Energy efficient hot water appliance factsheet

Owned by the people of WA

HORIZON POWER

Hot water appliance factsheet

Water heating accounts for the second largest energy use category in Australian homes, ranging from 15% to 27%[1] of total household energy use. Many households in Esperance use either a natural gas storage tank hot water system or an instantaneous hot water system which can be replaced with an energy efficient heat pump hot water system or a solar thermal heating system with an electric booster.

Heat pump hot water systems offer operating efficiencies between 250% to 400% compared to natural gas hot water systems which usually operate at 75%[2] efficiency. The high working efficiency of the heat pump technology can significantly decrease your household energy bills.

Another option you may be considering is a solar thermal system with an electric booster. Solar thermal hot water systems rely on the sun, and require an electric booster element to ensure hot water is provided during low sunlight days. Esperance is located in climate zone 5, one of the coolest climate zones in Australia and therefore solar thermal systems in this region will rely heavily on the booster element. Reliance on the electric booster element makes this technology less energy efficient than the heat pump hot water system technology, and results in higher electricity costs.

Technology overview

The most energy efficient hot water technology is a heat pump hot water system.
A heat pump hot water system consists of four key units:

1. an evaporator
2. compressor
3. condenser
4. an expansion valve.

Instead of using electricity to heat water, a heat pump absorbs thermal energy (heat) from the surrounding air using refrigerant gas. By utilising a refrigerant's thermal properties, heat pumps only use 30% of the electricity compared to an electric element hot water system.

A heat pump's performance depends on the climate in which it operates. Heat pumps work best in climates that stay above 0ºC year-round, making Esperance the ideal climate for heat pump technology. According to the Bureau of Meteorology, ambient temperatures have not dropped below 0ºC since 1971 and heat pump technology has an operating range of -5ºC to 42ºC.

Previously, heat pump technology was not considered appropriate for Esperance due to the town's water having high concentrations of calcium and magnesium salts. This is known as 'hard water' and can lead to a build-up of lime scale on hot water system components, resulting in the system working harder to heat water or reducing the system's lifespan. However, there are now commercially available heat pump hot water systems designed for hard water conditions. These hot water storage tanks have been lined with a special enamel such as vitreous enamel, which protects against scale build-up.

LPG versus electric equivalent appliance

When choosing between converting a natural gas appliance to electric or LPG, consumers will often have a preference based on familiarity with an appliance type and previous user experiences, but you should also consider the energy efficiency, bill impact and operational benefits. When reviewing your options, you should also consider advancements in technology. Modern, electrically powered appliances can often deliver the same or improved user experience compared to a gas equivalent. Table 1 summarises an electrical equivalent hot water system and user benefits compared to a gas equivalent.

Table 1: Most efficient appliance quick facts

LPG appliance	Electric equivalent	Electrification benefits
LPG storage tank water heater	Hot water heat pump	• **Efficiency:** roughly 250% to 400% efficiency, compared to a maximum 75% efficiency[2] of a traditional gas hot water system • **Performance:** no change in water supply compared to a natural gas hot water system

When considering electric appliances, you should also consider other factors, such as energy bill savings, only having a single supply charge (not paying a supply charge for both LPG bottle and electricity connections), safety, and air quality.

Table 2: Comparative annual costs of LPG and electric hot water systems

Appliance	Annual cost	Savings compared to LPG
LPG storage water heater	$1,235	N/A
Hot water heat pump	$361	$874
Solar thermal with electric booster	$877	$358

*The above comparison considers a medium household of 3-4 people; higher savings are expected for larger households.

**Costs are based on the average cost of a 45kg LPG tank from local Esperance suppliers, and the average household electricity A2 tariff in Esperance as of 31st March 2022.

[1] Commonwealth of Australia, Hot water systems, < www.energy.gov.au/households/hot-water-systems >

[2] NSW Now, Energy Saver, < www.environment.nsw.gov.au/resources/business/CogenerationFeasibilityGuide.pdf >

Greenhouse gas emissions savings

Most households can expect to reduce their greenhouse gas (GHG) emissions by utilising the high energy efficiency of a heat pump water heater. A heat pump hot water system can reduce GHG emissions by approximately 20% compared to a natural gas hot water system. The GHG emissions savings are equivalent to driving from Esperance to Perth almost 2.5 times or using an LED light bulb continuously for 20.5 years. These GHG emission reductions enable Esperance households to make a meaningful impact on climate change.

Some heat pumps have a timer function which allows for custom schedules. If you have a solar PV system, you may operate the heat pump during the middle of the day to achieve further energy cost savings.

Installation considerations

When installing a heat pump hot water system, you should consider the number of people in your household and the amount of water used in your home. Heat pump water units range from 220 litres to 325 litres. An accredited plumber or electrician will be able to correctly size the system.

Heat pump hot water systems can typically be installed in place of existing natural gas storage tank systems. However, there are additional considerations to be made to account for the condensing unit of the heat pump. These units blow air and produce a humming sound, similar to an air conditioner. As such, when selecting the location of the heat pump, the compressor system should not be placed in direct proximity to doors or open windows to reduce any impacts on your household.

Before the selection, purchase and installation of a heat pump system, you should consult with a Horizon Power accredited plumber and electrician to determine which model is most suited to your location and whether you require any modifications to the electrical infrastructure before the hot water heat pump system is installed. When removing a natural gas hot water system, a licensed gasfitter will be required to make the redundant natural gas fittings safe.

energylink SERVICES

Government of **Western Australia**
Energy Policy WA