

choose

**Energy  
Smart.**

## Choosing a **hot water system**

*Hot water can account for one third of an average Perth household's energy consumption. Carefully considering your hot water needs and choosing the most appropriate system for your household can significantly lower your energy bills and environmental impact.*

Whether you are replacing a hot water system or purchasing one for a new house, your decision will depend on how much hot water you need, now and for the life of the system, as well as your personal priorities. This brochure aims to help you identify your hot water needs, outline the types of systems available and provide a guide to their running costs.

### **How much hot water do you need?**

To determine which hot water system best suits your needs, you will need to calculate your daily hot water consumption. Hot water use varies widely depending upon a number of factors including how many people live in your home and the age of those people. Information is provided in this brochure to assist you to estimate your household hot water consumption. As an approximation, 50 litres per day per person is about average.

Remember to consider your future needs when estimating your hot water consumption. A hot water system will last you a number of years so you will need to consider any possible changes to your household in the future. Younger children grow up to become teenagers who have a tendency to take longer showers.



## Hot water usage

### Bathroom

Typically most hot water is used in the bathroom. The amount of hot water you consume will depend on whether you prefer to take showers or baths.

If you take showers, you can calculate the amount of total water you use by multiplying the running time of your shower by the flow rate of the showerhead.

***Total water use = running time x flow rate of showerhead***

Showerhead flow rates can vary between 6 and 25 litres per minute. A standard showerhead can deliver up to 25 litres per minute (250 litres for a 10 minute shower) while a low-flow showerhead typically averages a delivery rate of 6 to 15 litres per minute (60-150 litres for a 10 minute shower). Generally, the older the showerhead, the higher the flow rate. The best way to determine your showerhead flow rate is to time how long it takes to fill a container of known volume, such as a 5 litre bucket. The following equation will help you to calculate the flow rate (litres per minute):

***Flow rate = (60 seconds ÷ seconds taken to fill container) x container volume in litres***

For example, if a 5 litre bucket takes 40 seconds to fill, then the flow rate is equal to 7.5 litres per minute (60 seconds ÷ 40 seconds x 5 litres). If a 10 litre bucket takes 1 minute and 10 seconds to fill, then the flow rate is 8.6 litres per minute (60 seconds ÷ 70 seconds x 10 litres).

Once you've multiplied the flow rate of the showerhead by the shower running time, you need to multiply the result by the ratio of hot water to cold water used to determine your total hot water use. Generally, hot water is mixed with around 30-40% cold water in the shower.

***Total hot water use = total water used x hot water mix (60%-70%)***

A low flow showerhead with a flow rate of 9 litres per minute during a 10 minute shower will use 90 litres of water. With a hot water mix of 70%, the total hot water use is 63 litres (90 x 0.7).

If you take baths, you can calculate your hot water use by multiplying the total volume of water required to fill the bath by the hot water mix. If your bath takes 100 litres of water to fill (which is about average), it will require about 60 to 70 litres of hot water (based on a cold water mix of 30%-40%). Spa baths typically take between 250 to 350 litres of water to fill and will therefore require a larger volume of hot water. Some spa baths and larger spa pools are connected to a cold water tap and heat their own water. If this is the case, their hot water consumption does not need to be taken into account when sizing your hot water system as they do not place a

demand on your hot water system.

### Laundry

The laundry is another room that places a demand on your hot water system. A standard warm wash cycle typically uses between 30 to 50 litres of hot water per wash. You can save on hot water use by washing clothes in cold water or using a front loading machine if you still need to wash clothes in hot water. Front loading machines generally use much less water than top loading machines.

### Kitchen

The amount of hot water you use in the kitchen will vary depending upon whether you have a dishwasher and if so, how it is set up. Most dishwashers are connected to the cold water tap and use an electric element inside the dishwasher to heat the water. If this is the case, they will place a demand on your electricity bills and not on your hot water system.

If your dishwasher does have a hot water connection, it will consume between 12 and 90 litres of hot water per wash and, therefore needs to be taken into consideration when sizing your hot water system. To find out which type of dishwasher you have and how much water it uses, simply consult the operating instructions.



## Types of hot water systems

Hot water systems come in two main types, instantaneous and storage. Both can be suitable for most households, although there are restrictions on the installation of gas hot water systems indoors. Consult with your gas system retailer/supplier to ensure the safety of installing any gas hot water system indoors.

### Instantaneous (continuous flow) hot water systems

- Water is heated as needed and therefore a storage tank is not required, saving on purchase cost and energy losses.
- As water is heated instantaneously, these systems do not run out of hot water.
- Their size is smaller than storage systems and they can be mounted on a wall or in a cupboard.
- They can be installed externally or internally, though restrictions exist on internal gas hot water systems.
- Hot water is delivered at a slightly reduced pressure.
- Standard units can generally deliver adequate hot water to only one tap at a time. When a second tap is turned on, the pressure and temperature of the water will drop somewhat.
- High powered units are available which can service larger flow rates and several taps.
- They can operate on natural gas, LPG or three phase electricity (single phase units are very low powered).

### Storage hot water systems

- Hot water is stored in an insulated tank ready for use throughout the day. The tank size is important and you should discuss with your supplier your specific size requirement.
- If the tank is too small for the number of people in the house, hot water can temporarily run out. If the tank is too large, operating costs will be higher than necessary.
- Heat will be lost from the tank. Losses depend on the temperature setting, the tank size and insulation of the tank. The smaller your tank, the less your daily tank heat losses will be.
- Solar hot water systems use solar thermal collectors (basically, black pipes in an insulated box with a glass lid) to heat the water, with a booster inside the tank.
- Other storage hot water systems have only the one heat source, which can be an electric element similar to that in a kettle, a heat pump or a gas or wood burner with a heat exchanger.
- Heat pump storage hot water systems use less electricity than electric element storage hot water systems. They use an electrically-powered compressor and a refrigerant gas to extract heat from the air (in much the same way as heat is extracted from your refrigerator) to heat the water stored in the tank. They make a low noise in operation, similar to a fridge.
- Mains pressure or reduced pressure (gravity feed) systems are available.



## Energy rating labels

All gas hot water systems (except gas boosted solar hot water systems) display energy labels with star ratings for energy efficiency. Electric hot water systems currently do not carry energy rating labels.

The more stars (six is best), the less gas used and the lower the operating costs.

This also means reduced greenhouse gas emissions. Rating labels will also tell you the expected annual energy consumption in megajoules (MJ), based on a consumption of 200 litres of hot water per day. To convert MJ to kWh units (as on your gas bill), divide by 3.6.

## Choosing your hot water system

Once you've estimated your daily hot water consumption you will be in a better position to purchase a hot water system suitable to your needs. For a low demand (around 100 litres per day), an instantaneous gas hot water system may be the best buy. For a medium sized household with more than one bathroom (around 200 litres per day), a storage hot water system or a larger instantaneous system may be suitable. Solar and heat pump hot water systems return their investment cost quickest for households with a high demand.

When deciding on which type of hot water system to buy, you may wish to consider

running costs and environmental impact in addition to initial purchase cost.

Many people consider only the initial purchase cost when buying a hot water system, without realising that they can spend between two and fourteen times the initial purchase cost of that system on running costs over its lifetime (based on a typical electric or gas hot water system).

If you are concerned about your contribution to the enhanced greenhouse effect, you might want to take into account the greenhouse gas emissions resulting from the use of your hot water system in addition to economic factors. A leaflet

showing the greenhouse gas emissions from various types of hot water systems is available from the Sustainable Energy Development Office's Energy Smart Line. The leaflet also shows average running costs of hot water systems delivering 200 litres of hot water per day. The costs and emissions are estimates only and will vary from location to location and with different types of use. Initial purchase and installation costs are relatively easy to find out, but note that they vary with suppliers and depend on whether you are installing a new or replacement system.

### System life

The life of a hot water system depends on water quality, maintenance and other factors.

#### Instantaneous

Gas instantaneous hot water systems usually have a relatively long life, provided they are well maintained. Warranties of up to 10 years are offered for their heat exchangers and the heat exchanger can often be replaced without having to purchase a complete new system.

Electric instantaneous hot water systems generally do not last as long as gas instantaneous hot water systems and some have a comparatively short life compared to other systems.

#### Storage

There are various sorts of tanks for storage hot water systems including copper, glass (enamel) lined steel tanks and stainless steel tanks. Copper and glass-lined tanks typically have a sacrificial anode to reduce tank corrosion and it's worth ensuring this is replaced at the appropriate time. Warranties offered for these systems range from 5 to 15 years and details vary considerably.

Properly maintained solar thermal collectors should outlast the life of the storage tank. When the tank needs replacing, the existing collectors can be connected to the new tank.



# Which type of fuel?

Choosing the right type of fuel to heat your water can make a significant difference to the running costs of the system and the amount of greenhouse gases emitted.

## Solar energy

- In Perth, a solar hot water system can heat around 65%-85% of your annual hot water using the sun's energy.
- The solar collectors are generally placed facing north on the roof of a home and coupled to a storage tank or an instantaneous heater. Traditionally, solar hot water systems come with the storage tank mounted above the collectors but are now offered as 'split-systems' with the tank or instantaneous heater mounted at ground level. The storage tank can also be located inside the roof.
- Mains pressure and reduced pressure systems are available.
- All solar hot water systems come with electric, gas or wood boosting to supply hot water on days when the sun alone is insufficient.
- Thermostatic tempering valves are available to stop the solar hot water system delivering water that is too hot in summer.

## Natural gas

- Can be used in storage or instantaneous models.
- Natural gas hot water systems are generally located outside the house. If inside, a room sealed flue (internally balanced) is required to maximise safety.
- A pilot light which burns continuously is common, although some of the newer models save energy by replacing this with mains electricity or battery ignition.
- Some higher capacity natural gas instantaneous systems may require you to upgrade your copper gas piping from the meter box. If you get quotes for installation, make sure this potential additional cost has been accounted for.

## Liquefied Petroleum Gas (LPG)

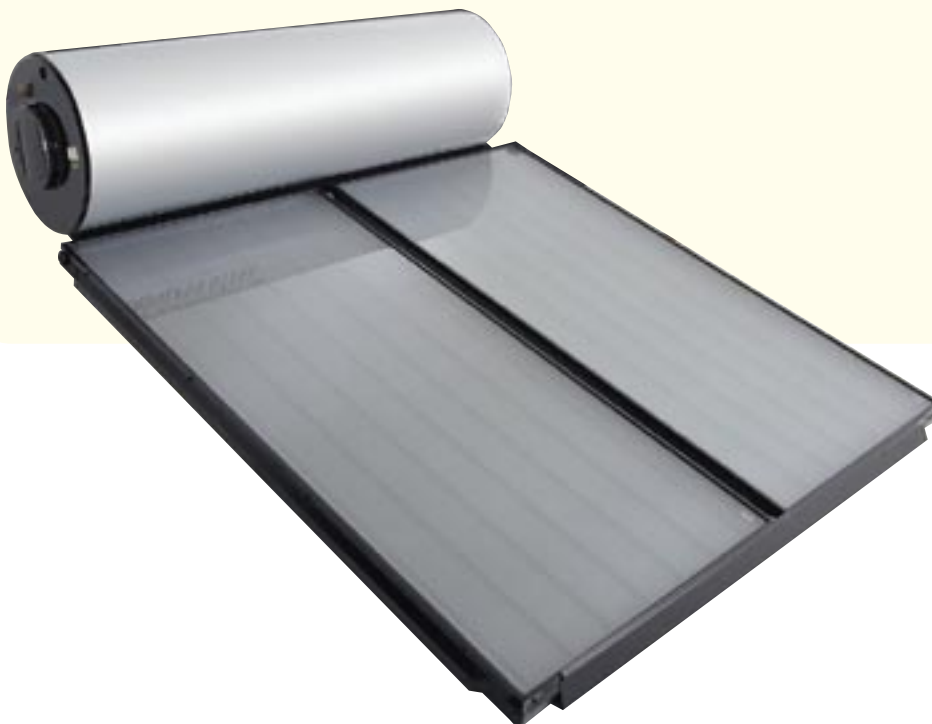
- Can be used in areas where natural gas is not available.
- Typically bought in 45 kg cylinders, although reticulated LPG is available in some areas such as Albany.
- Points outlined above for natural gas also apply to LPG.

## Wood fuels

- Cost of fuel varies greatly.
- Water can be heated using a 'wetback' attached to a wood room heater.
- Must not be used with mains pressure systems unless a heat exchanger is used.
- Major problems with urban air quality can occur due to wood fires, so its use as a fuel source in urban areas needs to be considered carefully.

## Electricity

- Can be used with storage or instantaneous models, although instantaneous units typically require three phase power.
- A heat pump storage hot water system uses around one third of the electricity of an electric element storage hot water system.
- Lower tariffs may be available in off-peak periods. However, to take advantage of 'off-peak' electricity you will need a much larger tank to ensure you do not run out of hot water during the day when boosting becomes much more expensive.



# Installing and running your system for best efficiency

The installation and use of your hot water system has substantial influence on its running costs and life span.

## General

- Keep hot water pipe runs as short as possible to minimise the heat losses from pipes. Have your hot water system installed as close as possible to all points of hot water use. If this isn't possible, locate it close to where small, regular amounts of hot water are required (usually the kitchen).
- If buying a gas hot water system, look at the star rating labels - the higher the stars, the more energy efficient the hot water system.
- Consider installing a low flow showerhead, or fit a flow restricting valve to existing showerheads (see information on instantaneous systems below).
- Maintain your system as required and have it serviced according to manufacturer's instructions.
- Install solar hot water collector panels facing as close to north as possible.
- Have a registered plumber rectify any problems of 'water hammer'.

## Storage hot water systems

- To save money with a storage system, ask your installer to set the thermostat to 60°C and ensure you know how to turn it off when you go away on holidays.

- Consider installing a timer on electric storage units to reduce hot water production when you don't need it.
- Turn off your storage hot water system if you are going away for more than a weekend.
- If you decide on a storage hot water system, estimate your hot water needs as accurately as possible to ensure your tank is not oversized for your household.
- Insulate the first two metres of the hot water pipe leading from the hot water system, as well as the pipe leading from the relief valve. Insulating these pipes will reduce the heat loss from the pipes which would otherwise occur even if no hot water is being used.
- Insulating all hot water pipes is usually not cost effective and only results in small energy savings. Insulation should be considered where long pipe runs occur, where pipe runs are in exposed situations on the outside of the house and/or in areas with very cold winters.
- Gas storage systems usually reheat water more quickly than electric storage systems. This means that the size of the storage tank can usually be smaller for gas hot water systems than electric hot water systems, without compromising your hot water requirements.

## Instantaneous hot water systems

- Adjust the setting on a gas instantaneous hot water system to produce a comfortable temperature throughout the year. Some have electronic temperature controls which can be adjusted from a control unit inside the house.
- Electronic ignition uses a lot less energy over the year than a gas pilot light. Electronic ignition units use no gas at all when not being used. However, be aware that mains electricity ignition systems may not supply hot water during power 'black-outs'.
- Some low flow showerheads are not compatible with some instantaneous hot water systems as they can restrict the flow of water to the extent that the hot water system turns off. Ensure you select a showerhead that is suitable for the flow rate from your hot water system.
- Unlike storage hot water systems, there is no need to insulate the first few metres of pipes from instantaneous systems. However, insulation should be considered where long pipe runs occur, where pipe runs are in exposed situations on the outside of the house and/or in areas with very cold winters.

## Shopping around

Remember to consider both the capital, installation and running costs (life cycle cost) when considering a new hot water system. Detailed information on specific products, including warranties and

costs can be obtained from retailers and manufacturers of hot water systems. Look under the sections 'Hot Water Systems' and 'Solar Energy Equipment' in the Yellow Pages for supplier details.

## More Information

If you want to know more about choosing energy efficient appliances, keeping your house cool in summer and warm in winter or any other matters relating to home energy use, simply phone the **Sustainable Energy Development Office's Energy Smart Line on 1300 658 158** or visit the Sustainable Energy Development Office's web site at **[www.sedo.energy.wa.gov.au](http://www.sedo.energy.wa.gov.au)**

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