumption/residential/data/2009/#water>

- **Need Utility Midstream instant rebates \$700 or more, at Wholesale and Retail**
- **Heavily natural gas market.....**
.....Will fuel switching be allowed by the Utility programs?

Introducing the Voltex AL

Smart Residential Hybrid Electric Heat Pump Water Heaters

Market leading performance and features

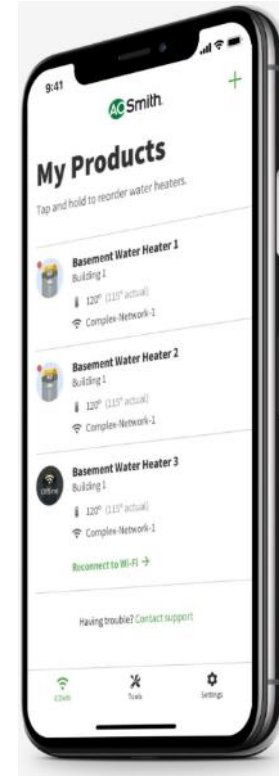
- **4x to 5x more efficient than a standard electric or gas water heater***
 - 4.02 UEF (66-gal); 3.80 UEF (50-gal)
- **Top & Front Water Connections**
- **Zero Clearance Design (sides/back)**
- **Quietest Operation (45 dBA)**
- **iCOMM™ Smart Connectivity w/ Leak Detection**
- **Smart Anode**
- **ENERGY STAR certified, NEEA Tier 4**
- **50, 66, 80-gal sizes**



iCOMM Smart Connectivity

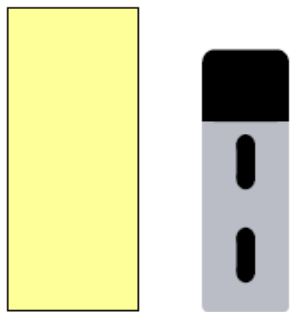
Connect to the free A. O. Smith app

- WiFi and Bluetooth connectivity
- Alerts and notifications
- Change set point temperature
- Change operating mode
- Schedule when you want hot water to save on energy usage
- Load Utility Time of Use rate plan schedule to prioritize heating when electricity is inexpensive



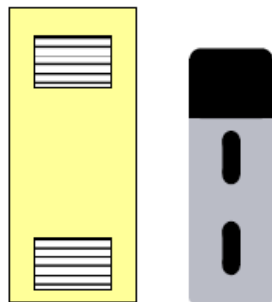
Confined Space Ventilation Options

If room is $\geq 450 \text{ ft}^3$ no additional ventilation is required



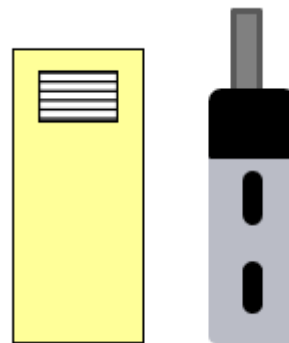
Room $\geq 450 \text{ ft}^3$

Enclosed room is allowed



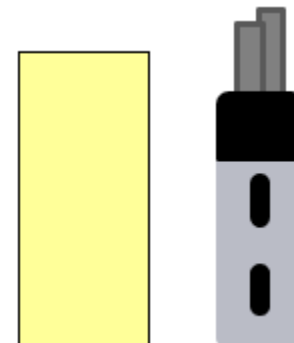
Room 84-449 ft^3

- a) Louvered door
- b) Double louver
- c) Single louver and undercut door



No minimum size

- Inlet or Outlet ducting and
- a) Single louver
- b) Undercut door



No minimum size

Inlet and Outlet ducting

HPWH / Furnace Interactions

Interaction between Heat Pump Water Heaters or Other Internal Point Source Loads and a Central Heating System – Pacific Northwest 2017 – PNNL/NEEA

“...the thermal distance of the load from the thermostat [is] the dominant factor in determining the degree to which the load “interacted” with the space conditioning system. “

https://www.pnnl.gov/main/publications/external/technical_reports/PNNL-26447.pdf

Heat pump water heaters in cold climates – Michigan 2022 - Slipstream

“**Customer satisfaction wasn't an issue in our study.** Our monitored installations were all in basements of single-family homes, and we couldn't detect an increase in space heating from using a heat pump water heater. Residents rarely complained about the HPWH affecting their comfort in their home. In fact, overall, our survey respondents reported high satisfaction with the technology.”

<https://slipstreaminc.org/research/heat-pump-water-heaters-cold-climates>

Product Training Resources

[PRODUCTS](#)
[ONLINE CERTIFICATIONS](#)
[ON CAMPUS TRAINING](#)
[LIVE](#)
[CONTACT](#)

Residential Hybrid Electric Heat Pump

[Top Service Items](#)
[Additional Resources](#)

Heat pump water heaters are the most efficient type of electric water heater and are required under NAECA III for some applications. Heat pump water heaters are easy to install, but do require management of the condensation produced. Heat pump water heaters have built-in diagnostics to make troubleshooting easier. Most problems can be diagnosed with the built-in diagnostics and a multi-meter.

Features and Benefits

FEATURES:

- High efficiency design
- Energy Star certified
- Built-in diagnostics
- Easy to install
- Quiet operation
- Long life expectancy
- Low maintenance
- Low energy consumption
- Low carbon footprint
- Low cost of ownership

How It Works

HOW WATER HEAT PUMP WORK

Application and Installation

LEARN MORE IN HEAT PUMP ACCESS

Get factory certification on this product today. Click here to start.

[PRODUCTS](#)
[ONLINE CERTIFICATIONS](#)
[ON CAMPUS TRAINING](#)
[LIVE](#)
[CONTACT](#)

Heat Pump Certification

Heat pump water heaters are the most efficient type of electric water heater and are required under NAECA III for some applications. Heat pump water heaters are easy to install, but do require management of the condensation produced. Heat pump water heaters have built-in diagnostics to make troubleshooting easier. Most problems can be diagnosed with the built-in diagnostics and a multi-meter.

Some electric utilities require that installers be certified by the manufacturer in order to qualify for utility rebates. The certification test below meets current utility requirements.

1: Heat Pump Water Heater Installation (7:17 min)

Certification Test

<https://university.hotwater.com/products/residential/heat-pump/>

<https://university.statewaterheaters.com/products/residential/heat-pump/>

AeroTherm Series® Heat Pump Water Heater

Gregg Holladay

Business Development Manager

gholladay@BradfordWhite.com

bradfordwhite.com

502-774-0773



— BRADFORD WHITE IS —

**AMERICAN
STRONG**

*Based on DOE test procedure and comparison of a standard electric tank water heater using 3493 kWh per year vs. the AeroTherm® heat pump water heater using 1003 kWh per year and national average electricity rate of 12 cents per kWh.



— BRADFORD WHITE IS — *



AeroTherm Series® Heat Pump Water Heater

* Products made by Bradford White are manufactured in the United States using the finest raw materials and components from around the world.



Today's Presenter – Gregg Holladay



Gregg works to educate architects, builders, and the plumbing/HVAC trade on the benefits of ENERGY STAR® certified heat pump water heaters, including Bradford White's own AeroTherm® Series.

Before joining the Bradford White team, Gregg spent 32 years with General Electric (GE) where he introduced GeoSpring™, the first ENERGY STAR® electric heat pump water heater, to the US market.


As a pioneer in this industry, Gregg is considered an expert speaker on this topic conducting countless numbers of webinars and advising utilities across the country on integration best practices.

Gregg Holladay

Business Development Manager
Specialty Markets
Bradford White Corporation

Learning to focus on the big picture will
help you keep things in a proper perspective.

Roy T. Bennett

 QuotesLyfe



**GET
HEAT
PUMPED UP!**™

How You Heat Your Water Matters™

Electric Heat Pump Water Heaters are the only Energy Star® electric water heater choice, providing about \$3 in hot water for every \$1 spent to heat water

3.43 UEF – 3.64 UEF compared to only .93 on standard electric tanks

Reduces energy usage by about 3,000 kwh's per year

All are connected – CTA-2045 compatible

NO direct green house gasses

30% Federal Tax Credit – Installed cost

Local Utility Rebates – Up to \$1,000



Heat Pump Water Heaters work By – both moving *and* creating heat



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

Moving = 550 watts power used
Creating = 4500 watts power used

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.

No carbon emissions *and* Pays For Itself!

*Payback = Return on **total** investment of product including installation

Above UEF

4.0 UEF

3.64



- Provides over \$3.00 of hot water for every dollar spent
- Saves about **\$300 a year** over standard electric water heater
- 10-year limited warranty



3.0 UEF

2.0 UEF

1.0 UEF

Payback above the line

Below

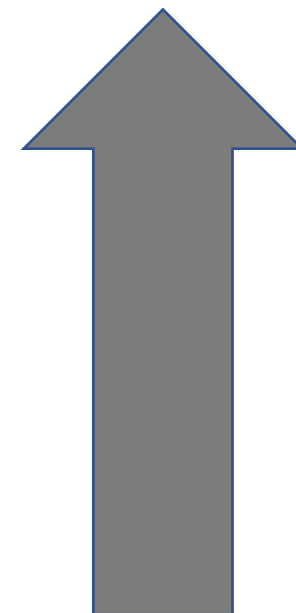
.82-.97



.93

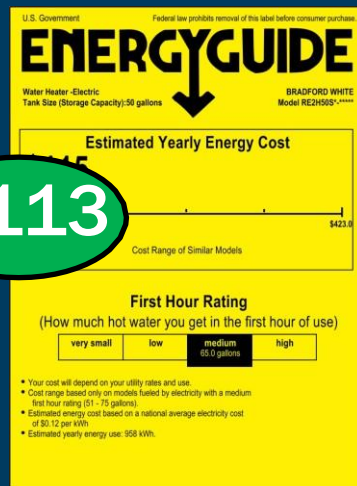


.60





Standard Electric .93 UEF
50 Gallon



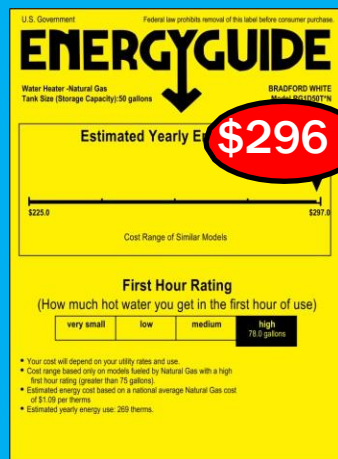
AeroTherm® 3.43 UEF
50 Gallon



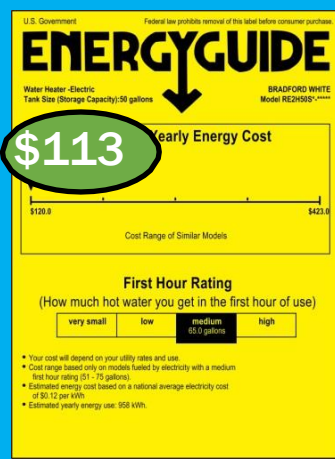
AeroTherm® 3.64 UEF
65 Gallon



AeroTherm® 3.59 UEF
80 Gallon

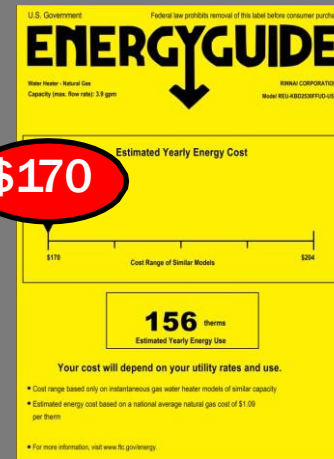


Standard gas tank .63 UEF

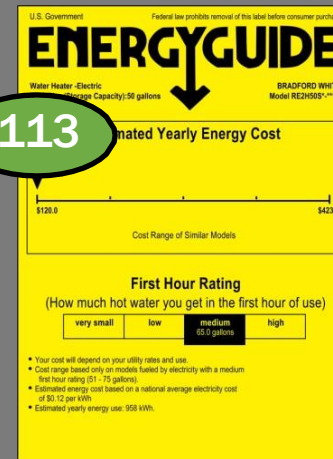


AeroTherm® 3.39 UEF

Saves \$181
Per Year
vs. Gas!



Gas tankless .90 UEF



AeroTherm® 3.39 UEF

Saves \$55
Per Year
vs. Tankless!

Best Locations



Basement

Non-conditioned space, inside a conditioned home
Heat in basement comes from the **FREE** warm earth outside the walls (50°-60°)



Laundry Room

Warm and damp due to dryer
May be next to HVAC
May be in closet with full louvered door

- **Garage**

- Non-conditioned space that stays above freezing
- Less efficient in winter, more efficient in summer – should average out to shown UEF listed by manufacturer
- Easy to run condensate line

- **Closet**

- Most require 36” closet for adequate space
- Need full louvered door for proper air flow

What's the Same as a Standard Electric

Same volume of water as standard electric

- 65-gallon first hour delivery (50 Gallon)
- 77-gallon first hour delivery (65 Gallon)
- 87-gallon first hour delivery (80 Gallon)

Smart recirc pump – YES!

Designed for installation in similar footprint as standard electric units:

- basement, garage, closet, utility room, attic

Same plumbing connections

- ¾" connections on top
- (2) standard electric elements
- Standard T&P relief valve

Same electrical connections

- Top – 25/30 amp 208/240v – **Exclusive to BW**



What's Different than a Standard Electric

Air Space Requirement

- **700** cubic feet or louvered door w/240 sq. in free air space

Clearance for Service

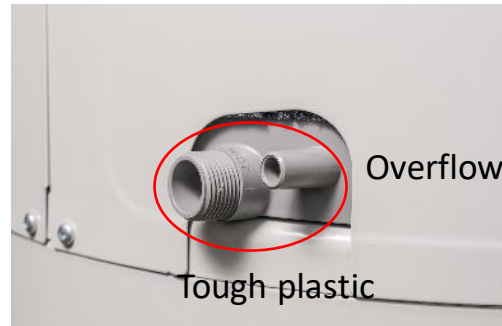
- **7"** around heater (recommended)
- **0"** on left side, **2"** behind

Condensate Drain Line

- Removes up to **2 qtrs.** of moisture
- Can be tied to HVAC drain
- $\frac{3}{4}$ " **male fitting** on heater

Air Filter

- Needs periodical cleaning
- Rinse and replace

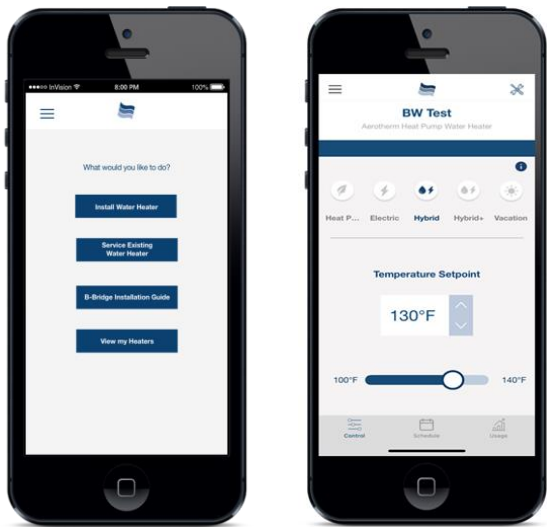


AeroTherm[®] Connected (-CON) Heat Pump Water Heater

- Includes Bradford White Connect[™]
 - 3.44 -3.64 UEF - \$113 Annual Operating Cost on 50 gallon
 - Wi-Fi Enabled
 - CTA-2045 Ready
 - Title 24, JA-13 Compliant
 - Recirculation pump/mixing valve – YES!
- 3 Sizes Available
 - 50 Gallon
 - 65 Gallon
 - 80 Gallon
- 5 Operating Modes for Greater Flexibility
 - 2 tank sensors
 - Heat Pump (only)
 - Hybrid Standard- Can add upper element only
 - Hybrid Plus – Can add upper element and then switch to lower for faster full tank recovery
 - Electric (only)
 - Vacation
- Meets Tier 4 of Advanced Water Heating Specification (AWHS) v8.0
- Quieter Operation
 - Less than 50dBA



Bradford White Connect™ Platform



Bradford White
Connect™ App



Bradford White
Connect™ adapter

- Can monitor up to 100 units – Multi-family
- Remote access by contractor

Bradford White Connect™ app compatible with Android and iOS. User can remotely

1. Change Settings
2. Monitor for Error Messages
3. Set multiple Weekly/Daily Schedules yourself

Bradford White Connect™ adapter

1. CTA-2045A port (DC) for WA
2. Backwards compatible with all Bradford White HPWH models
3. Plugs into front of the HPWH. Kit comes with mounting equipment and cables
4. Can be installed up to 100' away - Bradford White Exclusive!

MORE PROTECTION THAN EVER.

Bradford White is the **ONLY** company to feature Microban® antimicrobial technology in water heaters.



PROTECTS THE TANK.

Enamel tank lining that helps prevent corrosion and extend the life of the water heater.



KEEPS THE TANK CLEAN.

Antimicrobial product protection to help prevent the growth of bacteria, mold and mildew on the surface of the tank lining.



BRADFORD WHITE
WATER HEATERS
Built to be the Best®

Vitraglas® and Microban® offer protection and peace of mind around-the-clock.

- **EFFECTIVE:** Vitraglas® tank lining prolongs the life of the water heater by protecting it from the corrosive effects of water. Microban® provides additional protection by helping to prevent the growth of bacteria, mold and mildew on the surface of the tank liner.
- **EXCLUSIVE:** Bradford White's unique formula for Vitraglas® is the **ONLY** tank lining in the industry to feature Microban® antimicrobial technology. This is included as a standard feature on nearly all tank-type water heaters from Bradford White, at no extra cost.
- **DURABLE:** The enamel tank lining and protective features are effective for the lifetime of our reliable water heaters.
- **PROVEN:** For more than three decades, Microban® antimicrobial technology has been infused into a wide range of appliances and plumbing products.



Inside view of commercial tank lined with Vitraglas® + Microban®



BRADFORD WHITE
WATER HEATERS
Built to be the Best®



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Microban® antimicrobial product protection helps prevent the growth of bacteria, mold and mildew that may affect the product. The built-in antimicrobial properties do not protect users or others from disease-causing organisms. Microban® is a registered trademark of Microban Products Company.

<https://player.vimeo.com/video/766214492>

BRADFORD WHITE
WATER HEATERS

AeroTherm Series® Heat Pump Water Heater

Gregg Holladay

Business Development Manager

gholladay@BradfordWhite.com

bradfordwhite.com

502-774-0773



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*Based on DOE test procedure and comparison of a standard electric tank water heater using 3493 kWh per year vs. the AeroTherm® heat pump water heater using 1003 kWh per year and national average electricity rate of 12 cents per kWh.



The new degree of comfort.®

A stylized graphic of a globe, split vertically. The left half is a light green color with a textured, leaf-like pattern. The right half is a light blue color with a textured, water-like pattern. The globe is positioned behind the main text.

**Overcoming barriers and misconceptions of
Heat Pump water heating, a way to getting
to “Net Zero”.**

DESIGNING FOR ZERO WASTE



DEGREES OF INNOVATION

We are focused on innovating with intent, engineering solutions with lifetime sustainability in mind—from material selection to smart features to responsible recycling.

Our 2025 goal: Launch a line of heating, cooling and water heating products that boast a 50% reduction in greenhouse gas footprint.



DEGREES OF EFFICIENCY

We strive for operational excellence, working smarter and more sustainably to consume fewer resources, generate less waste and ensure simpler, safer processes.

Our 2025 goal: Reduce greenhouse gas emissions by 50% and achieve zero waste to landfill in our global manufacturing operations.



DEGREES OF LEADERSHIP

We hire and inspire our teams to be next-generation thinkers and responsible stewards of our industry, the greater community and the environment.

Our 2025 goal: Rheem will train 250,000 plumbers and contractors on sustainable products or sustainable installation and recycling best practices.

HYBRID HPWH WILL BECOME THE PRODUCT OF CHOICE

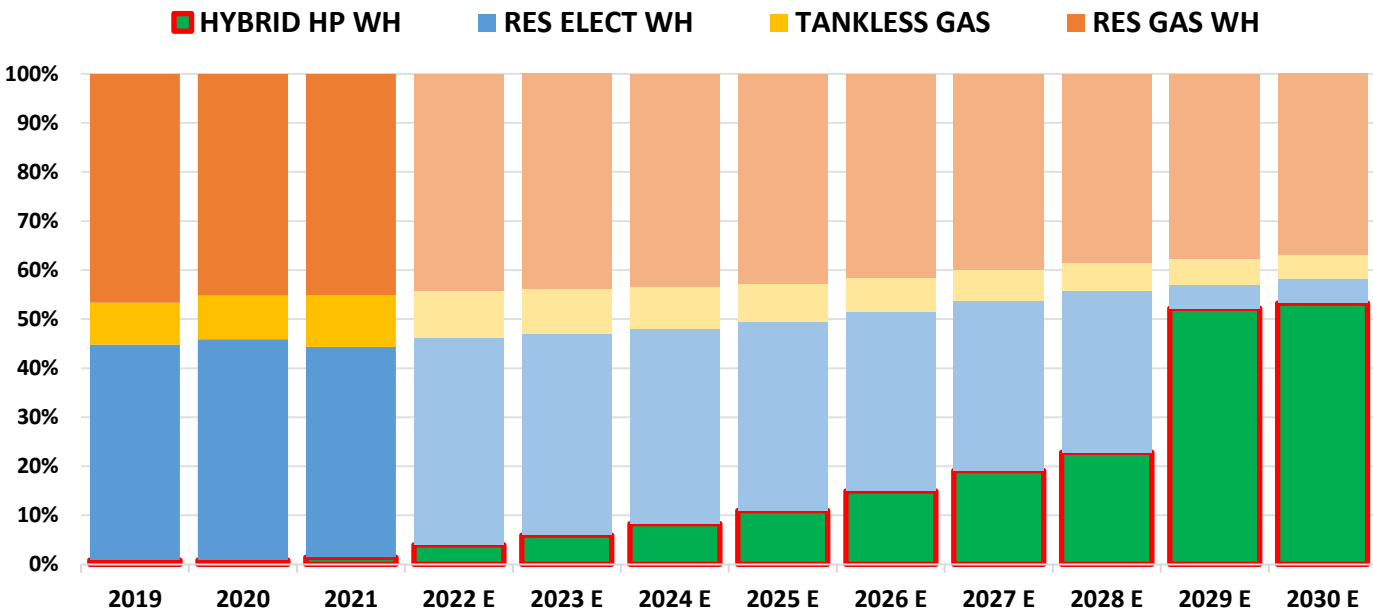


HPWH expected to grow **3,600%** growth in 10 years

By 2030, **90%** of all electric tanks sold will be a HPWH

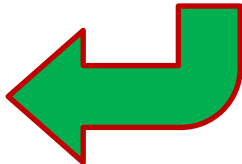
HPWH will make up **50% plus** of the residential market by 2030

Residential Water Heater Market Projections



New Regulation: N4 goes effect in ~2028

- Electric water heaters that are 20-55 gallons likely will be HPWH



Inflation Reduction Act (IRA)

- Increased Tax Credits for HE Upgrades
- \$4.3B for Home Rebates to Increase Energy Savings (HOMES program)
- \$4.5 Billion for the High-Efficiency Electric Home Rebate Program. Rebates will cover full cost for low-income households and half the cost for higher-income households. Covered components include:
 - up to \$8,000 for heat pumps
 - \$1,750 for heat pump water heaters
 - \$840 electric clothes dryer
 - \$4,000 for a breaker box
 - \$2,500 for electric wiring, and
 - \$1,600 for insulation, ventilation and sealing
- Capped at \$14,000



Federal Tax Credit

Manufacturer Rheem® Sales Company – Water Heating Division Equipment Classification and Qualifications The U.S. Internal Revenue Service (IRS) is providing consumers with a tax credit on high efficiency water heating equipment under the provisions at Title 26 of the U.S. Code, Section 25C.

The Federal tax credit is 30% of the water heater and installation costs up to \$600 for gas-fired water heaters and \$2,000 for heat pump water heaters. Please keep this Certification Statement and your dated proof of purchase receipt for federal tax filing purposes. Homeowners must submit IRS Form 5695 and meet all federal tax credit requirements to qualify. Tax credit is limited to an existing home and must be the homeowner's primary residence. New construction and rentals do not apply. Any tax credit that exceeds the consumer's regular tax liability for the taxable year may not be refunded nor carried forward under Section 25C. Please consult with a tax professional for complete details. Qualifying Rheem Models: See list of Tankless and Heat Pump model numbers on pages 2 and 3 of this document.

Certification Statement Under penalties of perjury, I declare that I have examined this certification statement, and to the best of my knowledge and belief, the facts presented are true, correct and complete. For further questions regarding this certificate, please call Rheem customer service at 800-621-5622.





How would you respond?

Heat pump water heaters won't work in a cold climate....

Will work in temperatures as low as 38°F and offer year round savings regardless of climate

It's too expensive.....

60% energy savings and incentives

Condensate water should be neutralized.....

Condensate water from this unit is not acidic (*no flue gases*) and does not need to be neutralized

It's too loud.....

only 49 decibels-
Quietest hybrid unit currently available

I don't want to run out of hot water.....

Same delivery (*or more*) as a standard tank

Contractor Friendly



208/240V 30 and
15Amp



Can Be Placed
Against a Wall*



Can Be Transported
On Its Side



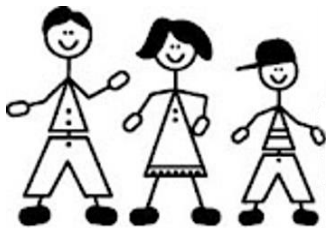
100% Plumber
Serviceable



ProTerra Sizing Reference

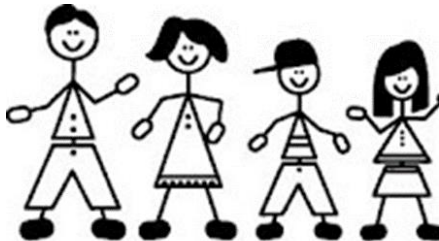
40 Gallon

Delivers 3 hot 8-minute showers back to back



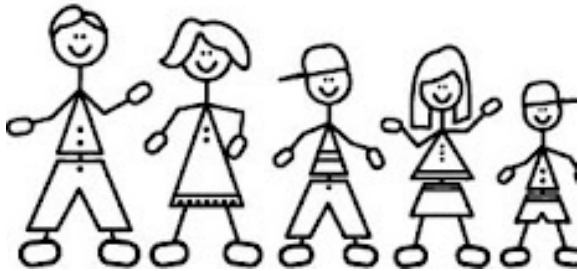
50 Gallon

Delivers 4 hot 8-minute showers back to back



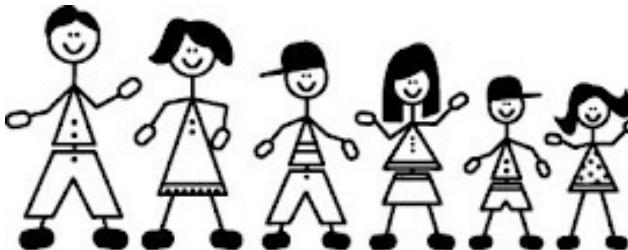
65 Gallon

Delivers 5 hot 8-minute showers back to back



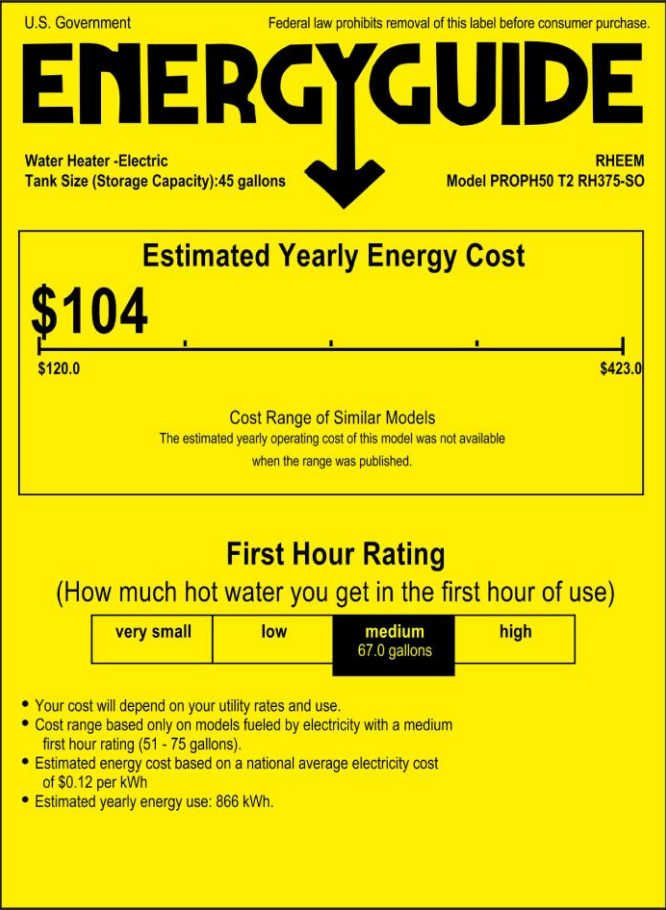
80 Gallon

Delivers 6 hot 8-minute showers back to back

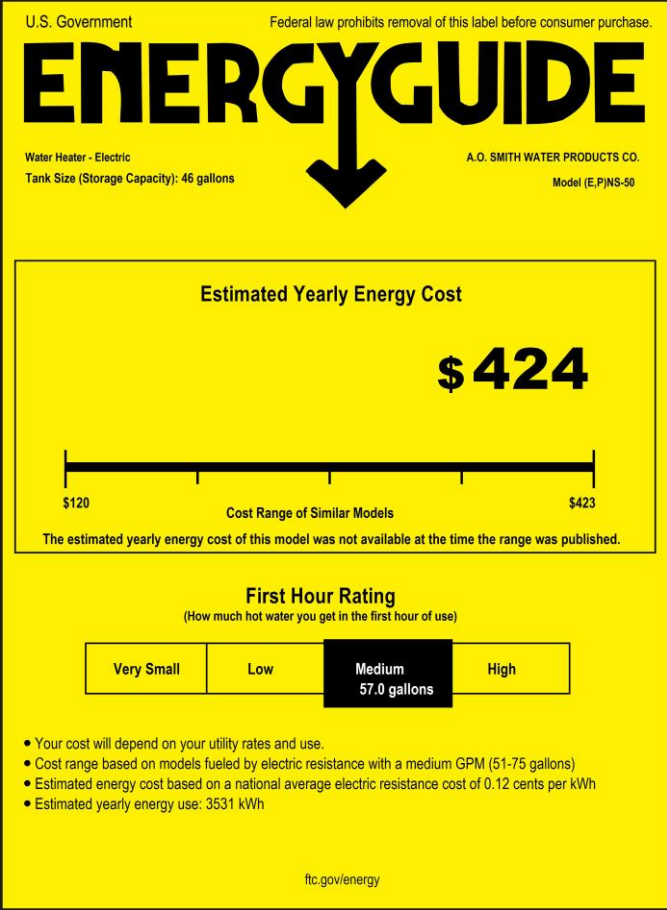


Over 75% Reduction In Energy Usage

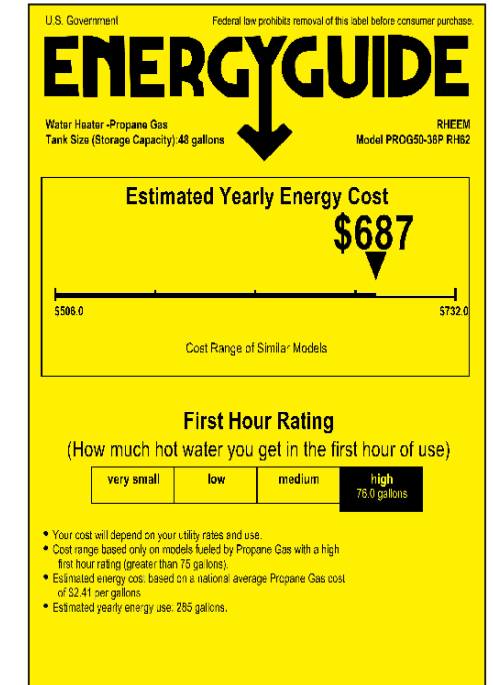
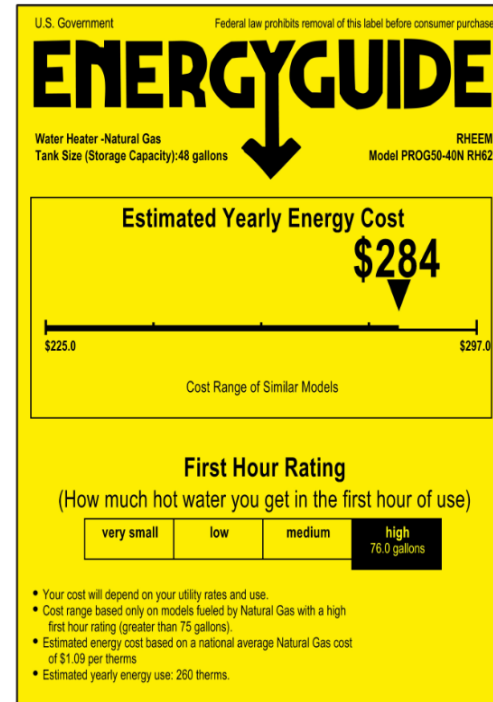
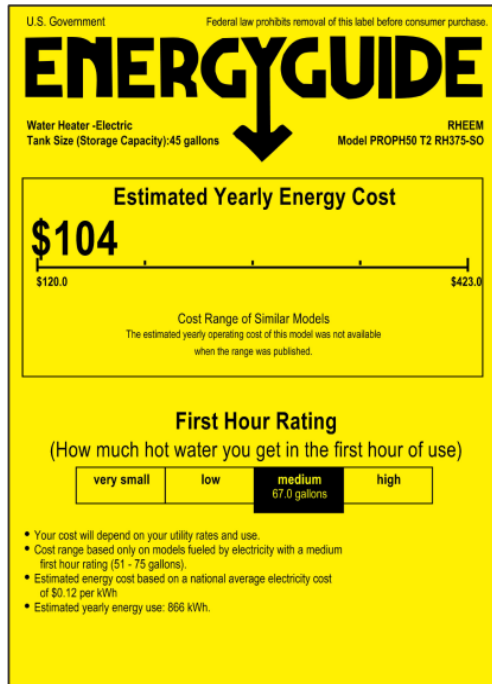
867 kWh per Year



3,531 kWh per Year



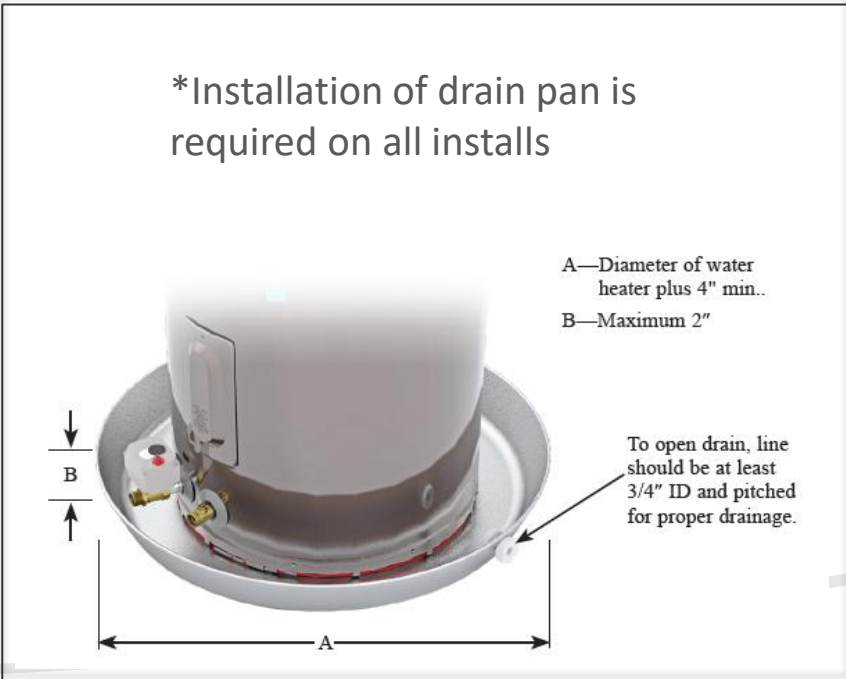
ProTerra vs. Gas (Natural & Propane)



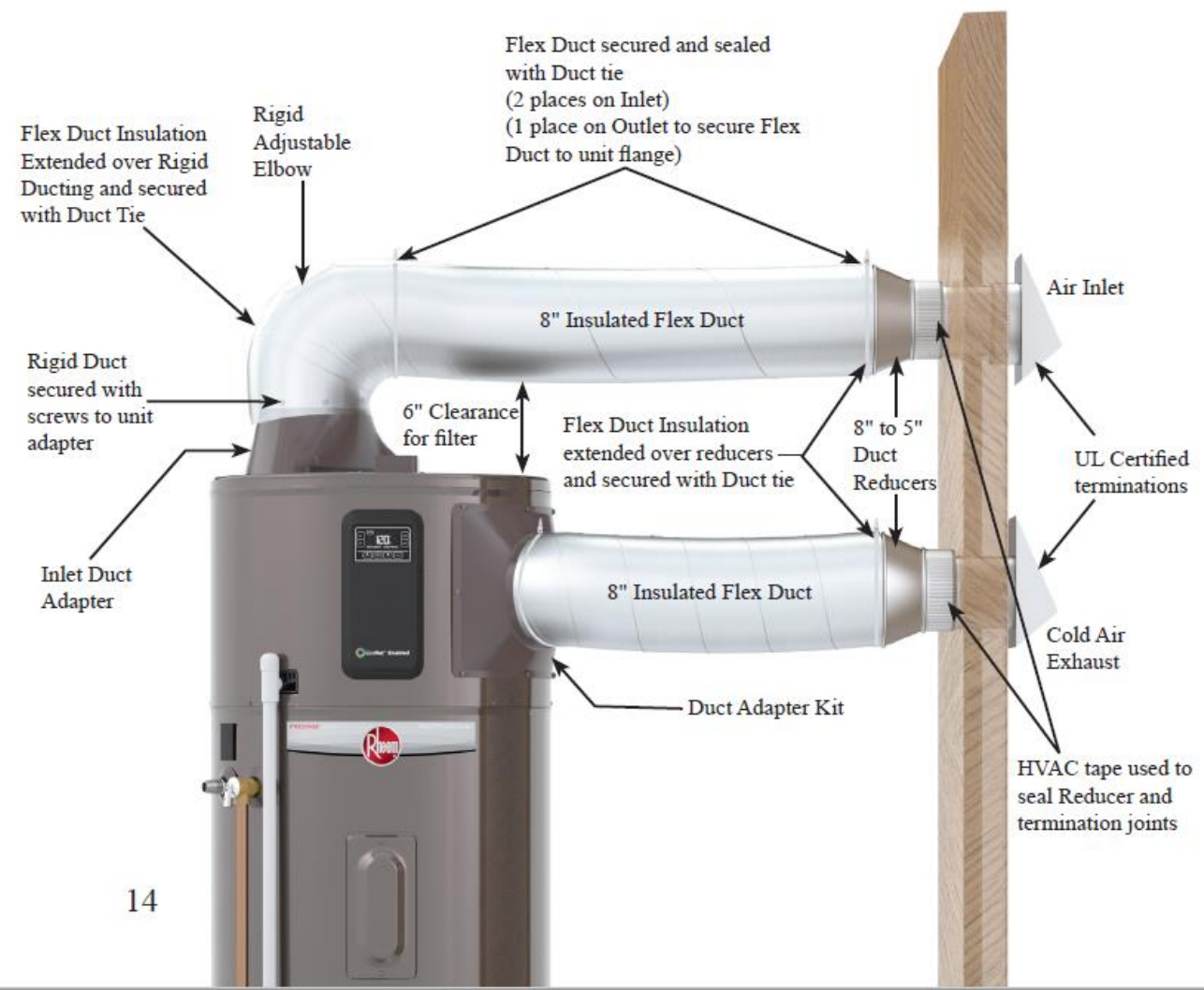
PHYSICAL INSTALLATION



Typical Installation



Ducting



Maximum Duct Lengths

Duct Type / Diameter	8"	7"	6"	5"
Rigid	340'	160'	65'	17'
Flexible	125'	65'	25'	--



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Plumbers Support Team	866-339-2388
EcoNet Technical Support	800-255-2388



Recap/Questions?



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