

EFFICIENT WATER HEATING

Most businesses use either centrally located or individual storage water heaters which hold smaller amounts of water that are heated using electricity, natural gas, or renewable energy sources such as solar. Some larger sites used centralised boilers or co-generation systems. Operations with restricted space and access may use instantaneous systems that heat water to one or several taps where it is used. They typically operate on natural gas or LPG but in some cases they operate as 3 phase electricity. In order to improve your water heating systems; energy efficiency, it is important that you understand how your system operates.

STORAGE HEATERS

In storage heaters the water is heated to a relatively high set temperature (usually between 60 °C and 70 °C) and kept ready for use in a tank. When hot water is needed, it's drawn from the top of the tank and replaced by a layer of cold water at the bottom¹. The temperature drop is sensed by a thermostat, which turns on the heater at the bottom of the tank.

Although the tank is insulated, it's constantly losing energy. So the water temperature drops over time unless it's reheated. If you draw hot water faster than the cold water can be heated up to replace it, the cold layer will eventually move to the top of the tank resulting in a lack of hot water.

Electric

It is important to recognise that most electricity providers offer a choice of tariffs for water heaters. To see what tariffs are available in your region visit www.livinggreener.gov.au/rebates-assistance

Continuous Electricity Supply

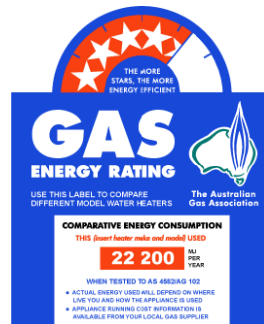
If you connect your heater to a continuous supply, electricity is available 24 hours a day. The heater can replace tank heat losses, and are unlikely to run out of hot water. This allows the tank to be smaller than with an off-peak system. Continuous electricity supply is charged at a single price and has a higher price per kilowatt hour (kWh) than off-peak electricity².

Off-peak Systems

Off-peak or night-rate systems only receive power for a period during the night (1). Tank heat losses and hot water that's drawn off can't be replaced until the following night. This therefore requires a large tank that can cope with a day's hot water demand.

Gas

Gas water heaters have a gas energy rating label with more stars signifying the efficiency³.



There are standard and high-efficiency gas storage heaters. Gas storage heaters only need relatively small tanks, as gas is available 24 hours a day and heat losses can be replaced quickly. Some gas suppliers may have a specific tariff for gas storage water heaters and you should seek advice on these tariffs in your region.



Solar

Solar systems typically have an insulated tank located either on the roof so they can use gravity to circulate water or on the ground where they require a pump but are less visually intrusive and accessible for maintenance. There are two common types of solar collectors:

- **Flat plate collectors** consisting of copper tubes attached to a dark-coloured metal plate facing the sun; or
- **Evacuated tube collectors** consisting of copper tubes encased in two layers of glass. These contain a liquid that absorbs heat from the sun and then transfers this heat to the water, which is then pumped back up to the roof. Due to their cylindrical nature, they are exposed to the sun throughout the day making them good for areas with cold sunny days.

Most systems have an electric or gas booster for periods of insufficient sunshine. Developments in the materials used to make solar heaters and technological advances using lenses, mirrors or dye coated glass to focus sunlight into a small beam, achieving higher efficiency, should make solar a much more efficient and costs effective alternative for water heating in the near future.

Heat Pumps

Heat pumps absorb heat from the outside air using a refrigerant liquid which is kept at a temperature lower than the outside air. The heated refrigerant is then compressed into a hot vapour which can be used to heat water via a heat exchanger. A compressor is required to compress the refrigerant and subsequently these types of systems make a noise similar to an air-conditioning unit. While they still consume electricity, they are up to three times more efficient than conventional electric water heaters. When used in the right environment they save energy.

If your operation is located near another source of heat such as hot groundwater, bedrock, or even waste heat from nearby processes or businesses, heat pumps can utilise this heat. Unlike solar systems, these

pumps do not require sunlight so they can be located anywhere, including sitting on top of existing hot water systems inside buildings.

INSTANTANEOUS WATER HEATERS

These water heaters only produce as much hot water as you need, when you need it. When you turn on the tap, cold water flows through a heat exchanger, igniting a gas burner or switching on an electric element. There are no heat losses, and as long as there's gas or electricity, you'll never run out of hot water.

The size your business may require (the flowrate in litres per minute) will depend on the number of hot water outlets the heater has to serve.

WATER HEATING SYSTEM CONSIDERATIONS

If you wish to implement a more energy efficient or larger water-heating system for your business it is important to consider your situation and what model would suit your business. Factors that should be considered are;

- How many people will your system have to service (e.g. 20 customers wanting a hot shower in the mornings and laundry hot water requirements)
- Is natural gas available in your area?
- How much sunlight does your roof/property get in summer and winter?
- Local climate
- Your budget and the purchase and operating costs, including possible rebates
- Your current system – if you currently have electric storage, you may qualify for a rebate to replace your system with a more energy efficient model. For more information on rebates in your state visit;

www.livinggreener.gov.au/rebates-assistance

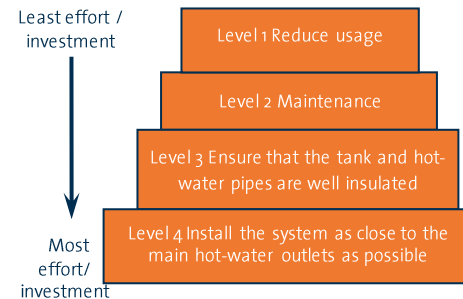
TIP

A good hot water system supplier can analyse your current usage patterns and recommend hot water system options. Get quotes from a few different suppliers, to explore different options and brands and make sure you get a good deal.

IMPROVING SYSTEM EFFICIENCY

Before you decide that you want to replace your system consider improving your current systems' efficiency through the following helpful hints;

Storage Systems



LEVEL 1: REDUCE USAGE

One of the most beneficial methods to reducing your energy cost in regard to water heating is to reduce the usage of hot water. This can be done with various water consumption reduction fittings and behaviours.

Water-saving Shower Heads

Install low flow shower heads (Less than gL per minute) or flow restrictors and encourage shorter shower times.

Special low flow showerheads that are compatible with instantaneous hot water systems may be required as they do not restrict the flow of water so much that the hot water system turns off. To reduce shower times use signage, install shower timers or consider push button showers that deliver water for a set period.

Water-Efficient Taps

Install water-efficient taps, known as aerators, which give the feel of a high flowrate with only half the water. They simply screw onto the end of a tap and reduce the flowrate while aerating the water.

Flow restrictors must be periodically cleaned and de-scaled to remain effective. Tamper-proof restrictors can be used if they are routinely removed.

Other options for taps include timer taps (e.g. push taps) or sensors that turn taps on and off automatically.

Cold Washing Machine Setting

Use low-temperature detergents that not only reduce energy consumption but require less rinsing. Ensure detergents are measured

correctly as overuse not only increases costs but also increases rinsing requirements. Investigate cleaning chemicals that can be used in cold water, reducing the need for hot water and saving energy.

Reduce Washing Loads

Consider providing guests with the option of reusing towels and bed linen rather than replacing them every day to reduce the amount of washing required. Signage that promotes the environmental benefits of reusing linen may increase the effectiveness of this initiative.

If your operation is not well equipped for the volume of laundry it generates consider using commercial laundries that tend to be more energy and water efficient. It could save your operation time and energy, detergent, water and labour costs, however additional costs such as transport and the need to purchase additional linen will also need to be considered.



CASE STUDY:

Big 4 Adventure Whitsunday Resort, Airlie Beach, QLD

The Big 4 Adventure Whitsunday Resort Caravan Park at Airlie Beach have reduced water heating costs through the installation of over 25 renewable solar heat pumps throughout the park resulting in more than half the park's facilities operating on renewable hot water heating pumps.

BENEFITS:

The benefits experienced by the resort are as follows:

- 75% reduction in hot water running costs
- A reduction in their greenhouse emissions and carbon footprint
- Increased recognition of the business in the local community, the Big 4 Network and consumers due to the sustainable practices being adopted by the resort.

LEVEL 2: MAINTENANCE

Temperature

The temperature on many water heaters is set at an unnecessarily high level. It is important to regularly check the thermostat and adjust the temperature to provide the minimum hot water temperature required. The optimum water temperature for storage hot water systems is between 60–65°C⁴ in the tank. Instantaneous hot water systems should be set to no more than 50°C.

Leaks

Leaks can impede your system's efficiency to produce hot water and it is important to regularly check the system for leaks including the tank and pipework.

LEVEL 3: INSULATION

Insulation can typically reduce heat loss by up to 90%⁵. Origin Energy provides a useful factsheet on ways to implement insulation: www.originenergy.com.au/files/SMEfs_HotWater.pdf

LEVEL 4: REDUCE PIPEWORK

Installing your system as close to the main hot water outlets as possible will reduce the amount of pipework need to transport the hot water. Reducing the distance will in turn reduce heat loss when the water is being distributed.

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Disclaimer

The views expressed herein are not necessarily the views of the Commonwealth of Australia, and the Commonwealth does not accept responsibility for any information or advice contained herein.



Australian Government
Department of Climate Change
and Energy Efficiency

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