



# HEAT PUMP WATER HEATER BEST PRACTICES GUIDE

For Informed Customers,  
DIY Installers, and  
Curious Contractors



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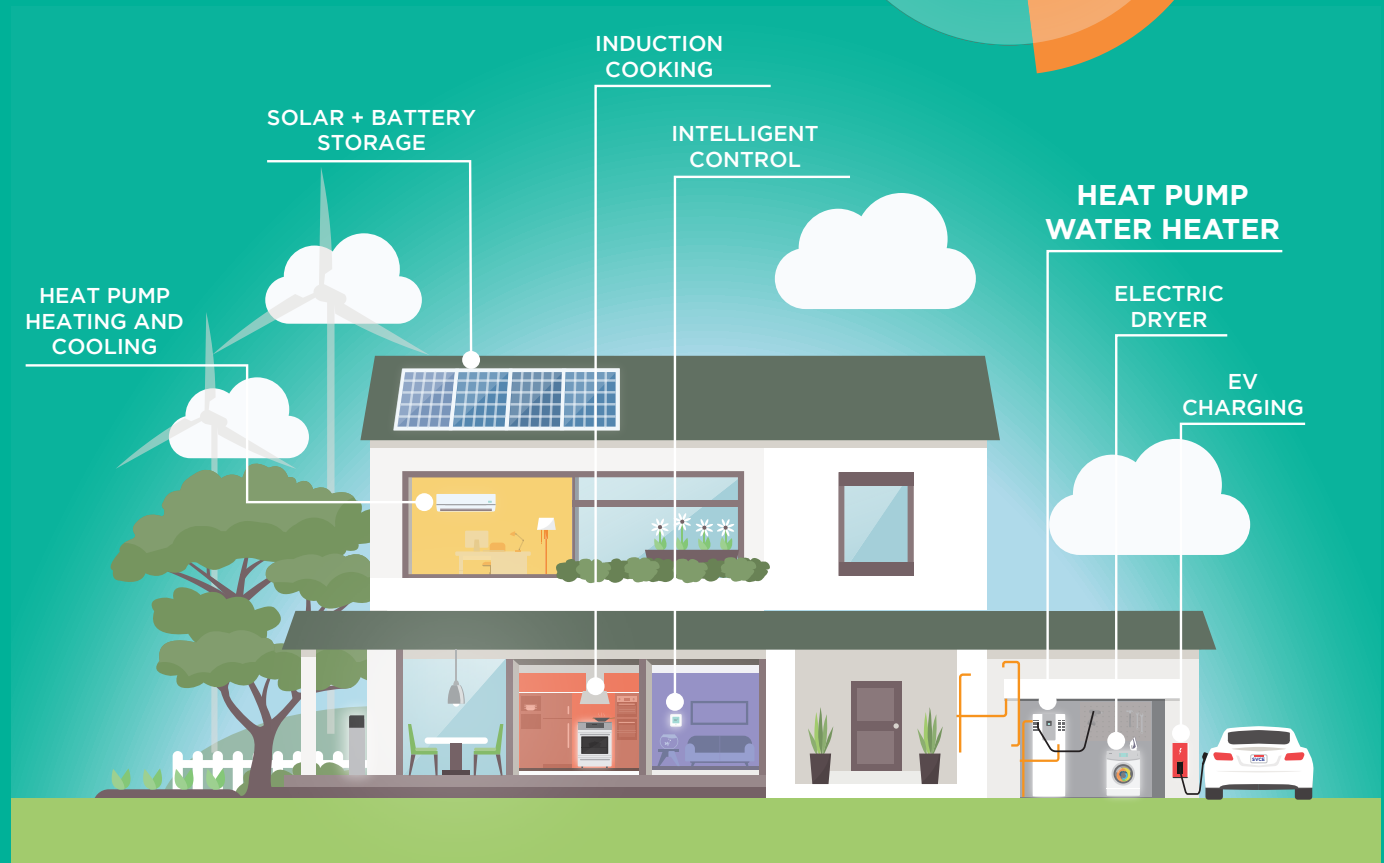
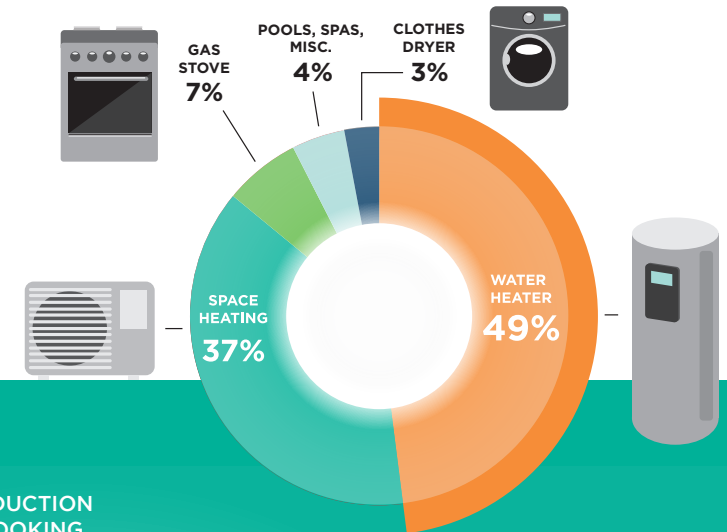
# INTRODUCING THE “FUTUREFIT” HOME

An all-electric FutureFit home is more efficient, comfortable and safe. Appliances run on clean electricity from sources such as solar, wind and hydropower – rather than fossil fuels that harm indoor air quality and pollute the environment. At the core of a FutureFit home is an electric Heat Pump Water Heater.

Most existing homes in the San Francisco Bay Area have water heaters that run on natural gas. Gas water heaters are typically a home’s single biggest source of emissions that are damaging to air quality and the environment.

This guide offers important information on the benefits of installing an electric Heat Pump Water Heater, buying considerations, product details and installation.

## HOME EMISSION SOURCES





# KEY ELEMENTS OF THE FUTUREFIT HOME

## INDUCTION COOKING

Gas stoves release harmful pollutants in your home and are a less efficient way to heat your food. Induction cooking is clean and fast and provides precise temperature control.

## INTELLIGENT CONTROL

Intelligent controls, such as smart thermostats, help your home and appliances use electricity efficiently, and when electricity rates are lowest.

## ELECTRIC DRYER

Why clean your clothes with dirty fossil fuels? Use clean electricity for an even fresher load of laundry.

## EV CHARGING

Home EV chargers provide convenience, allowing you to start each day with a “full tank”, and they can be programmed to use electricity when it costs less.

## HEAT PUMP WATER HEATER

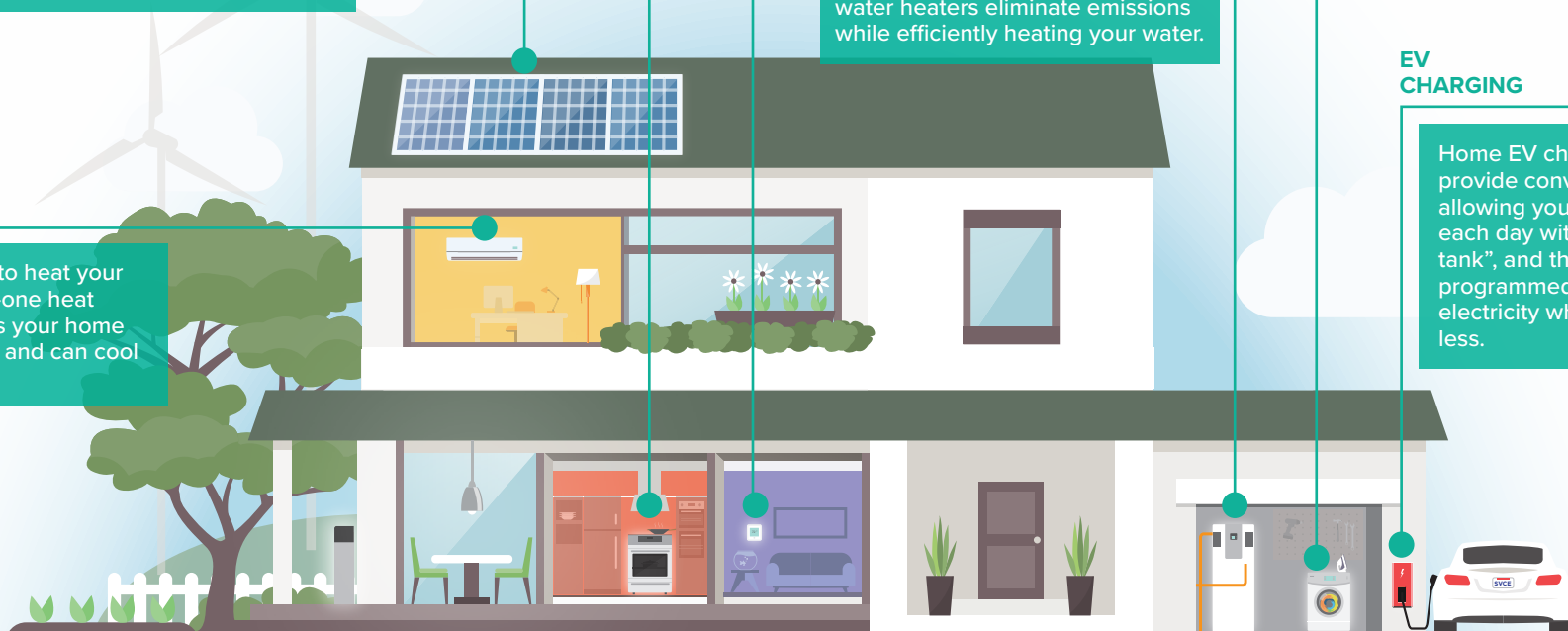
In this guide, learn what you need to know about how heat pump water heaters eliminate emissions while efficiently heating your water.

## SOLAR + BATTERY STORAGE

Solar helps power the all-electric Future-Fit home, and storage allows you to use solar electricity when it is needed most, especially during the more expensive evening peak hours.

## HEAT PUMP HEATING AND COOLING

Don't burn gas to heat your home. A two-in-one heat pump unit heats your home more efficiently and can cool your home too!







## 02 BENEFITS

A Heat Pump Water Heater (HPWH) offers many benefits compared to gas water heaters:



### Energy Savings

Heat Pump Water Heaters are more energy efficient because they use less energy to heat water compared to natural gas water heaters.

HPWHs help lower your energy bills by taking advantage of time-of-use electricity rates, and can even participate in money generating opportunities, like utility grid-interactive programs, neither of which are available to natural gas water heaters.



### Usable Cold Air

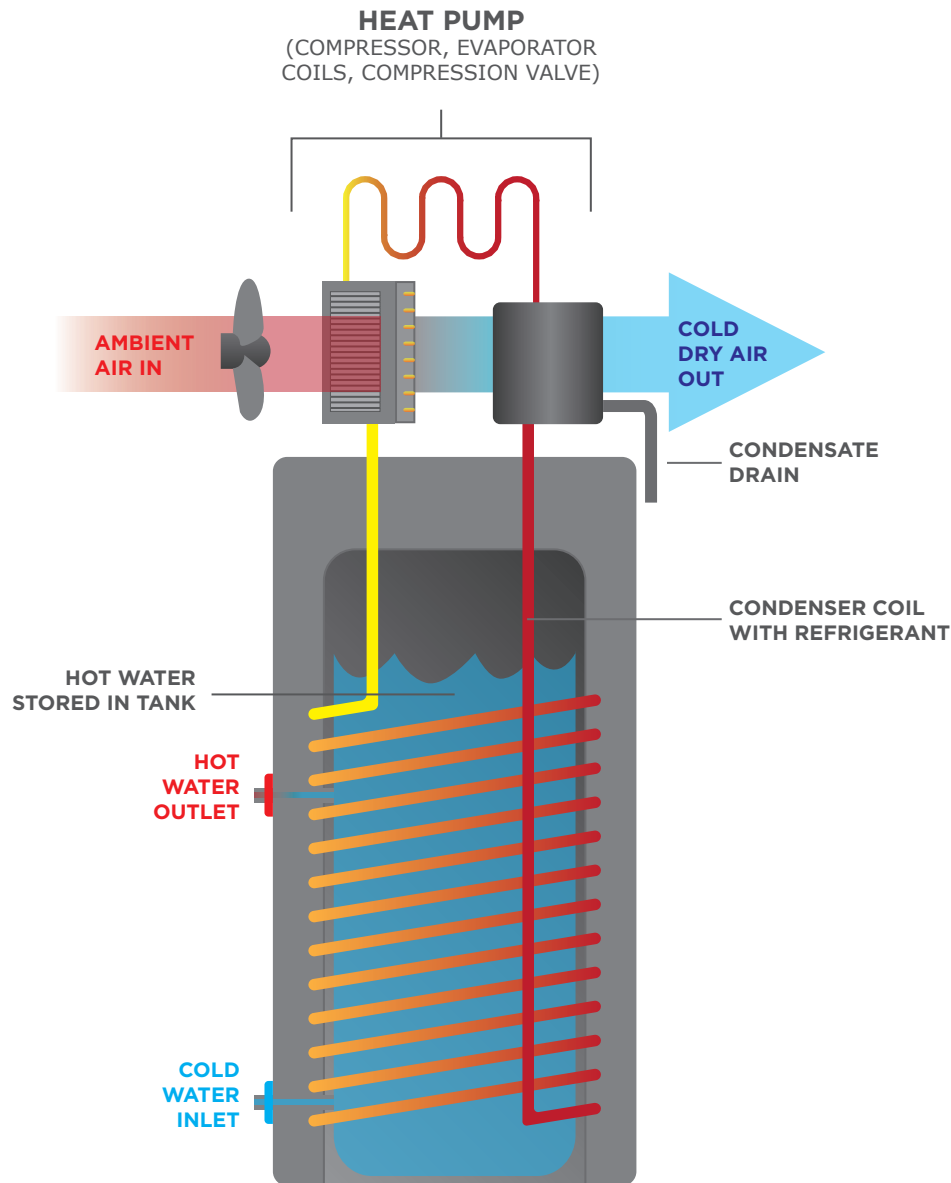
When a heat pump is operating, it expels cold air. This can often make the surrounding space more comfortable during warm months.



### Healthier and Safer

Replacing the combustion of natural gas with clean electricity for your water heater removes a major potential source of Carbon Monoxide (CO) and Nitrogen Dioxide (NO<sub>2</sub>) from your home.

With SVCE providing clean electricity for your home, switching to a HPWH cuts nearly 50% of your home's overall greenhouse gas emissions that otherwise would have occurred with your natural gas water heater.



## 03 HOW IT WORKS

A Heat Pump Water Heater works similarly to a refrigerator, except in reverse. While a refrigerator removes heat from an enclosed box and expels that heat to the surrounding air, a HPWH takes the heat from surrounding air and transfers it to water in an enclosed tank.

As ambient air is pulled into the heat pump, heat is absorbed by refrigerant inside an evaporative coil which transfers heat to the water. The cooled, dehumidified air is then pushed back out into the surrounding space. Cold water enters the tank, is heated by the hot refrigerant in the condenser coil and is then sent to you through your home's pipes.

HPWHs typically allow for multiple modes of operation depending on the situation:

- **Efficiency/Economy** – Maximizes energy efficiency and savings by only using the heat pump to heat water.
- **Electric/Heater** – This high-demand setting is the least energy-efficient, using only the electric resistance element to heat water. To keep bills lower, we recommend avoiding this setting.
- **Auto/Hybrid** – The default setting is ideal for daily use, providing energy-efficient water heating using the heat pump, with backup heat as needed from the electric element.
- **Vacation & Timer** (not available on all models) – Save energy when away from home by placing the unit in “sleep” mode until you return.

# 04 SELECTING A HEAT PUMP WATER HEATER



SVCE recommends considering the following when choosing a Heat Pump Water Heater to install:

## Efficiency

Look for a Uniform Energy Factor (UEF) of at least 3.3. This number represents how efficiently the unit operates: the higher the number, the less it will cost to heat water. A UEF of 3.5 or greater is quite common.

The Northwest Energy Efficiency Alliance (NEEA) rates products by performance – look for a unit rated as Tier 3 or 4 for better performance and lower noise.

See: <http://neea.org/img/documents/qualified-products-list.pdf>

## Connectivity

Look for a “smart” HPWH that’s connectable either through Wi-Fi or CTA-2045. This allows better control of the unit, makes it easier to lower bills by syncing with hourly utility rates, and enables participation in Demand Response programs which can provide additional money saving opportunities.

## Condensate

When HPWHs pull heat out of the surrounding air they also capture condensation. This extra water needs to be sent to a drain through a small pipe. If a gravity flow drain isn’t easily accessible from the water heater location, a condensate pump may need to be installed to push the piped water further.

## Thermostatic Mixing Valve

We highly recommend adding a thermostatic mixing valve when installing a HPWH – it allows water in the tank to be stored at a higher temperature (140° F) and blended with a small amount of cold water to provide the desired temperature (typically 120° F). Each additional degree the water is heated in the tank provides the equivalent of one extra gallon of storage capacity, making sure there’s always plenty of hot water. Including a thermostatic mixing valve is also a requirement of many incentive programs as well as a prerequisite to participate in most Demand Response programs, which can lead to increased bill saving opportunities.

## Recirculation Pumps

Some homes may have recirculation pumps to reduce the wait time for hot water, but they are inefficient and may not comply with state code. If a recirculation pump already exists, we recommend replacing it with a demand-based recirculation pump with manual on/off controls and a sensor that shuts the pump off when the temperature in the pipe meets a specified temperature.



# 05 TANK SIZING GUIDELINES

## Sizing a heat pump water heater

If you plan to replace a gas water heater with a heat pump water heater, consider upsizing the tank. While heat pumps are more efficient, they take longer to heat up. A bigger tank reduces the chance that you will run out of hot water.

Water heater sizing should be based on characteristics of the home (i.e. number of bedrooms) rather than occupancy, which can change over time. The table provides some general guidelines for tank size. Always consult a licensed plumber or equipment manufacturer before purchasing a system to make sure the selection suits your needs.

Consider also including a thermostatic mixing valve for additional heat capacity to ensure there's always plenty of hot water.



Recommended heat pump water heater size (gallons)

Existing gas water heater tank size	Studio	1-br	2-br	3-br	4-br
40 gallon	40	50	65	65 or 80	80
50 gallon	40	50	65	65 or 80	80
60 gallon	-	65	80	80	80
80 gallon	-	-	80	80	80

Above are for 240V systems.

**For 120V plug-and-play systems, we recommend increasing to the next available system size.**

# REDUCING NOISE AND VIBRATION

Just like all water heaters, heat pump water heaters make some noise. If you plan for the sound when choosing a location and take steps to isolate noise and vibration, the water heater can add to the comfort of your home without noticeable disruption.

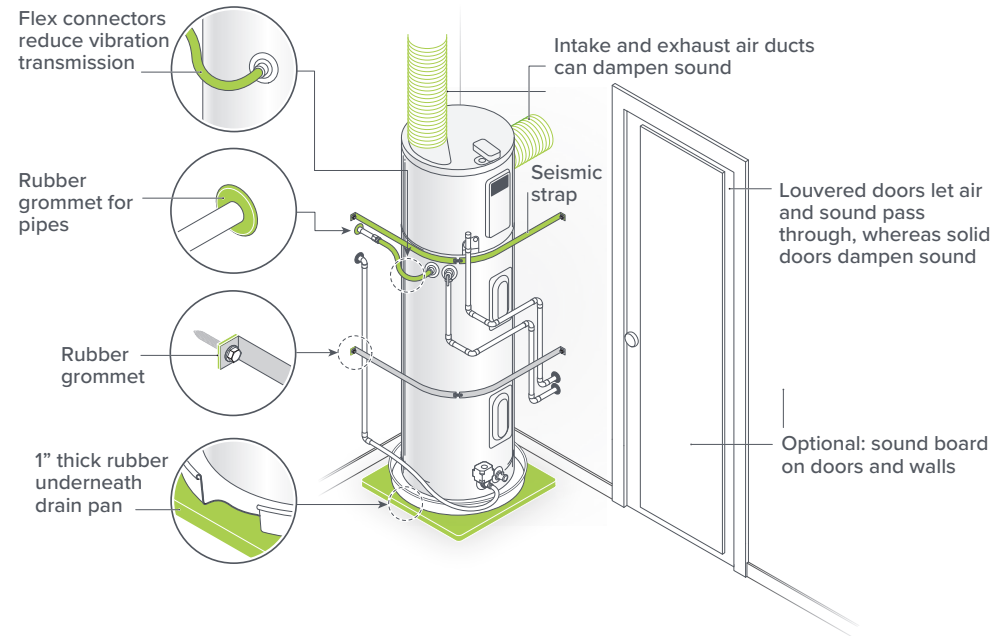
## Best-case scenario

Place the water heater at a distance from your bedrooms, the living room, and other gathering places. The easiest installation projects make use of sufficient space in a basement, a garage, or a laundry room.

## Similar noise level to a microwave

Many heat pump water heaters give off about 49-52 decibels of noise while running. Total runtime depends on usage. A good rough approximation is that the water heater will operate for about three hours per day. Expect the device to make more noise than a refrigerator but less noise than a clothes dryer.

## Noise and vibration control



**Reduce the vibration.** If the floor is concrete or other hard surface, a rubber mat or an off-the-shelf isolation kit made of neoprene or rubber will dampen vibration. Use flexible fittings such as PEX connectors where permissible and flexible ducts for ventilation. For seismic strapping, use rubber grommets or other noise control accessories. When in doubt check with a professional such as a licensed contractor or local permitting staff for specific recommendations for your situation.

**Lower the noise.** A solid door, wall insulation, and other materials will reduce noise. Ventilating air ducts also help contain sound. Many water heaters can be set to run at convenient times.

# 07 AIRFLOW AND VENTILATION

## Give your water heater enough space and air

A heat pump water heater needs plenty of air. Look for a room with at least 700 cubic feet. In a smaller space, you can increase ventilation by installing air ducts or louvered doors.

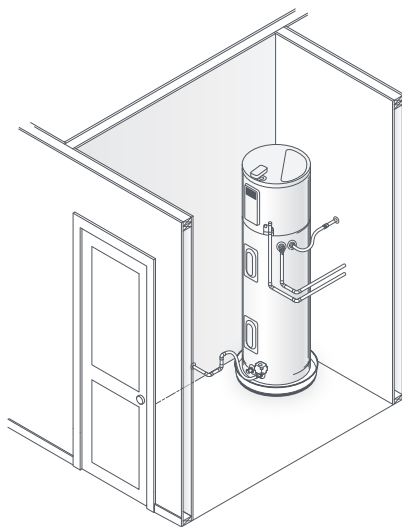
### Best-case scenario: Garage or space of at least 700 cubic feet

For example, a 10-foot by 10-foot room with a 7-foot ceiling. Some HPWHs require 800 cubic feet.

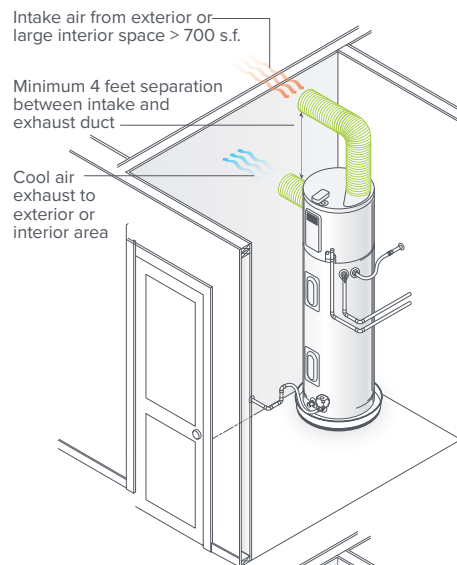
A heat pump water heater pulls in warm air and blows out cold air. In a small space with little circulation, the air gets too cold for the water heater to work properly.

### Will a larger water heater fit in my space?

For reference, an 80-gallon heat pump water heater is about 2 feet in diameter and needs at least 6'-6" of ceiling height. For smaller water heaters, consider installing a thermostatic mixing valve. With a mixing valve, you can safely turn up the temperature of the water heater, which can provide more hot showers from the same sized tank.

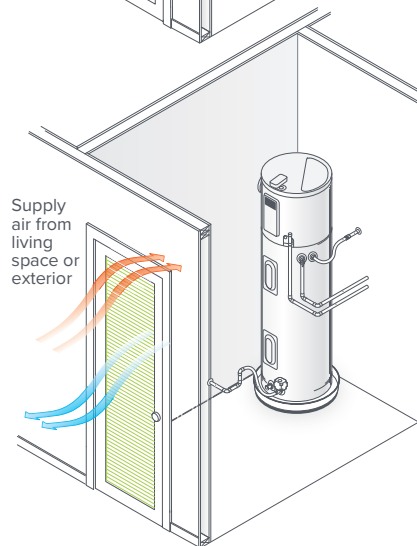


If your space is too small, here are two ways to circulate more air.



### Ventilate with air ducts

Heat pump water heaters can be connected to air ducts. In a smaller space, an air duct can supply warm air and a separate duct can remove cold air from the water heater outlet.



### Ventilate with louvered doors

Louvered doors are aesthetically pleasing without blocking air flow. Some water heaters have special requirements, but in small spaces you generally can use louvered doors for ventilation. It's important to note this will allow cold air and some additional noise to travel to the adjacent space.



Electrification of home appliances always begins with assessing the electrical panel. Specifically:

- How many amps is the main panel rated for?
- How many remaining amps are available?
- How much breaker space is available?

Many homes have the potential to be electrified on 100-amp service, without the time and expense of a service upgrade. Below are some recommendations for electrifying equipment without overloading the existing panel. Always consult with a licensed electrician before making decisions or attempting to perform home electrical projects.

Situation	Potential Solution #1	Potential Solution #2
Panel has no remaining capacity (amps)	Install a circuit sharing device to share the 240V dryer or EV charging circuit	Install a 120V Heat Pump Water Heater on an existing circuit
Panel has no remaining breaker space	Replace standard breakers with slimline (skinny) breakers	Have an electrician combine circuits to free up breaker space or install a subpanel



# LOWERING ENERGY BILLS

Health and safety are important reasons to switch from fossil-fuel burning appliances to electric solutions, but you can also save money by using a Heat Pump Water Heater! Below are recommendations to keep energy bills lower and take advantage of HPWH technology for additional savings opportunities:

- **Choose a high efficiency unit.** The uniform energy factor (UEF) describes a Heat Pump Water Heater's efficiency, and the higher the better. A UEF of 3.5 or higher is common and will result in bill savings compared to a lower efficiency unit.
- **Optimize your electricity rate.** Installing a HPWH enables access to electrification-friendly rates such as EV-2A and E-ELEC. These rates are designed to reduce costs for customers with electric space and water heating and offers high discounts on off-peak energy use between the hours of 12 a.m. - 3 p.m. Learn more at [svce.info/rates](https://svce.info/rates).

- **Sync your water heater to off-peak energy use.** Automatically heat during hours of lowest cost and avoid using energy during higher periods. Connecting your water heater to Wi-Fi or CTA-2045 will optimize your unit to heat water when energy is cheapest. Alternatively, manually program the water heater to correspond to off-peak periods (12 a.m. - 3 p.m.).
- **Select “Auto/Hybrid” mode** for your HPWH to prioritize the efficiency of the heat pump to heat water. Avoid the “Electric/Heater” setting, which will use the most energy.
- **Turn on “Vacation” mode** when taking longer trips to increase bill savings.
- **Participate in Demand Response Programs.** These types of programs provide customer savings by incentivizing HPWH operation during certain times of day while avoiding times of high emissions or grid constraints. “Smart” (connected) water heaters with thermostatic mixing valves can take advantage of these types of programs to save money.



## 10 ADDITIONAL RESOURCES



Below are additional resources for contractors and homeowners to support electrification:

### **Go Electric Advisor**

Free live service to help customers with every step of the process, from simple questions to detailed plans.

**M - F, 9 a.m. - 5 p.m.: (833) 243-4235**

### **FutureFit Fundamentals Contractor Training**

Get paid \$500 for online training and up to \$5,000 per year for installing electric appliances.

[svce.info/fff](https://svce.info/fff)

### **Explore rebates and incentives**

Offset the cost of your electric home upgrade with regional and federal rebates and tax credits.

[svce.info/incentives](https://svce.info/incentives)

### **Use our eHub tools**

Check out SV Clean Energy's programs and resources to help your electrification journey.

[svce.info/ehub](https://svce.info/ehub)