



Singing in the shower – a guide to hot water heat pumps

Heating water is the second highest source of energy use in an average household. Replacing an existing inefficient system with a hot water heat pump (HWHP) can greatly reduce household energy costs.

Most households use a standard electric element hot water system or a gas system (either storage or instantaneous) for water heating. In comparison, HWHP systems are more energy efficient than conventional electric water heater. They can reduce your energy use, lower your power bills, and lower your greenhouse gas emissions. This guide provides information on how a HWHP works, their benefits, and considerations for purchasing and installing a HWHP.

Understanding hot water heat pump systems

HWHP systems achieve their high efficiencies through extracting heat energy from outside ambient air and transferring this energy into water, which heats it up and allows it to be used in your home. The process differs from a standard electric storage hot water system that heats the water directly with a resistive coil. Although it does not seem like cold air has much heat energy, air at 0°C still has over 90% of the heat energy of air at 40°C and therefore has plenty of heat to extract. This is achieved with a heat pump, which uses a compressor, expansion valve and heat exchangers to absorb and transfer this heat energy into the water.

The ability of a HWHP to operate at above 100% efficiency is known as a coefficient of performance (CoP), with 100% efficiency being represented as a CoP of 1, and 300% efficiency being represented as a CoP of 3. HWHP systems on average can achieve 300%-400% efficiencies, or a CoP of 3 – 4. The higher the CoP, the more efficient and cheaper the system will be to run.

Needing only electricity and adequate airflow to run, a HWHP produces no carbon dioxide emissions and is about 50-70% cheaper to run than a gas or standard hot water system. These systems can still heat water to 60°C, the temperature required for hot water storage, and can heat and supply hot water to your home in the same way an electric storage or gas system would. In summer, most systems achieve a CoP of over 4. Certain models suitable for Canberra's winter can still achieve a CoP of at least 2 in sub-zero temperatures. When purchasing a HWHP, the retailer or installer will be able to tell you the system's CoP.

Why should I replace my current hot water system with a hot water heat pump system?

To heat a standard 300L hot water tank to 60 degrees with an electric resistance heater requires about 14 kWh of electricity. In the past, gas hot water systems have been promoted as a cheap way to heat your water and reduce emissions. Current heat pump technology means that HWHPs are now very efficient and cheaper to run than gas hot water systems.

With Canberra being powered by 100% renewable electricity, HWHP systems are now entirely emissions free in their operation. A HWHP system will heat your water to 60°C as quickly and easily as a conventional hot water system but will use much less energy in doing so. A HWHP offers lower running costs, emission reduction, and can even run efficiently in temperatures as low as -10°C.

The table below presents comparative costs for heating your hot water.

	Energy use	Daily cost	Annual cost	Annual kg CO2
Standard electric hot water system	14kWh	\$3.93	\$1,435	0
Gas hot water system	59.3 MJ (16.5kWh equivalent)	\$2.33	\$850	1,115
Hot water heat pump	4.7 kWh	\$1.31	\$478	0

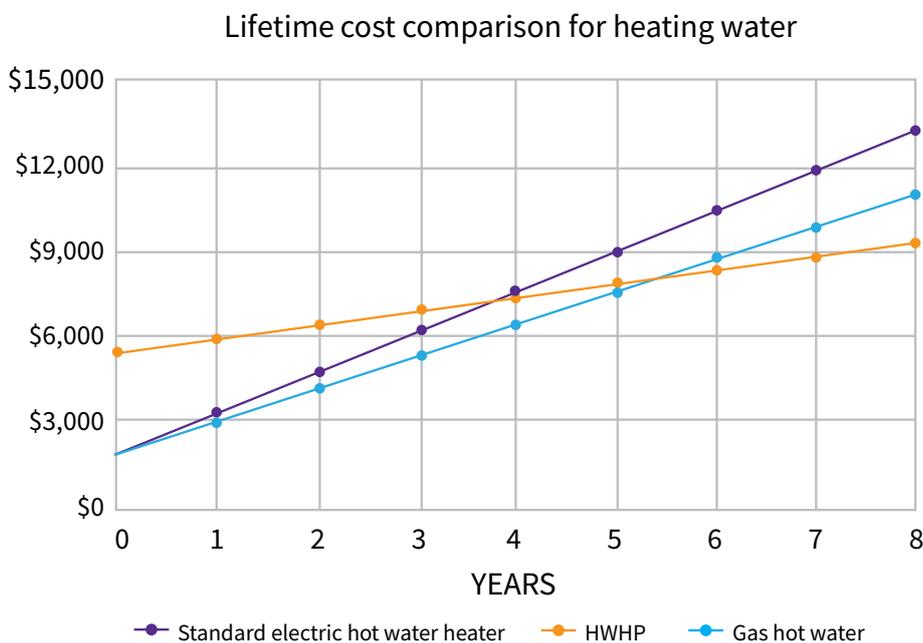
Table 1: Cost comparison to heat 300L hot water tank to 60oC per day at 2021/22 utility prices, gas heater 85% efficient, HWHP with COP of 3

HWHPs typically have a higher upfront cost to other water heating systems, but their lower running costs can quickly offset this and can become cost neutral within five years. A high-quality HWHP can cost around \$5,500 installed, while a standard electric or gas hot water system costs about \$1,800. If you consider running costs over time, a HWHP system can pay itself off in about 4-6 years.

The table and graph below display the cost breakdown over a 5- and 10-year period.

	Purchase price	Annual running cost	5-year total cost	10-year total cost
Standard electric hot water system	\$1,800	\$1,435	\$8,677	\$15,855
Gas hot water system	\$1,800	\$850	\$7,575	\$13,350
Hot water heat pump	\$5,500	\$478	\$7,892	\$10,285

Table 2: Lifetime cost comparison between water heaters, includes annual gas connection fee



What should I consider when selecting a Hot Water Heat Pump?

While all HWHP systems function in the same way, there are different options depending on your circumstances, so it is important that you discuss your water heating needs and budget with any installers before committing to a purchase.

System type

- All HWHP systems will have a compressor system and a water storage tank, with the compressor unit integrated within the storage tank itself or a separately mounted unit. Integrated systems take up less space but need to be installed outdoors, while separated mounted units can have the water storage tank indoors and the inverter unit outside.
- The best set-up will depend on your available outdoor space, plumbing set-up, and your budget. The size of the storage tank also varies by model, but usually ranges from 150 – 315 litres for standard sized systems. Higher capacity tanks will be required for households with more people to avoid running out of water.

Other things to consider

- Consider if your HWHP relies on a 'booster' during winter to assist with heating, as this is an electric heating element that can significantly increase your water heating costs. Your installer should be able to provide further information.
- HWHPs utilise well insulated storage tanks that lose heat very slowly, so they can heat water during the afternoon to take advantage of warmer air and achieve a higher CoP if they have a timer installed. Running the system during the day will also allow you to use solar energy if you have a solar PV system installed.

How to apply for a loan under the Sustainable Household Scheme

Firstly, check you are eligible to participate by reviewing the [Scheme Guidelines](#). It's also a good idea to review the Scheme [terms and conditions](#). If you've decided a HWHP is right for you, just follow these easy to steps to apply for your zero-interest loan:

- Get your quotes from suppliers accredited with our loans provider, Brighte. Information about accredited suppliers can be found on Brighte's [website](#). We suggest seeking more than one quote.
- Select your preferred quote and your chosen supplier will initiate the loan process with Brighte.

Some important things to note

- You can bundle products from the list of eligible products available under the Scheme, with a maximum of \$15,000 available to each household.
- The model of HWHP must be included on the VEU register for 'Water heater – Heat pump': <https://www.veu-registry.vic.gov.au/Public/ProductRegistrySearch.aspx>
 - The VEU register lists HWHP models suitable to all climate zones across Australia.
 - Due to Canberra's extreme winters, it is important to consider selecting from models rated for zone 5 climates with an energy saving of at least 65%.
 - Check that the system can operate on the heat pump alone down to -5°C to ensure you still get good energy savings in winter. You can find these specifications by searching the model number from the VEU register or by talking to your installer.
- Installation of a HWHP requires both an ACT licenced plumber and electrician.
- Any requirements to upgrade to 3-phase power can be included as part of your loan.
- If the install of your HWHP means you no longer need a gas supply (if your hot water is your only remaining gas appliance), you will be able to disconnect your gas supply, either through plugging the line or completely decommissioning the meter. The cost for residential gas network disconnection through ActewAGL is \$136.90 (as of September 2021) and can be included under the loan. Doing this will also save you about \$350 annually as you will no longer need to pay a gas connection charge, so disconnecting is recommended if you will no longer have any gas appliances.
- You must be upgrading an existing gas or inefficient electrical system to get an interest free loan for a HWHP installation, so new builds are not eligible.

Need some free advice?

Contact the Actsmart team for general and free energy advice on 1300 141 777 or actsmartadvice@act.gov.au.



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