TRI-COUNTY
REGIONAL ENERGY NETWORK
SAN LUIS OBISPO • SANTA BARBARA • VENTURA

Builder's Perspective: Heat Pump Water Heaters

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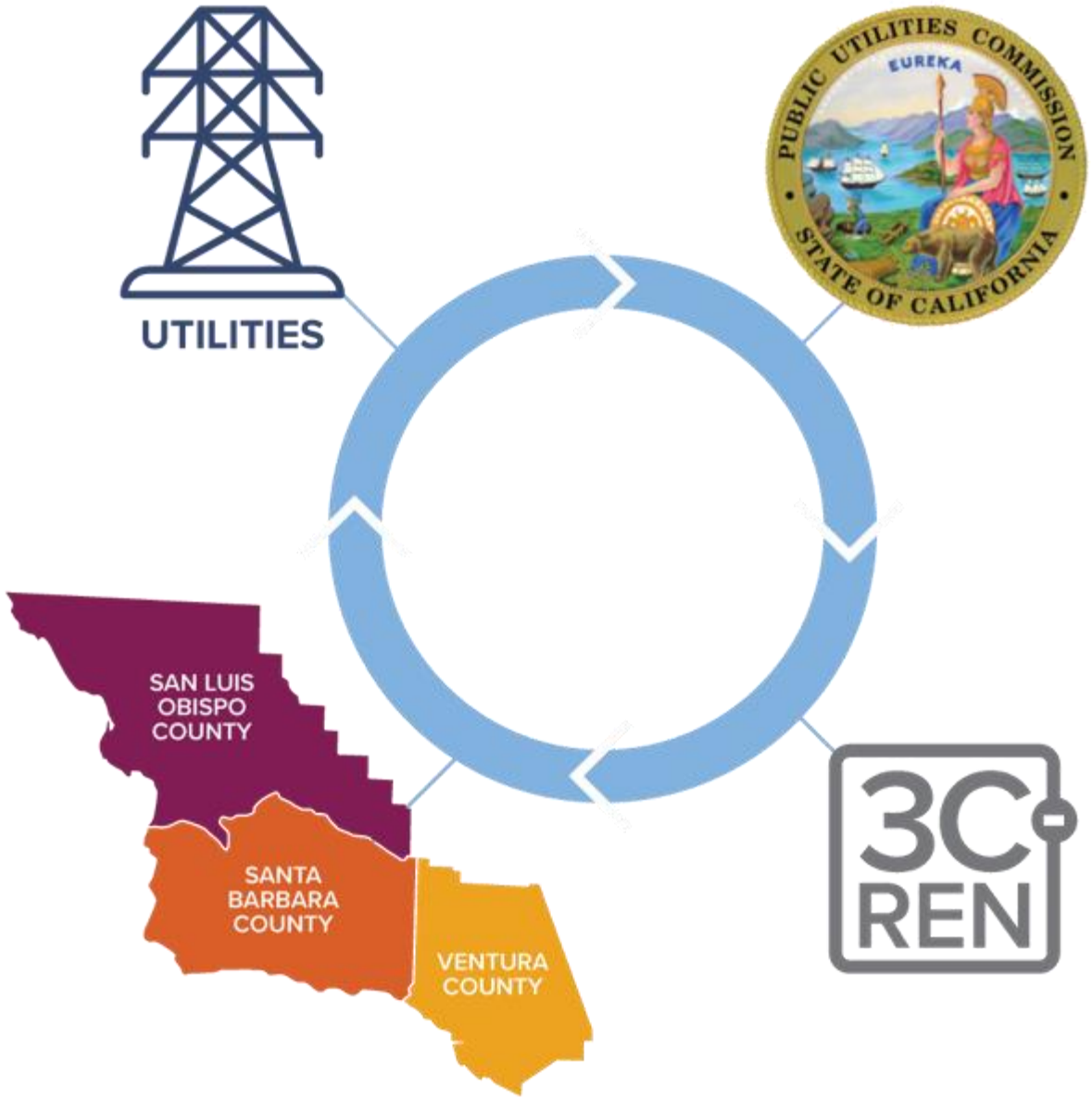
February 18, 2026

Before We Begin

Here are some quick reminders:

- Call in? Please **share** full name to confirm attendance
- To receive AIA LUs, you **must attend** at least 80% of the training. Attendance will be verified
- Use the "**Chat**“ to share questions or comments
- Slides/recording are **shared** after most events and can be found on 3C-REN's on-demand page
- 3C-REN does **not** allow **AI notetakers**, unless used to accommodate a disability



Tri-County Regional Energy Network

3C-REN is a collaboration between the tri-counties

Our programs reduce energy use for a more sustainable, equitable and economically vibrant Central Coast

Our free services are funded via the CPUC, bringing ratepayer dollars back to the region

Our Services

Incentives

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Today's Learning Objectives

- Learn what factors to consider when locating a HPWH and how equipment selection and installation will vary based on location
- Discuss specifications and maintenance of a HPWH for efficient operations and to meet client expectations
- Learn Energy Code mandatory measures for installation as well as best practices for meeting those requirements
- Review special considerations for replacing an existing gas water heater with a HPWH

Learning Units:

- 1.0 AIA HSW LU approved for this course
- 1 ZNCD CEU approved for this course

Agenda

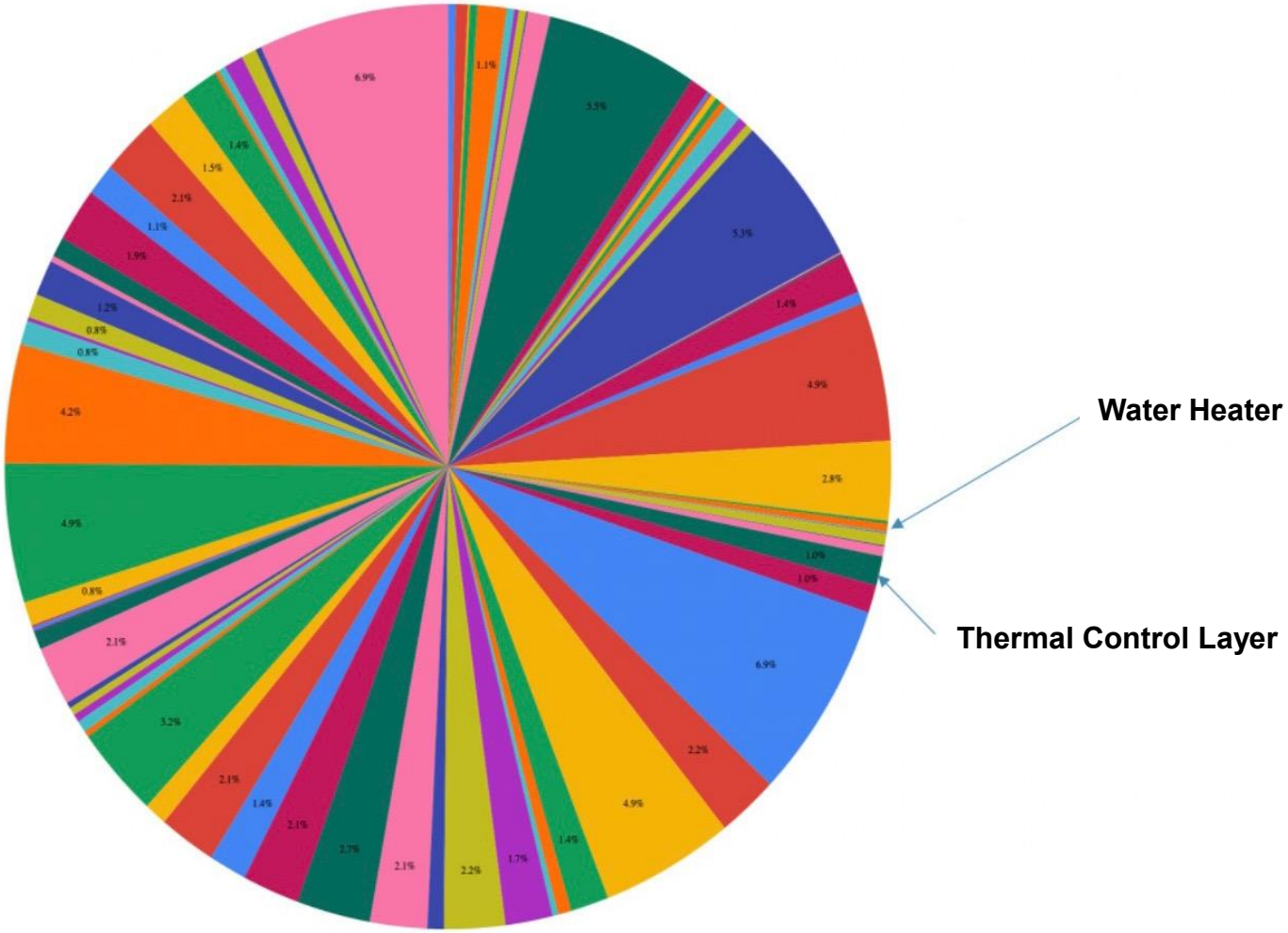
1. Allowable Water Heater Types
2. Heat Pump Water Heaters
3. Locating HPWH’s
4. HPWH’s in the Energy Code
5. Installation Considerations
6. Wrap Up

Builder's Perspective

Heat Pump Water Heaters:

1. Very easy to install –no flue, no gas piping, no combustion
2. No additional trades are needed on site –no gas or refrigerant
3. Energy efficient –2 to 4 times more efficient than standard electric
4. Less GHG emissions compared to standard gas and electric water heaters

Relative Cost of Residential Water Heating System



Allowable Water Heater Types

Domestic Hot Water System Types

	Natural Gas	Electric Resistance	Electric Heat Pump
Storage Tank		 	 Split System  Integrated (Hybrid)
Tankless On-Demand		 	Not Applicable

Heat Pump Water Heaters

The Current Market for Residential HPWH

In our area, the most common are AO Smith and Rheem family of brands.

BRADFORD WHITE
WATER HEATERS

Rheem

RUUD

AO Smith

Lochinvar

state
WATER HEATERS

STIEBEL ELTRON

LG

SANDEN

SANCO2
Hot water, naturally.

Heat Pump Water Heaters:
"They operate just like your electric beverage cooler"

Cooler/Travel Frig

Compressor/ Condenser and Ventilation Openings

- Heat is removed from the air inside the cooler.
- The heat is rejected to the surroundings.

HPWH

Compressor/ Condenser and Ventilation Openings

- Heat is removed from the air inside the garage.
- The heat is rejected/transferred to the water.

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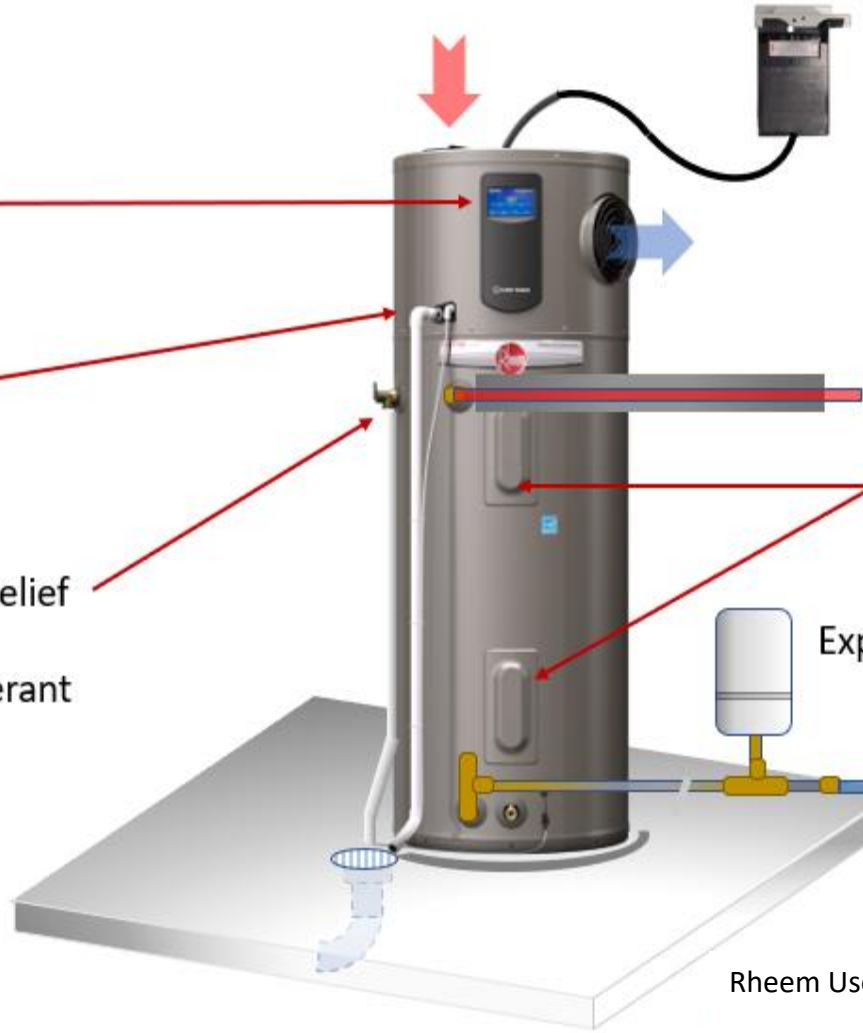
Components of a HPWH System



15 or 30 Amp
240 V, dedicated
circuit

Integrated Control Panel

Smart Phone Enabled

Condensate Lines

Glass Lined Storage Tank

Temperature and Pressure Relief

Factory sealed R134A refrigerant

Drain pan and/or floor drain recommended depending on the location

Flexible Insulated Hot Water Line

Electrical Heating Elements

Expansion Tank as needed

Flexible Cold Water Line

Rheem Used for Illustration

…but Wait. What size of HPWH do I need?

- ***TANK SIZE TIP #1***
  Upsizing tank size increases the potential for thermal energy storage, which will allow a user to take maximum advantage of utility load-management programs or time-of-use electric rates.
- ***TANK SIZE TIP #2***
  Upsize the tank if the occupants are likely to have high hot water draw periods, such as a household with teenage children or occupants with a preference for baths.

Tank Size Guidelines (Gallon Capacity)											
Number of Bathrooms	1 to 1.5			2 to 2.5				3 to 3.5			
Number of Bedrooms	1	2	3	2	3	4	5	3	4	5	6
FHR per Uniform Plumbing Code	38	49	49	49	62	62	74	62	74	74	74
ENERGY STAR NextGen Minimum Tank Size	**36**	**45**	**59**	**45**	**59**	**72**	**72**	**59**	**72**	**72**	**72**

Additional Tip:

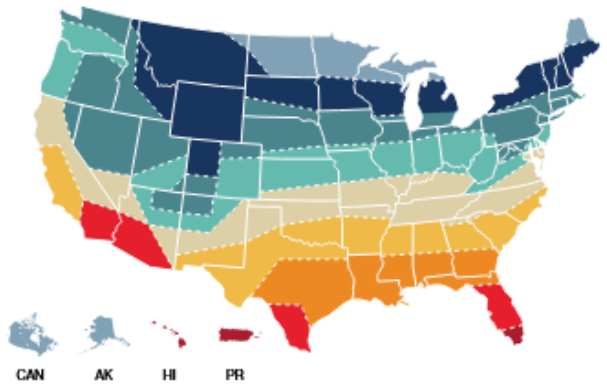
Raising the setpoint temperature to 140 deg F and using a thermostatic mixing valve can effectively increase the first hour rating.

https://www.energystar.gov/partner-resources/residential_new/educational_resources/sup_program_guidance/heat_pump_water_heater_guide

Compare to Manufacture … size by 8-minute showers?

Source: Rheem

Hybrid Electric Heat Pump Water Heaters - Sizing by Map Zones



1. Select the geographic zone where you live.
2. Determine the number of back-to-back showers required for your household.
3. Select the gallon size of your Hybrid Electric Heat Pump Water Heater from the table below matching your zone with the number of back-to-back showers required for your household.

Number of Showers per Gallon Size

Gallon Capacity	Zone 1 37°F/ 3°C	Zone 2 42°F/ 5°C	Zone 3 47°F/ 8°C	Zone 4 52°F/ 11°C	Zone 5 57°F/ 14°C	Zone 6 62°F/ 17°C	Zone 7 67°F/ 20°C	Zone 8 72°F/ 22°C	Zone 9 77°F/ 28°C
	30 AMP Models								
40	3	3	4	4	4	4	5	5	6
50	4	4	4	4	5	5	5	6	7
65	4	5	5	5	5	6	6	7	8
80	5	5	5	5	6	6	7	7	8
	15 AMP Models								
40	2	2	2	2	3	3	3	3	4
50	2	2	3	3	3	3	4	4	4
65	3	3	3	3	3	4	4	4	5
80	4	4	4	4	4	5	5	5	6

Number of showers shown is calculated at 8-minute with a flow rate of 2 gallons per minute

This Hybrid Electric Heat Pump Water Heater sizing table provides a suggested water heater gallon capacity based on the installation zone and household back-to-back shower requirements. Data provided is for set temp of 125°F in Energy Saver Mode. Always consult your local plumbing contractor to determine the optimal water heater for your household needs.

https://rheemheatpumpguide.com/Rheem%20Heat%20Pump%20Water%20Heater%20Guide.pdf

Consult the Spec Sheets for Product Dimensions and FHR

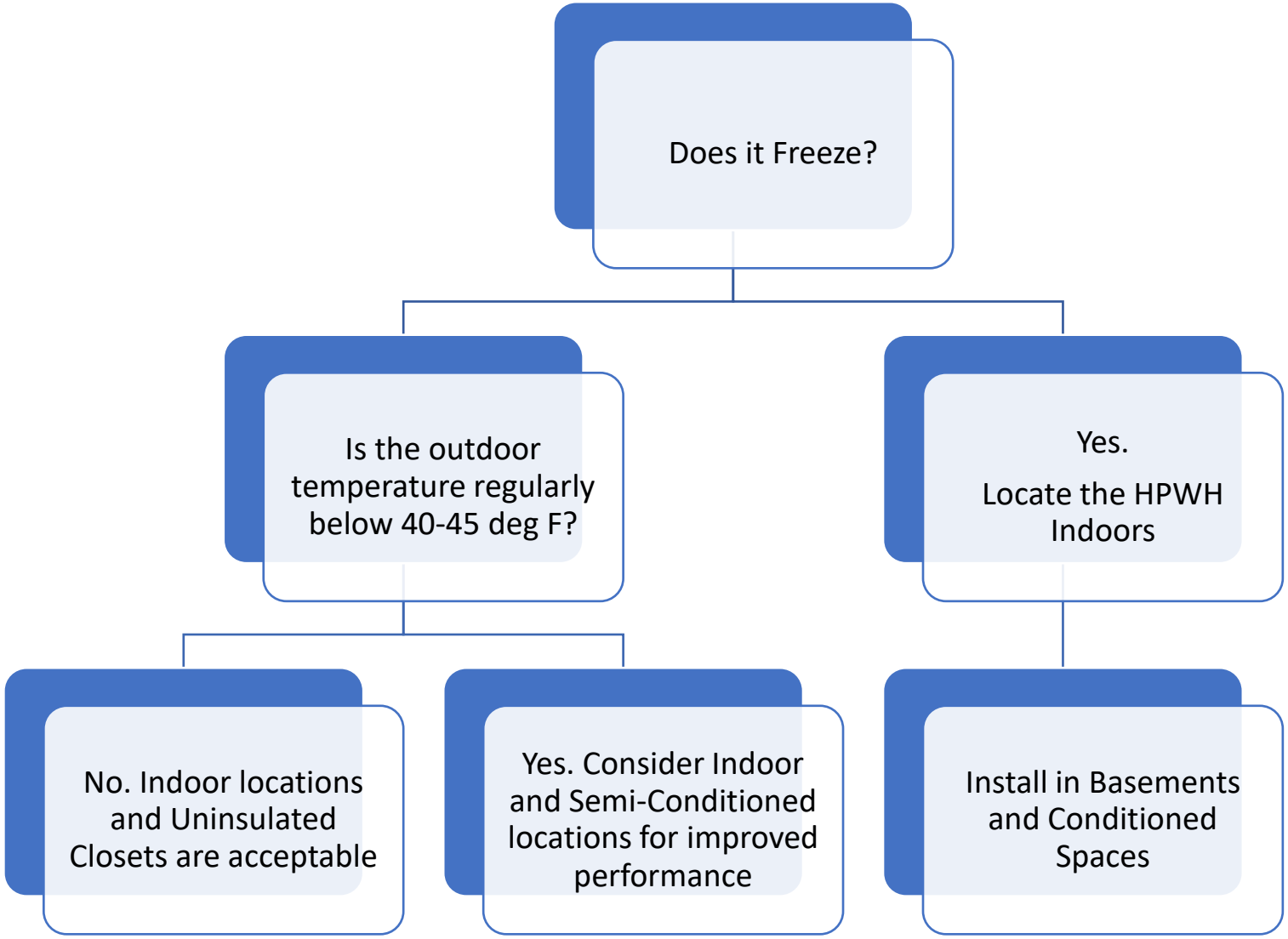
Example of a Rheem Proterra 30amp

PERFORMANCE PLATINUM™ Hybrid Electric Heat Pump Specifications

Fuel Type	Desc.	Nominal Gallon Cap.	Rated Gallon Cap.	Model Number	Electric Breaker Size	Uniform Energy Factor (UEF)	Element Wattage	Compressor Btu/H	Fan CFM	First Hr. Rating G.P.H.	Recovery in G.P.H. 90° F Rise	Tank Height A	Diam. B	Ht. to Cold Inlet & Drain Valve	Ht. to Hot Outlet & T&P	Unit Wt. (LBS.)	Approx. Ship Wt. (LBS.)
30 AMPS – SHUT OFF																	
Electric	Tall	40	36	XE40T10HS45U1	30	3.83	4,500	4200	150	60	26	63"	20-1/4"	3-5/8"	39-5/8"	166	184
Electric	Tall	50	45	XE50T10HS45U1	30	3.88	4,500	4200	150	67	27	62"	22-1/4"	3-5/8"	39-5/8"	185	203
Electric	Tall	65	59	XE65T10HS45U1	30	4.05	4,500	4200	150	76.6	27	65"	24-1/4"	3-7/8"	42-3/8"	245	289
Electric	Tall	80	72	XE80T10HS45U1	30	4.07	4,500	4200	150	87	27	75"	24-1/4"	3-7/8"	42-3/8"	261	306

Locating HPWHs

HPWH Location Decision Tree –Climate Zone Focused



Why Climate Matters

Heat pumps have an operational temperature range –outside of the range means electric resistance mode –which means more energy and more money to operate

Integrated HPWH

Lower temp range:

- Most brands 40-45 deg F
- Some models 37 deg F

Upper temp range:

- Most brands 145 deg F

SanCO2 Hydronic Split System

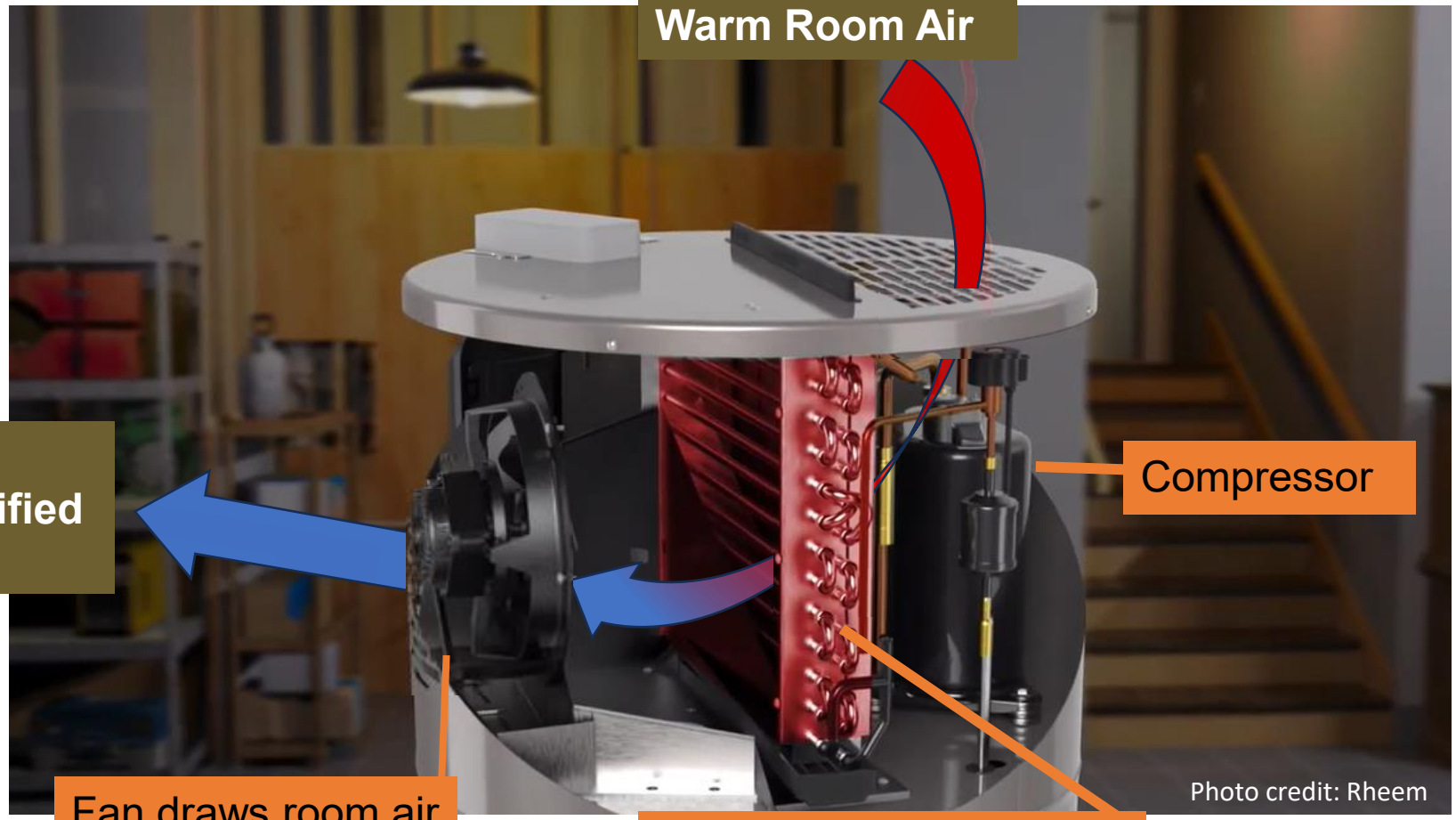
Lower temp range:

- -26 deg F

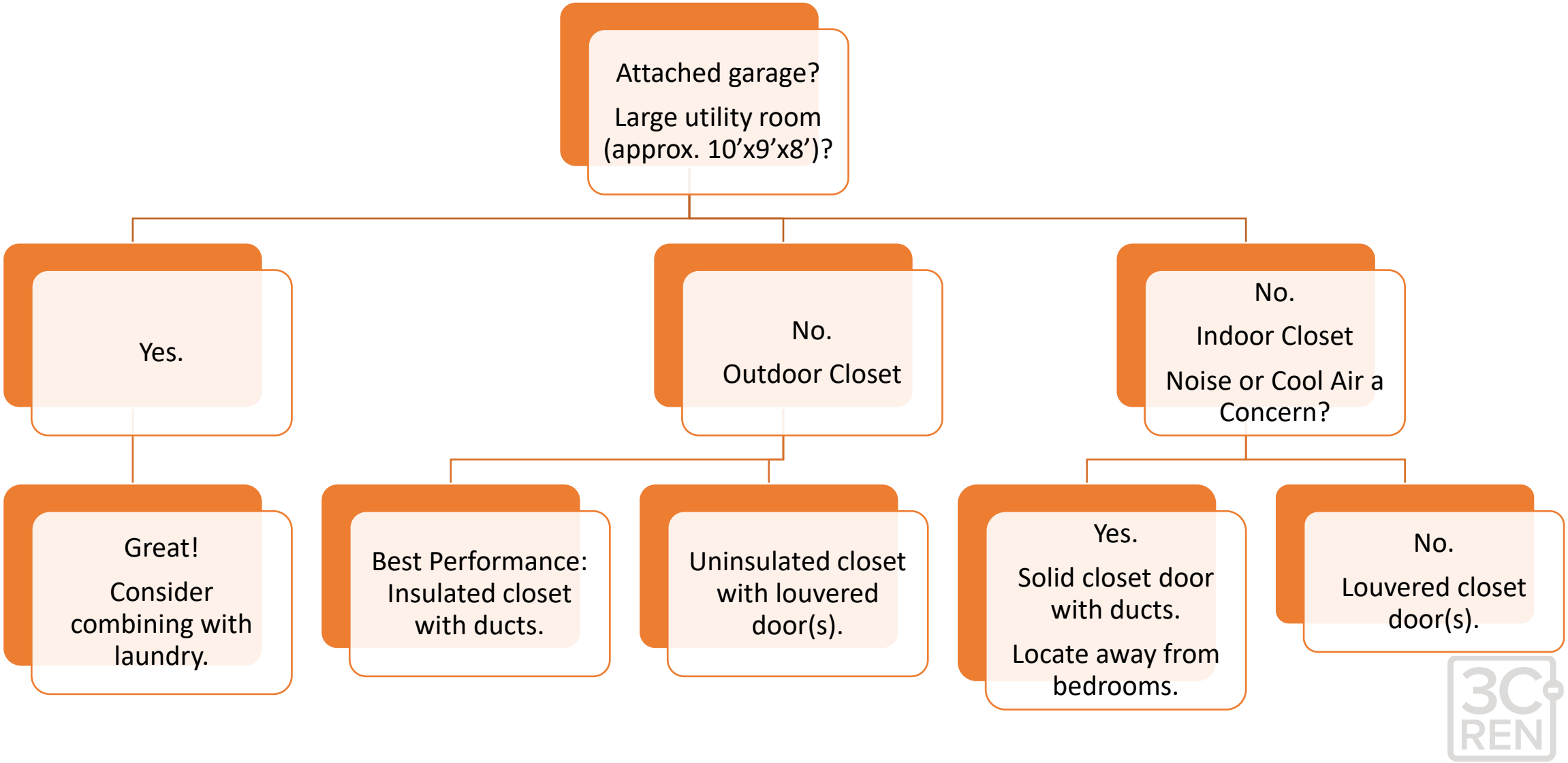
Upper temp range:

- 114 deg F

HPWH Location: Access to Air Volume



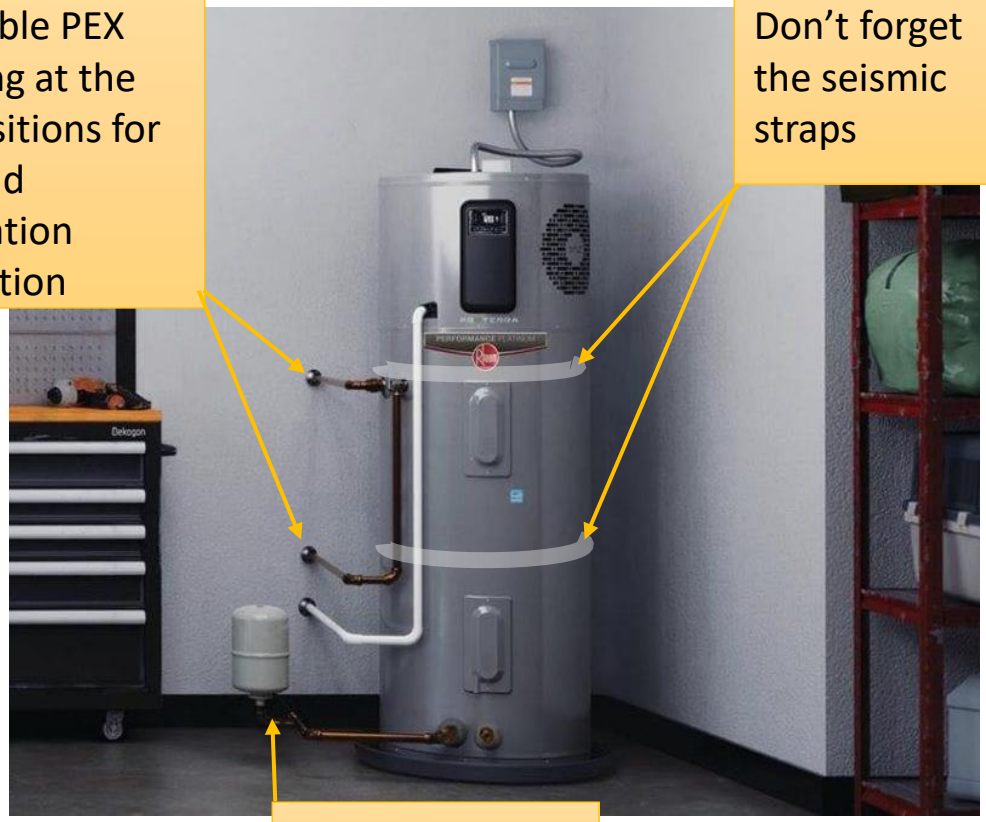
HPWH Location: Space Availability for air volume



For Best Performance –Locate the HPWH as close as possible to the hot water need(s).

Other Key HPWH Placement Considerations

- Unit dimensions – larger diameter and taller
- Space at the air exhaust port – 6” min, 12”-24” recommended
- Consider units with air exhaust and intake at the top of the tank
- Condensate drainage needs to be addressed
- Electrical 240V 30amp typical



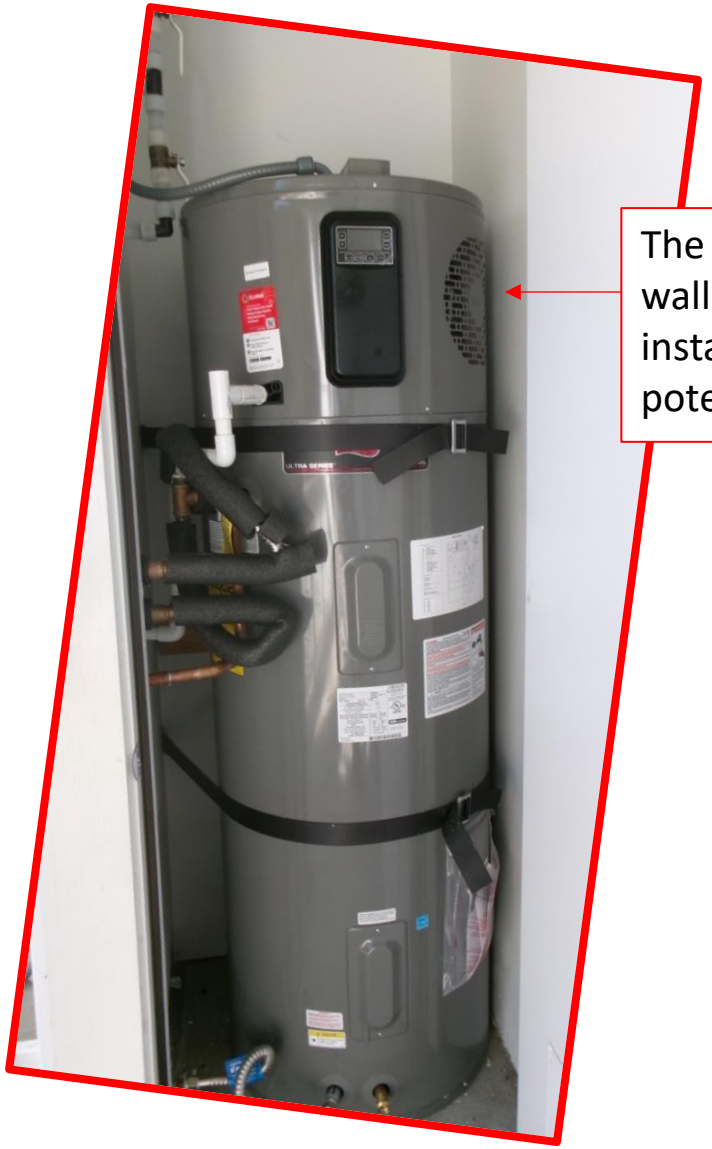
Rheem marketing

Garage / Workshop Location

- Hot and Cold piping is plumbed at top of the tank
- Flex Line helps reduce vibration noise
- No ducting needed
- Control panel is accessible
- Intake and Exhaust vents are free from obstruction
- Condensate drainage is plumbed to waste line

Maintain clearances at the air exhaust (and air intake)

Garage Location –Pass
Lots of Air Volume



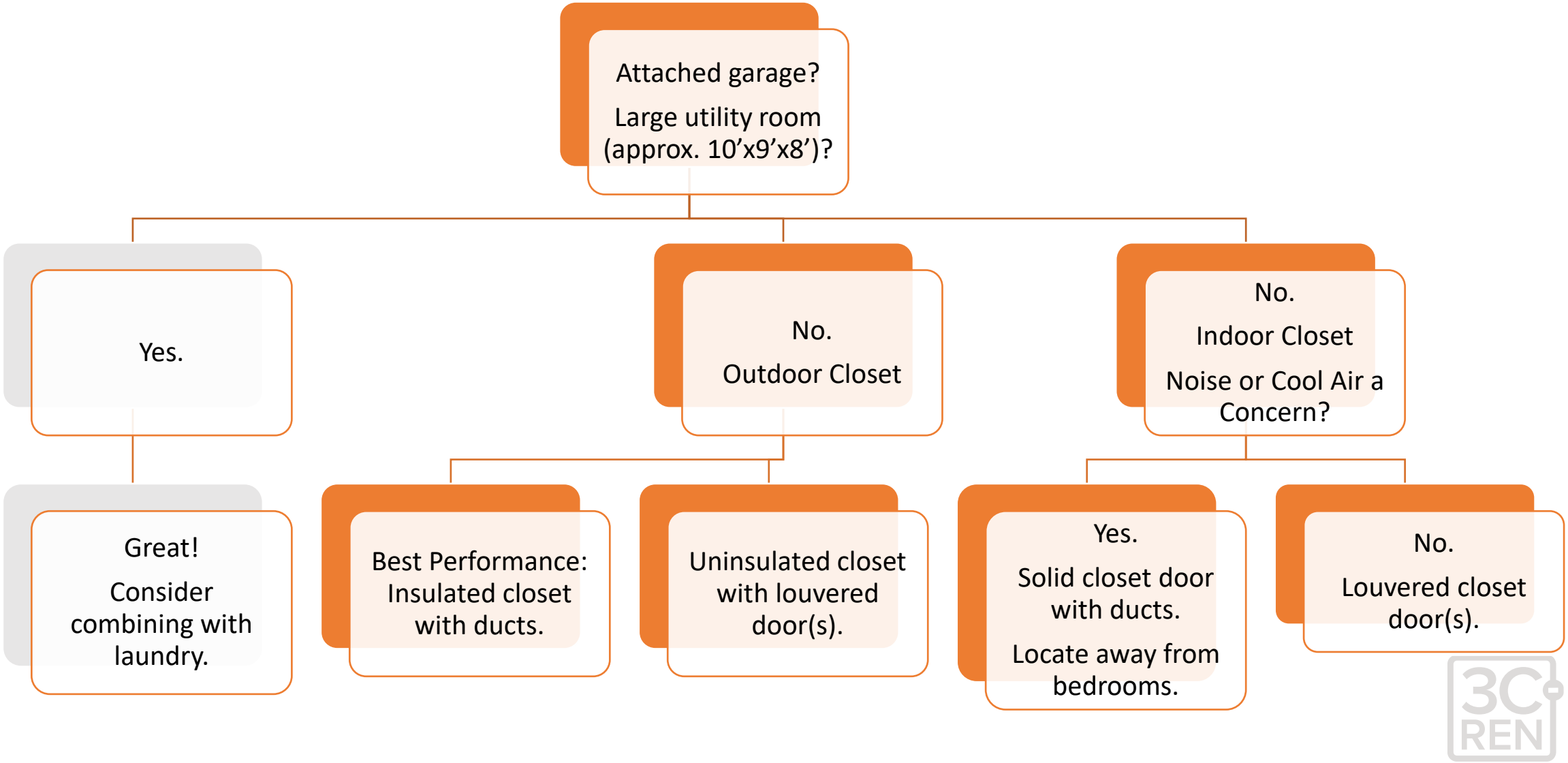
The exhaust port is too close to the wall –it doesn't meet manufacture's installation. Side Note: The wall has potential for condensation damage.

This project may have enough volume of air, but the clearances at the tank are not met.

Air Intake and Exhaust Ports –Avoid Obstructions

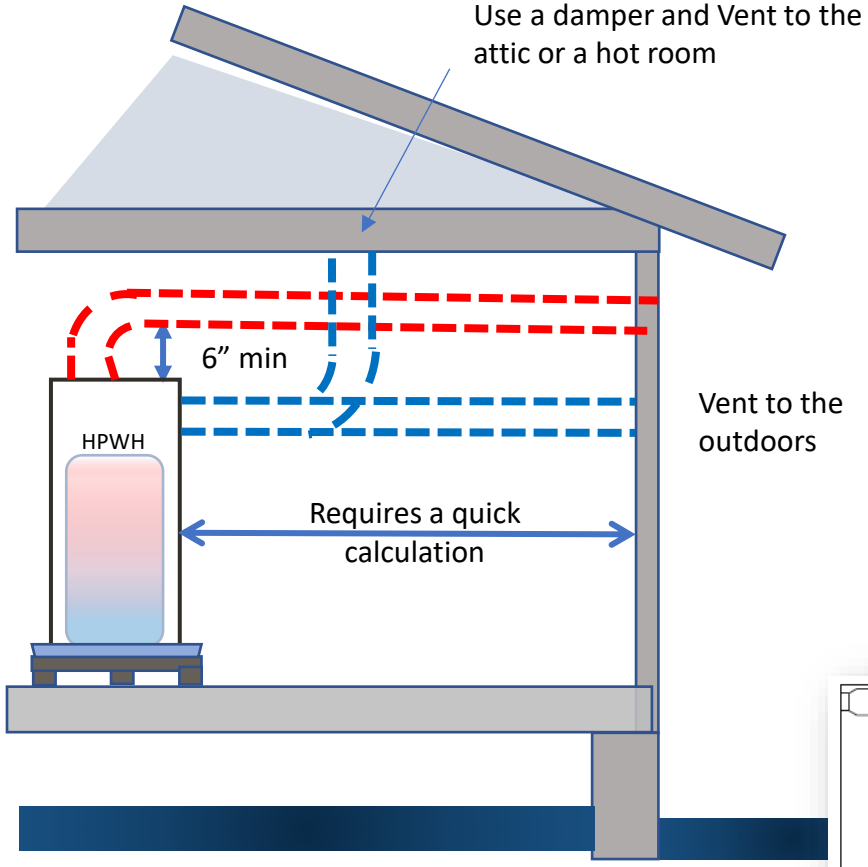
- 6” minimum Clearances per Manufacture
- 12”- 24” Recommended Best Practices

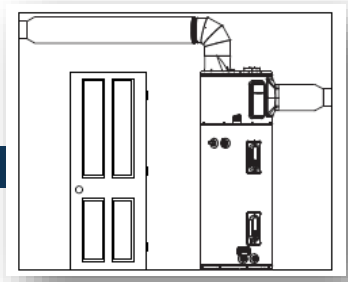
HPWH Location: Space Availability for air volume



Ducted Options are Available

Photo Credit: IBGC – Multifamily Project in SLO



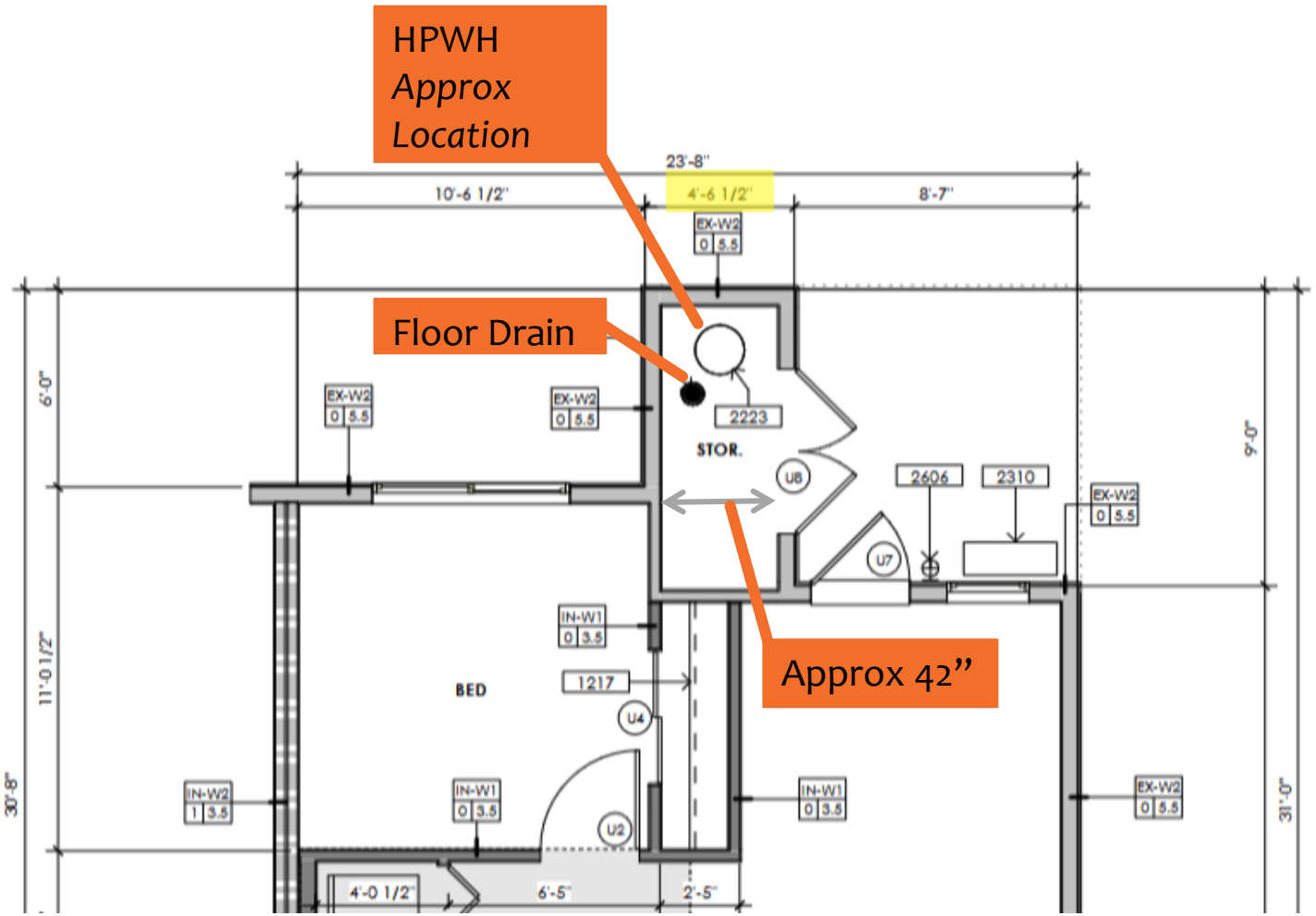


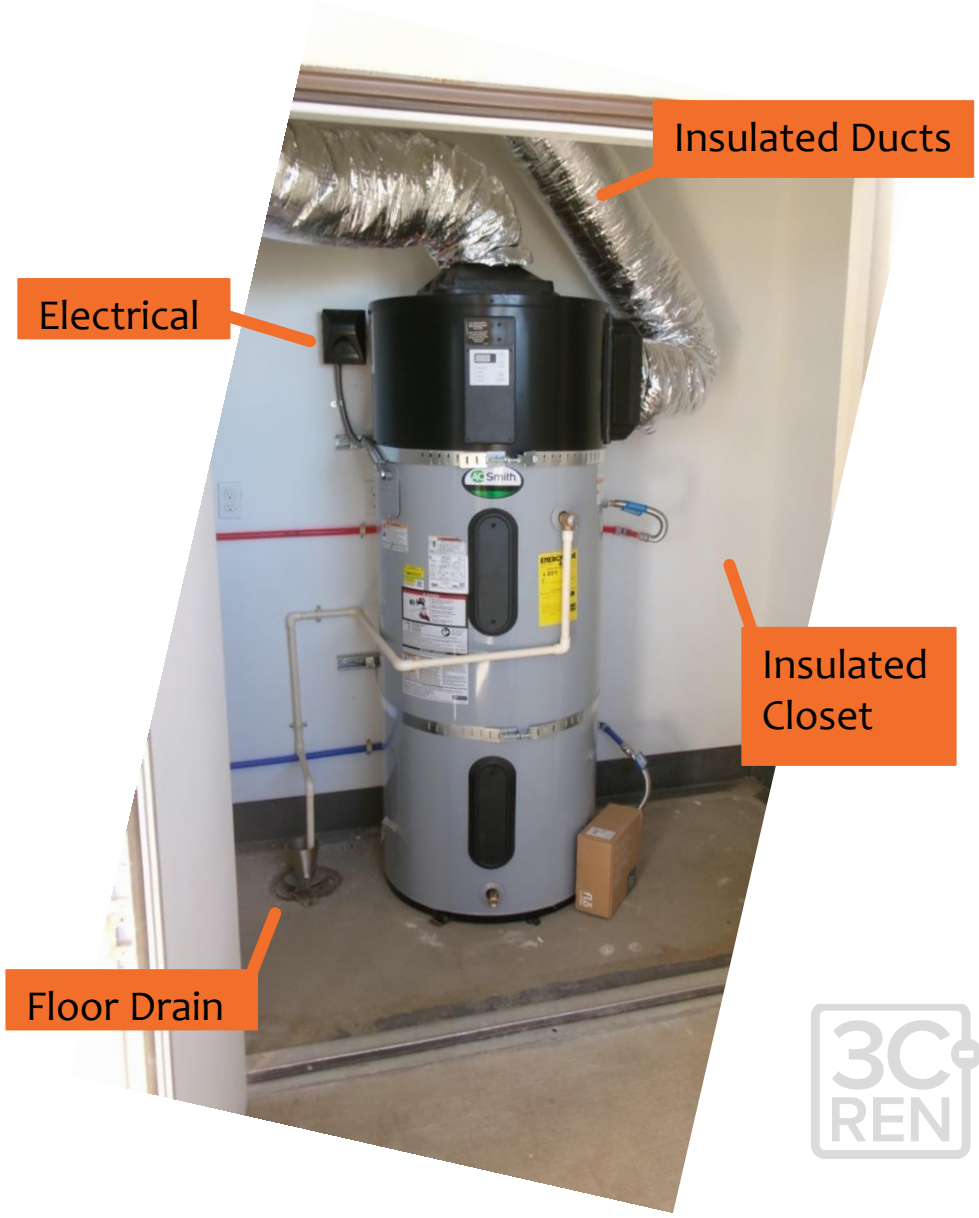
Rheem Example

Table 1.- Maximum Duct Length.

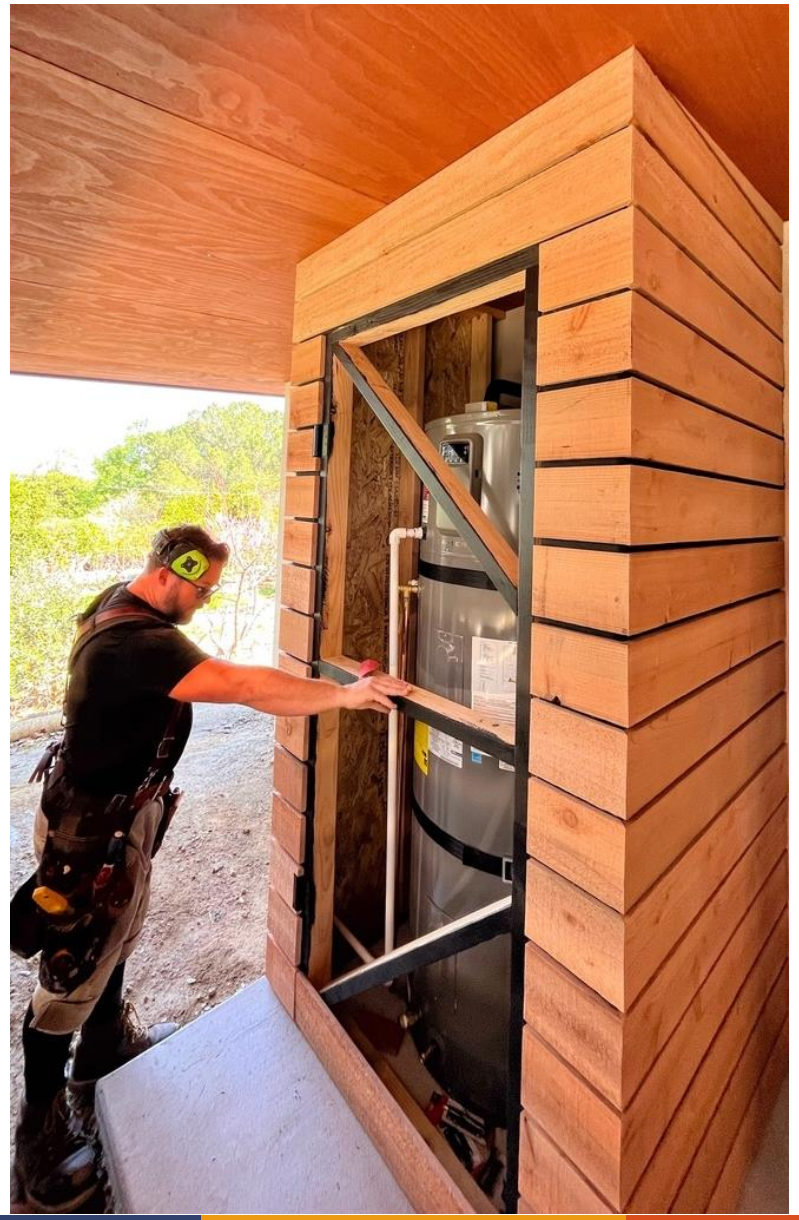
Duct Type / Diameter	8"	7"	6"	5"
Rigid	340'	160'	65'	17'
Flexible	125'	65'	25'	--

Insulated Closet – Insulated Ducts

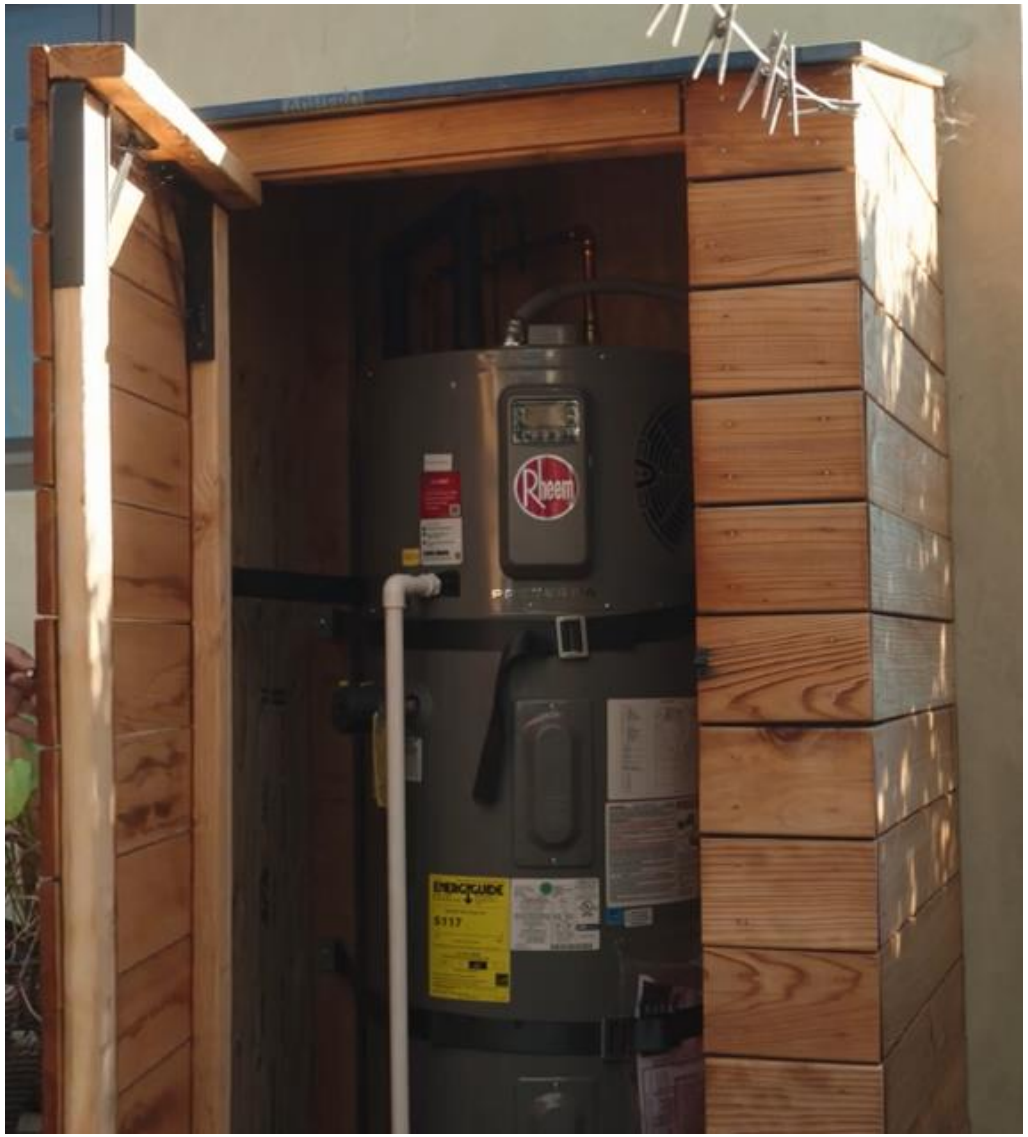




Uninsulated Closet –Louvered Door No Ducts Needed



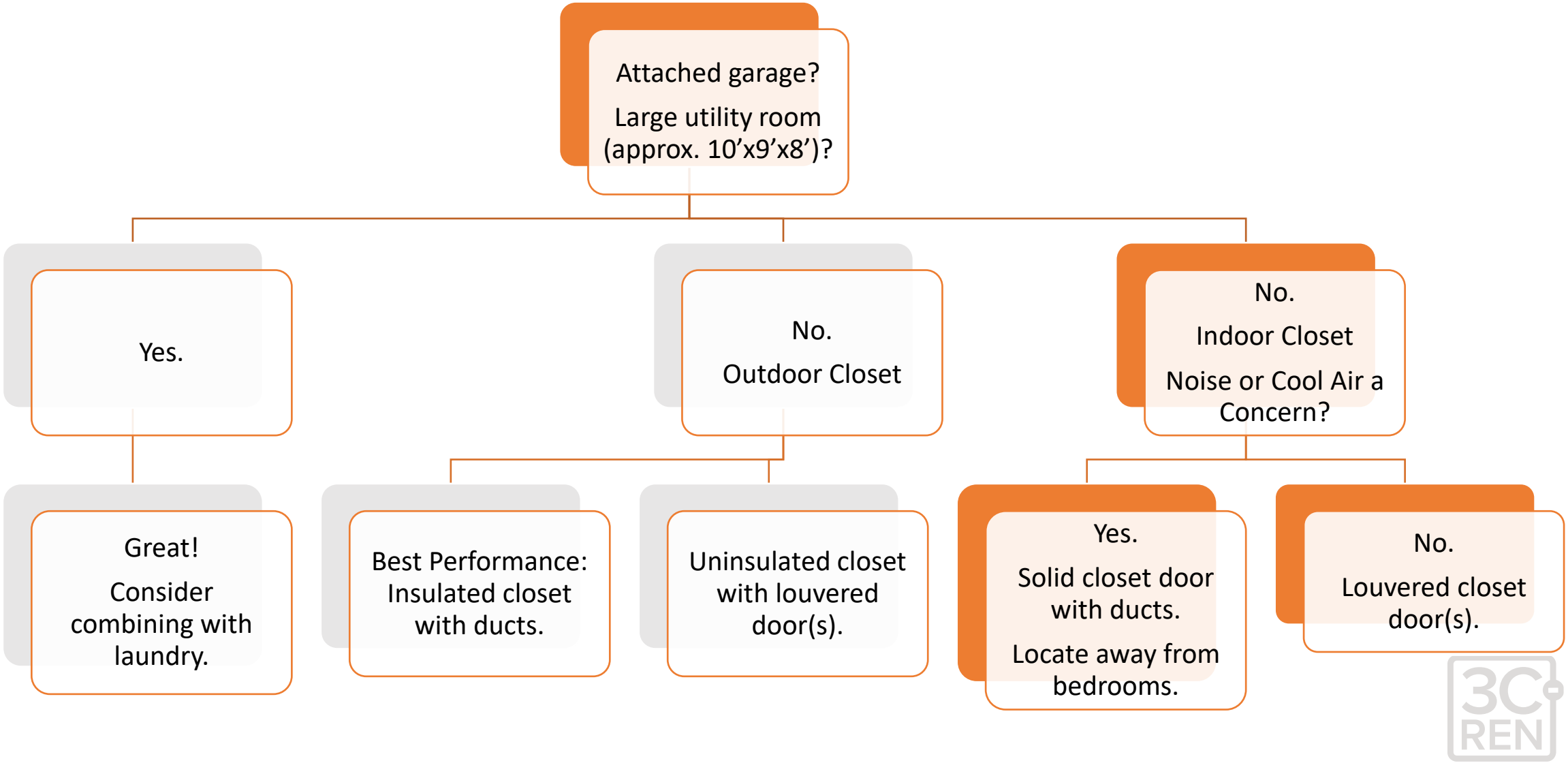
Existing Small Homes – Interior space or a garage may not be available



- Enclosure provides protection from the weather
- Appropriate for mild climates (HPWH units go into electric resistance mode around 40-45 deg F)
- Gaps between the siding boards allow for ventilation air

- Control panel is accessible
- Exhaust vent port is free from obstruction
- Condensate drainage is taken outdoors

HPWH Location: Space Availability for air volume



Interior Closets –Ducted and Louvered Door Options

Sealed at Penetrations

R-6 Ducts

Ducts allow the HPWH to utilize the great outdoors

Louvered door allows the HPWH to ‘communicate’ to the larger spaces of the house.

NFA = 125 sq in + 25 sq in per kBtu/h of compressor capacity or manufacturer specifications, whichever is larger

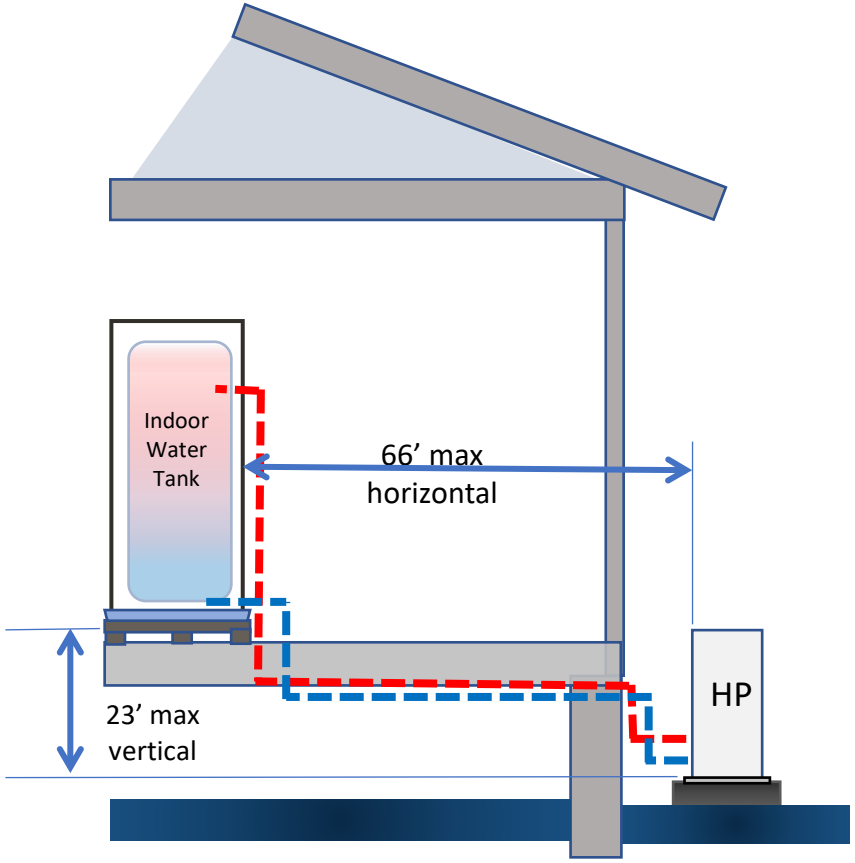
SanCO2 Hydronic Split System

- No noise
- No moving parts
- Can locate tank in tight spaces
- Can locate tank close to hot water needs
- System works in negative -26 deg F
- System uses CO2 as refrigerant

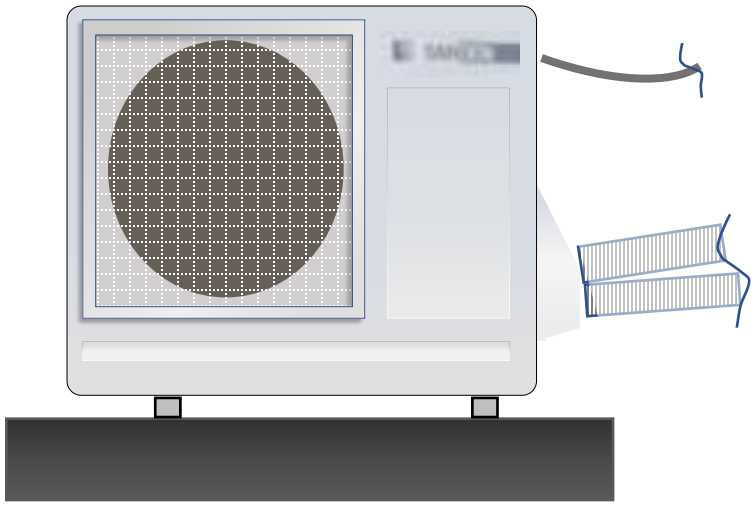
Under Stairs

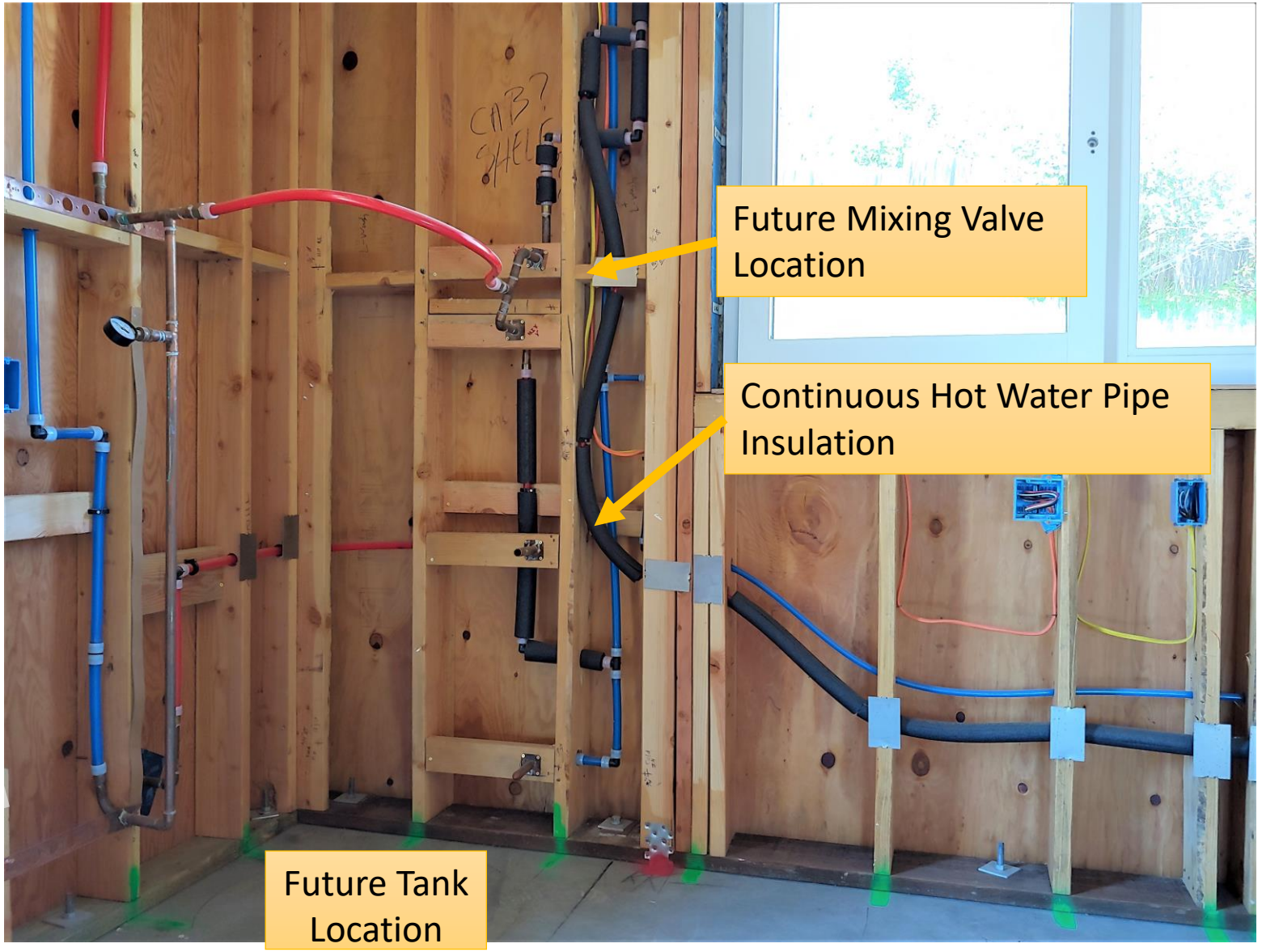
Photo Images:
https://www.eco2waterheater.com/gallery

In Closets



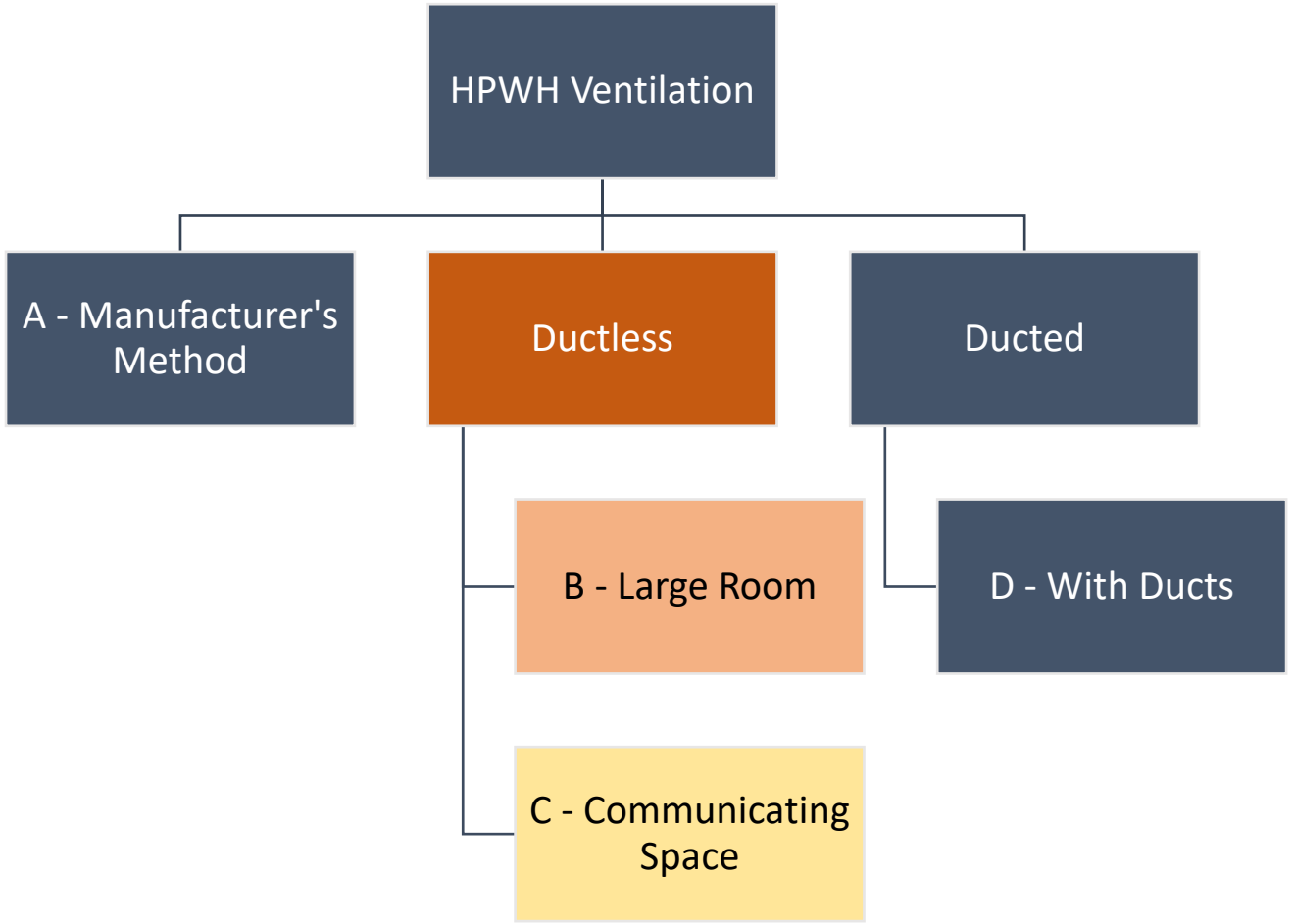
Indoor Plumbing Prep for a SanCO2





HPWHs in the Energy Code

2025 Energy Code –Min Ventilation Requirement



Option B – Without Ducts (Space Volume Method)

- Required volume = at least 100 cubic feet per kBtu/hr of compressor capacity, OR the manufacturer's minimum volume (whichever is larger).
- Example: A 5 kBtu/hr unit would require 500 cubic feet of space.

Option C – Without Ducts (Communicating Space Method)

- Ventilation must be provided through permanent openings:
  - Must be louvered grilles or doors.
  - Minimum Net Free Area (NFA) must be:
    - 125 sq in + 25 sq in per kBtu/hr of capacity, OR
    - The manufacturer's minimum (if larger).
  - Openings must be in the top and bottom halves of the enclosure (upper vent ≤12" from the top, lower vent ≤12" from the bottom).

Example of CF1R with Tank Located in an Outdoor Enclosure
with either Ducts or Venting to the Outdoors

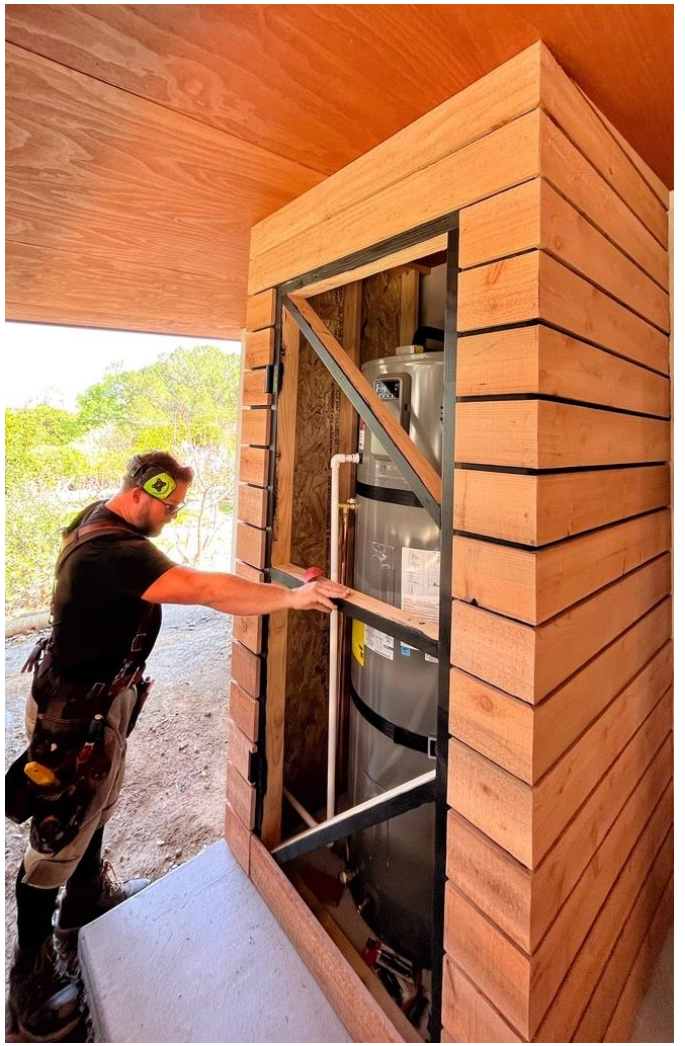
REQUIRED SPECIAL FEATURES
The following are features that must be installed as condition for meeting the modeled energy performance for this computer analysis.
• Solar Electric Generation Systems / Solar PV System requirements for newly constructed residential buildings are suspended per Executive Order N-29-25 • Indoor air quality, balanced fan • IAQ Ventilation System: as low as 0.14 W/CFM • IAQ Ventilation System Heat Recovery: minimum 60 SRE and 60 ASRE • IAQ Ventilation System: supply outside air inlet, filter, and H/ERV cores accessible per RACM Reference Manual • Floor has high level of insulation • Northwest Energy Efficiency Alliance (NEEA) rated heat pump water heater; specific brand/model, or equivalent, must be installed • One or more heat pump water heaters have been modeled as demand response compatible

WATER HEATING SYSTEMS

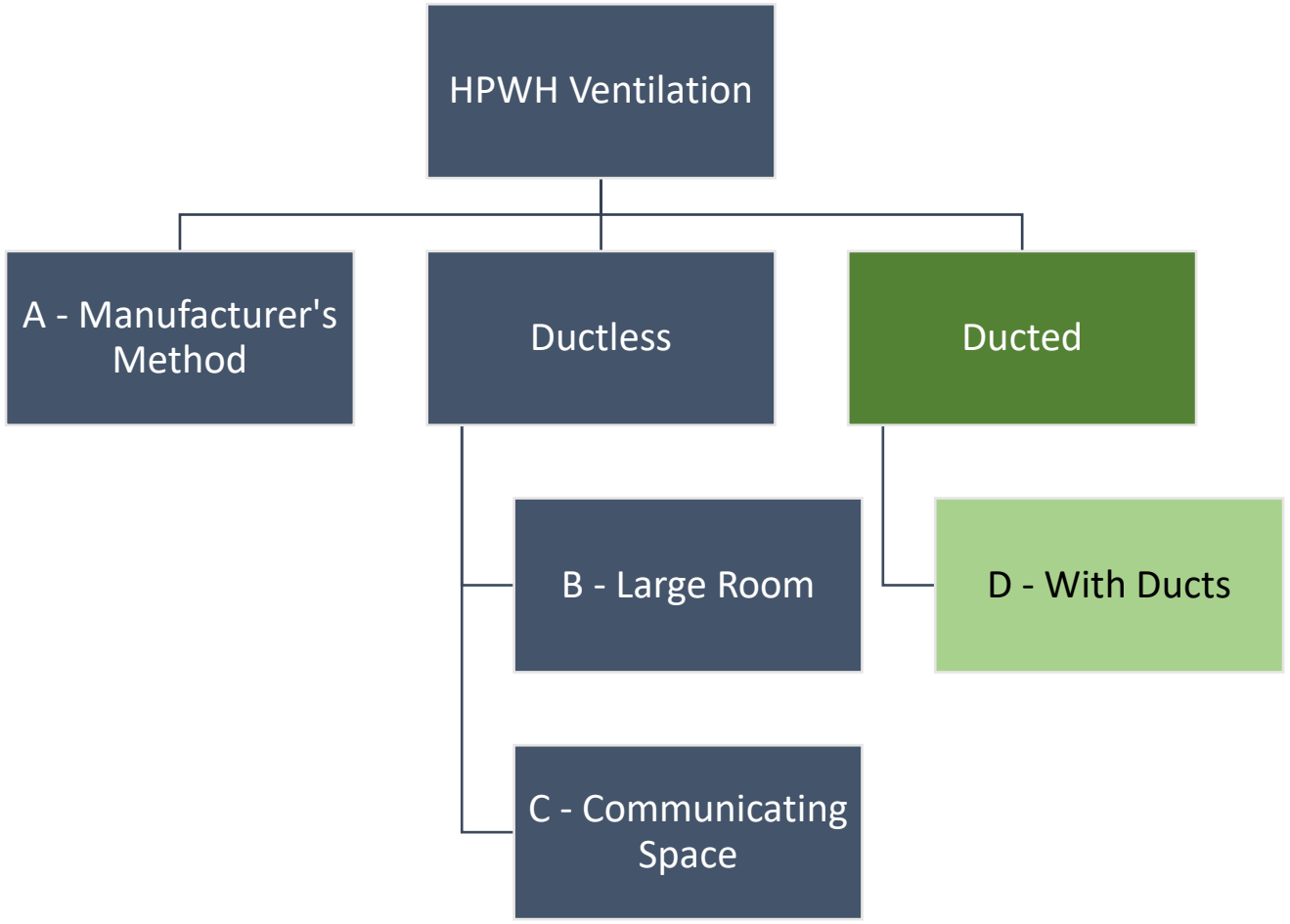
01	02	03	04	05	06	07	08	09
Name	System Type	Distribution Type	Water Heater Name	Number of Units	Solar Heating System	Compact Distribution	ECC Verification	Water Heater Name (#)
DHW System 1	Domestic Hot Water (DHW)	Standard	HPWH	1	n/a	None	n/a	HPWH (1)

WATER HEATERS - HEAT PUMP

01	02	03	04	05	06	07	08	09	10
Name	# of Units	Tank Vol. (gal)	NEEA Heat Pump Brand	NEEA Heat Pump Model	Tank Location	Duct Inlet Air Source	Duct Outlet Air Source	UEF	JA13 Compliant
HPWH	1	80	Rheem	RheemPROPH80 T2RH40015	Outside	Outside	Outside	n/a	☒



2025 Energy Code –Min Ventilation Requirement



Option D – With Ducts

- If ducts are used to bring in or to exhaust air:
  1. The space connected by the ducts must meet the minimum volume requirement
  2. All duct joints and penetrations through walls must be sealed.
  3. Exhaust ducts and any ducts crossing pressure boundaries must be insulated to at least R-6.
  4. If only the inlet or outlet is ducted:
     - The installation space must still have permanent openings (grilles/door undercut).
     - Ducted inlet: minimum NFA = duct's cross-sectional area.
     - Ducted exhaust: minimum NFA = larger of 20 sq in or the manufacturer's minimum.
  5. If both inlet and outlet ducts end within the same pressure boundary, airflow must be arranged so that the two air streams are diverted away from each other.

Installation Considerations, i.e., what to watch for!

Care and Maintenance

Changing the filter
Setting the temperature
Choosing the operation mode

Images: AO Smith https://www.hotwater.com/utility-programs/

Modes of Operation

- **Efficiency**: heat pump only
- **Hybrid**: both heat pump and electrical resistance heating elements
- **Electric**: electrical resistance heating only
- **Vacation**: puts the heater on hold at 60 deg F

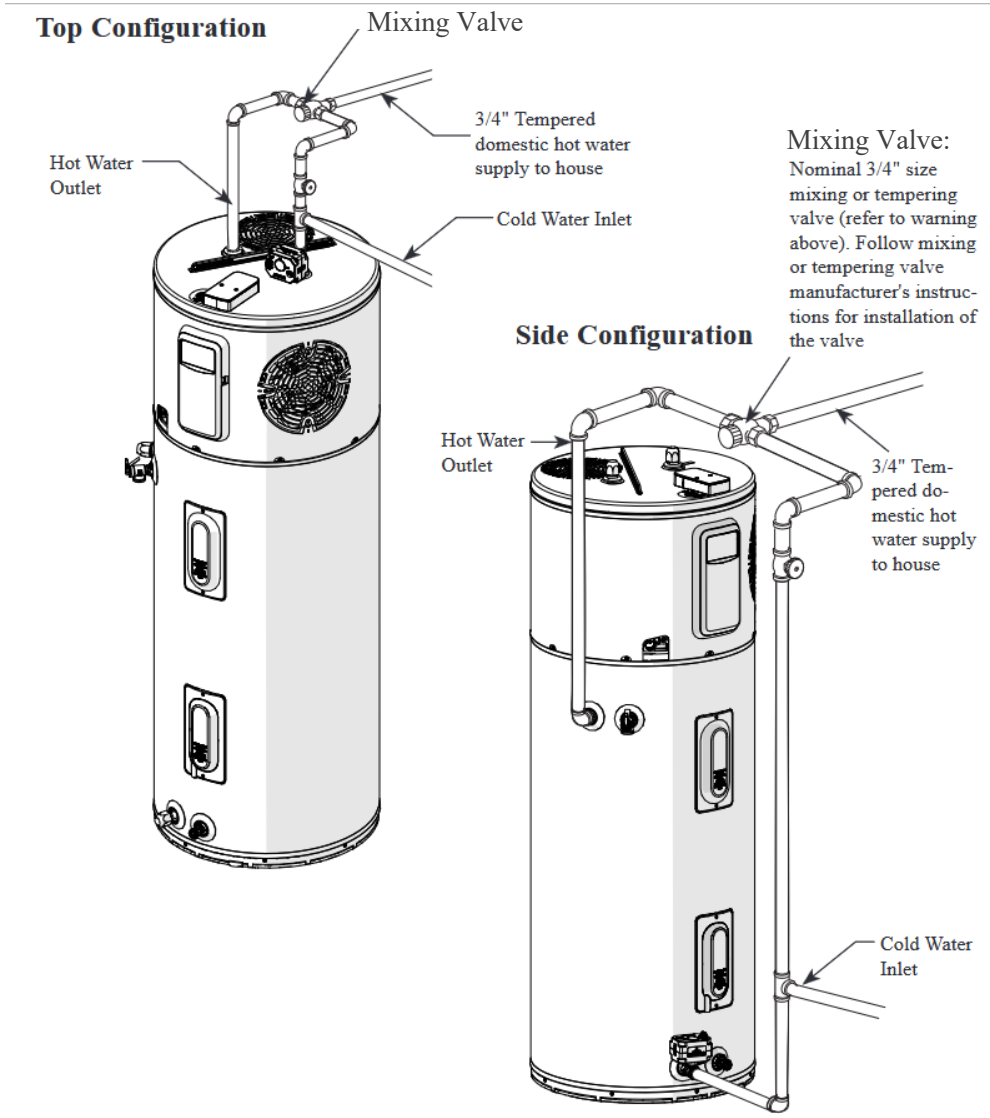
Images: AO Smith https://www.hotwater.com/utility-programs/

HPWHs Come with Washable Air Intake Screen Filters

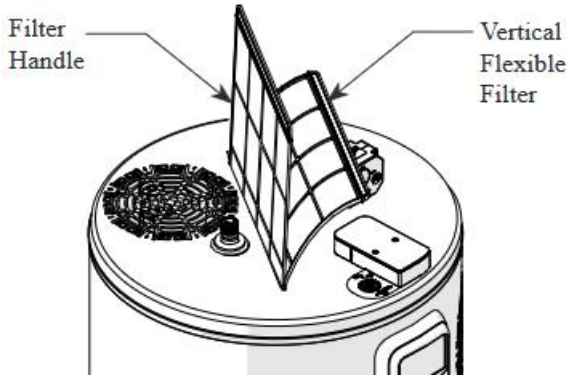
Filter is accessible and easily pulls out for maintenance

Issue: Elec conduit was installed over the top of the filter access zone

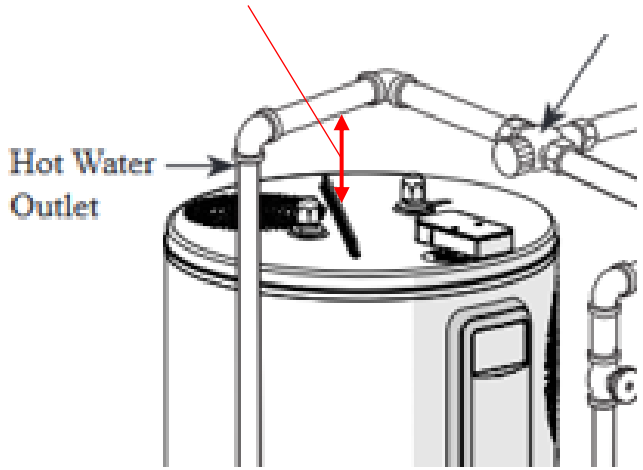
Piping over Top of Tank –Minimum Clearance



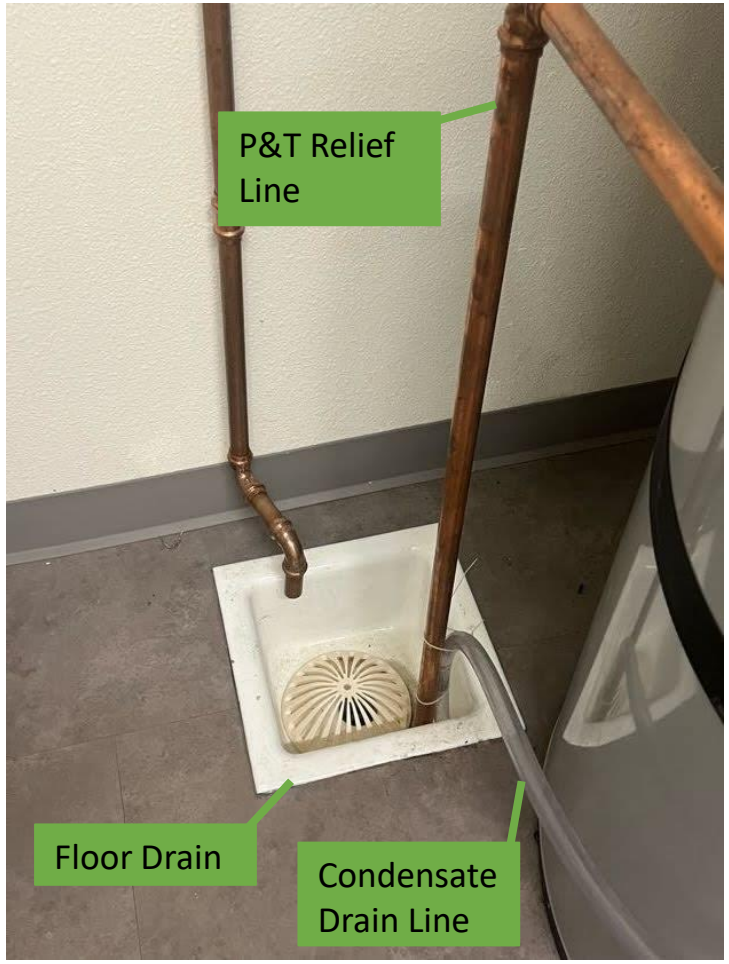
Most models have the air filter accessible from the top of tank.

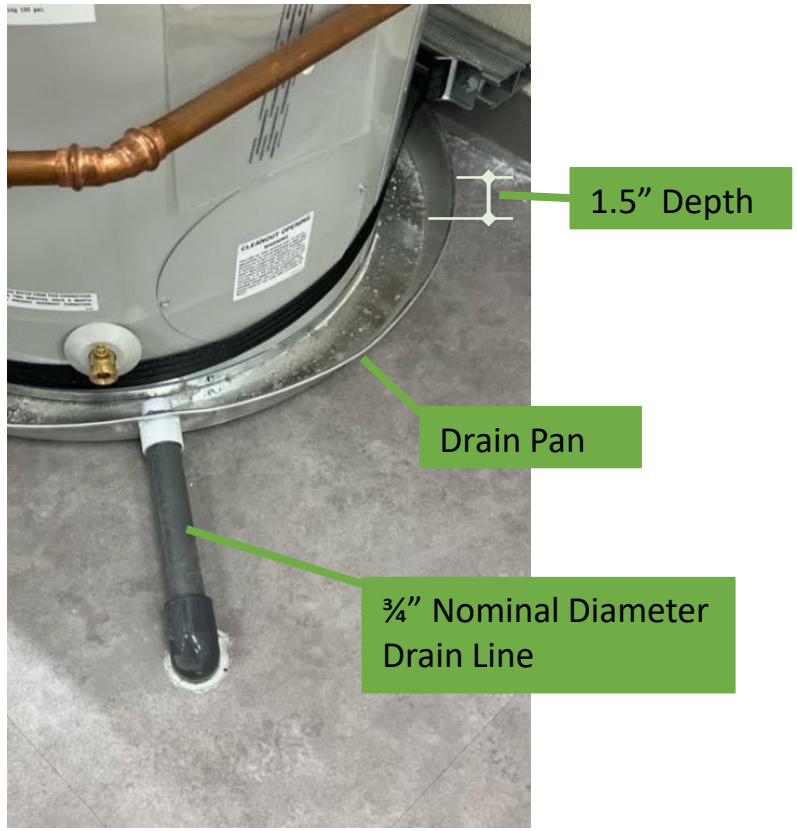


6” minimum clearance needed



Floor Drains and Drain Pans with Pathway for Drainage





Drain pans are required when installed over a substrate, floor, or space that could be damaged from water

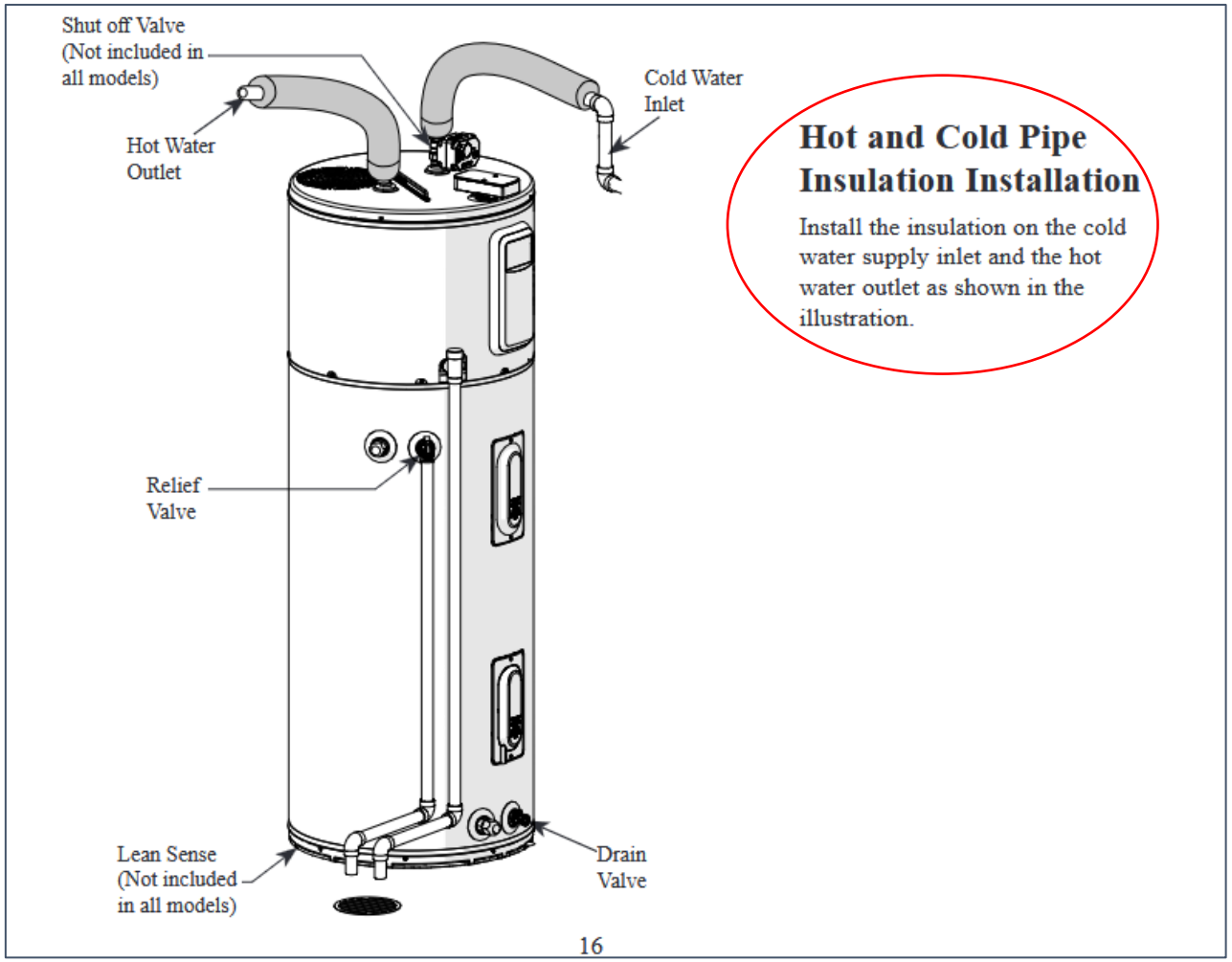
HPWHs Create Condensate when in Heat-Pump-Mode

Issue: Condensate line terminates to an interior closet

Note:
Condensate Piping –clear PEX –good for visual inspection

Manufactures Recommend Insulation on Both Hot and Cold Pipe

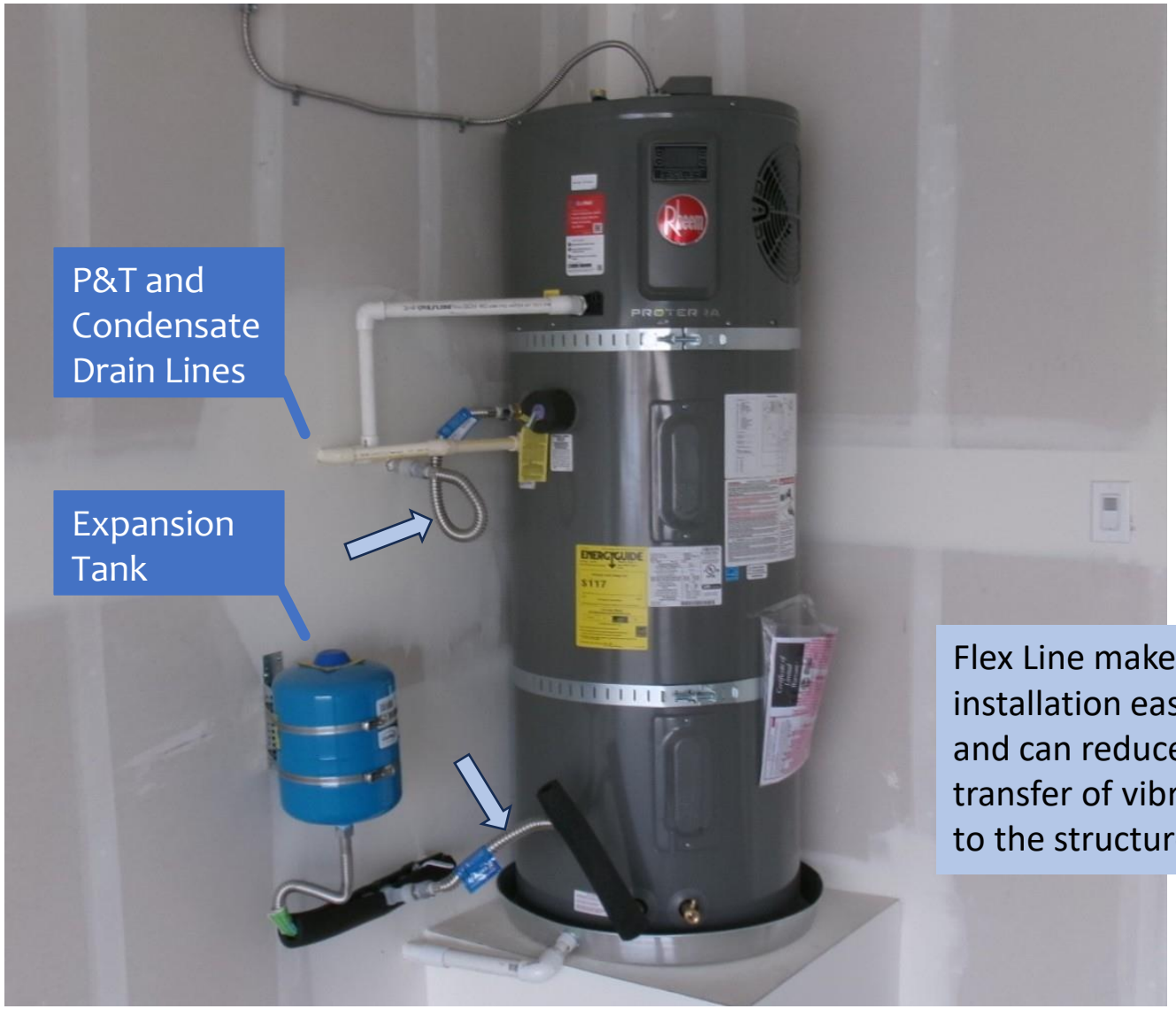
Excerpt from Manufacture Installation Manual



All Pipes Insulated –Good Practice and an ECC/HERS Credit

ECC/HERS Measure - All elbows and tees shall be fully insulated (and joints taped)

Insulation Example



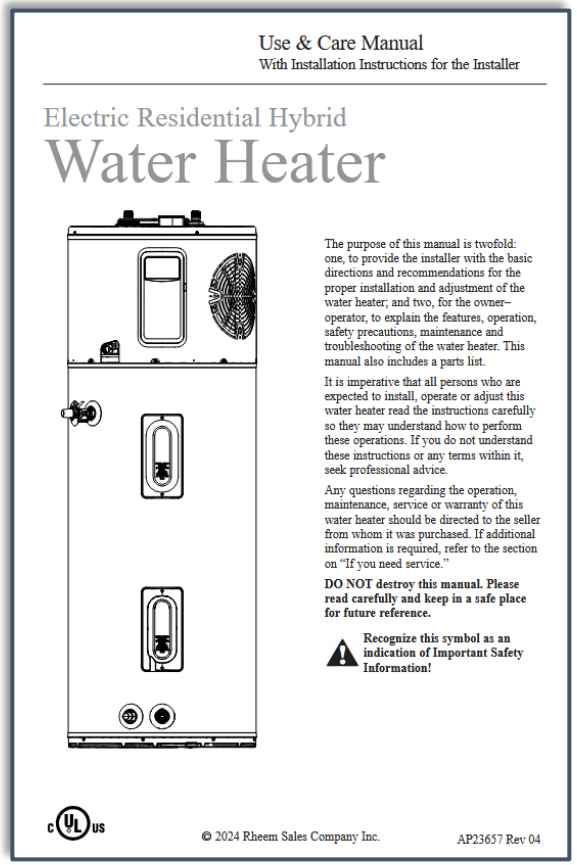
Note:
First 5 ft min of hot and cold water piping should be insulated with insulation as thick as the pipe diameter.

Ducted Closet Example –R-6 Ducts and Insulated Pipes

And other good stuff…

- Expansion tank
- Flexible piping at tank inlet and outlet
- Lines insulated --mostly
- Floor Drain in good location
- Controls easily accessible
- Air-Filter easily accessible
- Electric shut-off easily accessible
- Check valve between tank and recirc pump

Clearances, Air Exhaust, and Closet Installations –
Follow Manufacture's Installation Manual



Use & Care Manual
With Installation Instructions for the Installer

Electric Residential Hybrid
Water Heater

The purpose of this manual is twofold: one, to provide the installer with the basic directions and recommendations for the proper installation and adjustment of the water heater; and two, for the owner–operator, to explain the features, operation, safety precautions, maintenance and troubleshooting of the water heater. This manual also includes a parts list.

It is imperative that all persons who are expected to install, operate or adjust this water heater read the instructions carefully so they may understand how to perform these operations. If you do not understand these instructions or any terms within it, seek professional advice.

Any questions regarding the operation, maintenance, service or warranty of this water heater should be directed to the seller from whom it was purchased. If additional information is required, refer to the section on "If you need service."

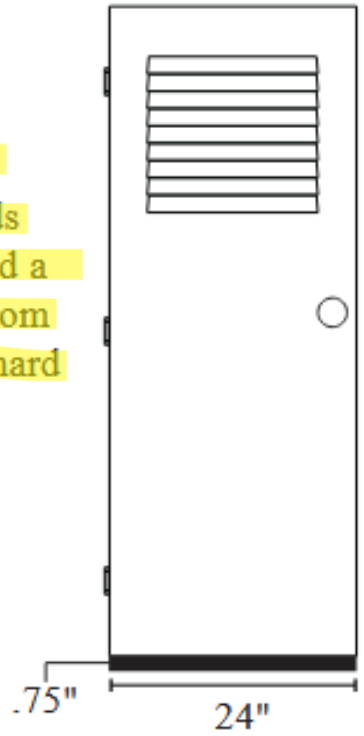
DO NOT destroy this manual. Please read carefully and keep in a safe place for future reference.

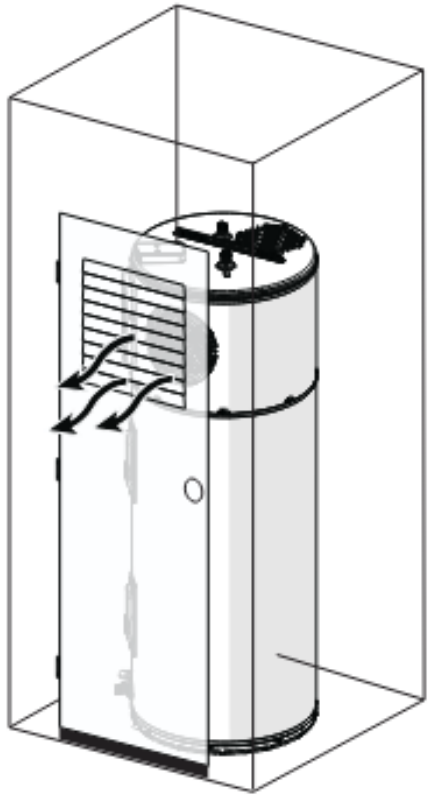
Recognize this symbol as an indication of Important Safety Information!

AP23657 Rev 04

Rheem.com

NOTE: The exhaust needs to be oriented a min. of 6" from any wall or hard surface





Heater: Not Ducted

Room size: Small closet
Requirements:

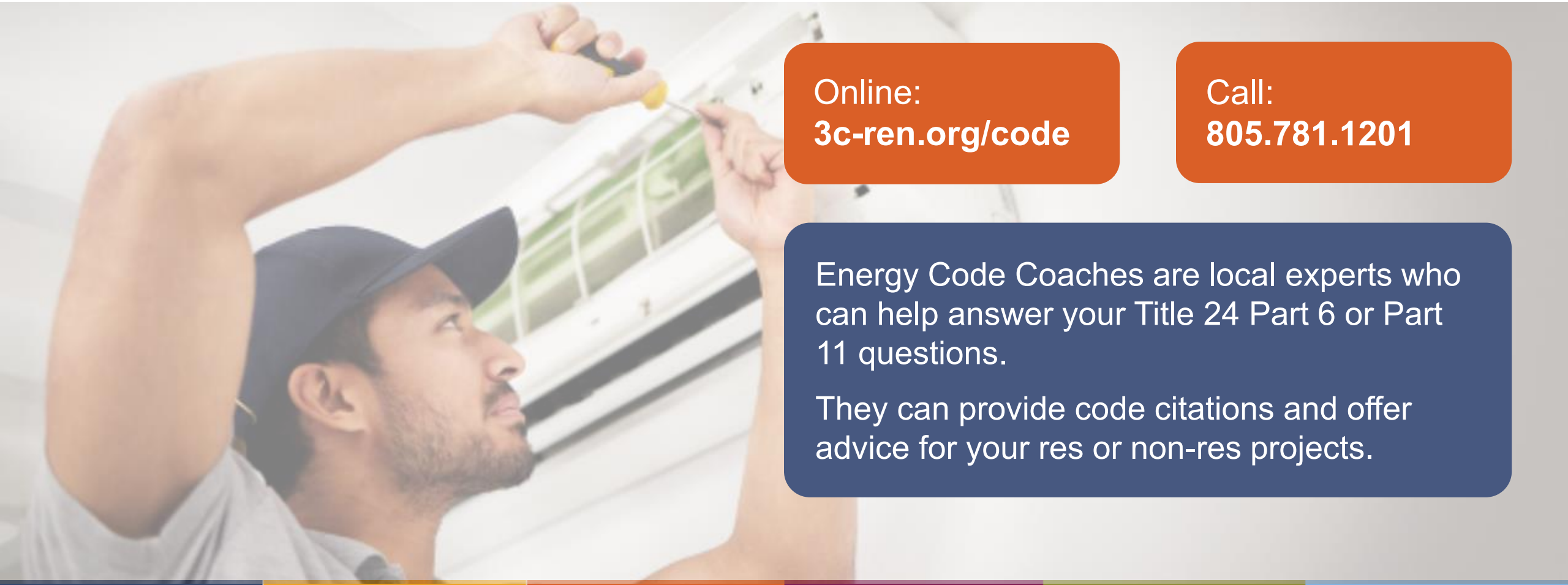
* Air gap under door equal to 18 in2 (0.75" clearance).
* Louver must be located the same height on door as the air exhaust on heater.
* Heater air exhaust must be positioned toward louver within one foot of door.

What am I, as a builder, looking for in Unit selection?

- Price
- Warranty
- Availability
- Reliability of the Vendor
- Dimensions (ties in with ventilation strategy)
- Access to Space

Questions about Title 24?

3C-REN offers a *free* Code Coach Service



Online:
3c-ren.org/code

Call:
805.781.1201

Energy Code Coaches are local experts who can help answer your Title 24 Part 6 or Part 11 questions.

They can provide code citations and offer advice for your res or non-res projects.

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Builder's Perspective: Insulation and Air Sealing!

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Coming to your inbox soon

- Slides & Recording from today's talk

Upcoming courses:

- 2025 Energy Code in Practice: Single Family Additions and Alterations (3/10)
- Ask the Experts: Load Calculations with **Judy Rachel** (3/12)
- Contractor Power Hour (3/20)
- Builder's Perspective: Insulation and Air Sealing (4/1)

Any questions?

- Contact chloe.swick@venturacounty.gov