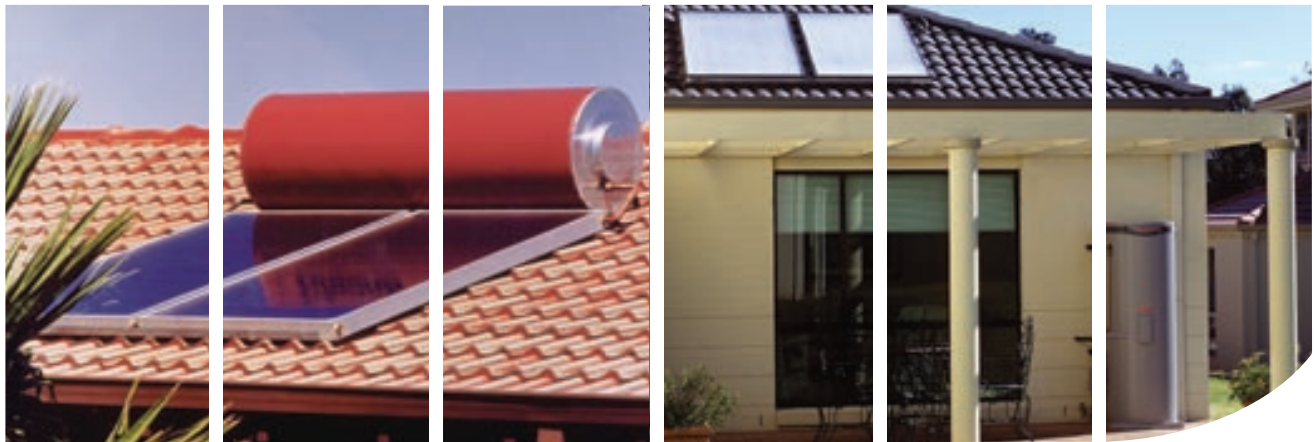


Solar hot water

Powered by the sun's natural energy



The benefits of solar hot water

For most Queensland households, around 35 percent of annual energy use is for hot water. However, by using the sun's energy to heat water, the average household can reduce its annual hot water costs by around 85 percent when compared to conventional electric systems. As well as costing less to run, solar hot water systems have a significant environmental benefit as their reduced energy use means less greenhouse gases produced.

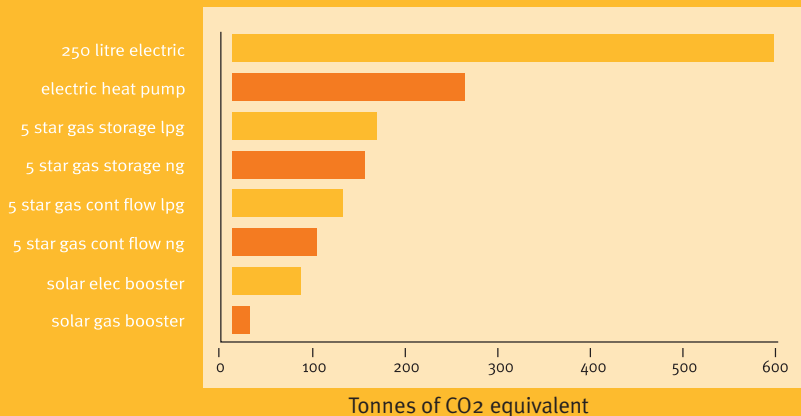
Despite Queensland's year-round abundance of solar energy, most Queensland households (around 80

percent) use electric hot water systems, which are the single largest electricity-consuming item in most homes. As solar hot water systems provide the greatest

potential for savings on energy costs and greenhouse emissions, they make smart sense for homeowners and the environment.

Greenhouse Gas Emissions

A comparison of hot water systems and their greenhouse emissions over 15 years is shown below.



Source: ENERGEX Institute

Hot water system options for new housing

Queensland's Sustainable Housing Regulations that came into effect on 1 March 2006 require new houses to be more sustainable. The changes require greenhouse-efficient hot water systems to be installed in all new Class 1 buildings (houses).

This can be achieved by installing:

1. a solar hot water system or heat pump that is eligible to receive:
 - (i) at least 22 Renewable Energy Certificates* in a building with 3 or more bedrooms; or
 - (ii) at least 14 Renewable Energy Certificates* in a building with 1 or 2 bedrooms; or
2. a gas hot water system with a 5-star energy rating.

* *Renewable Energy Certificates ('RECs') may be issued at point of sale or applied for separately by the purchaser as a 'cash back' rebate under the Commonwealth Government's Mandatory Renewable Energy Target (MRET).*

Types of greenhouse-efficient hot water systems apart from solar are:

- » instantaneous gas (in reticulated areas e.g. urban)
- » gas storage (stand alone tanks used in non-reticulated areas e.g. rural)
- » heat pumps.

Types of solar hot water systems

A solar hot water system does not make electricity, but takes energy from the sun in a similar way that a hose does when it is left lying in the sun – but the pipes in a solar hot water system have been designed to work much more efficiently than a garden hose!

In solar hot water systems, heat from the sun is absorbed through solar collectors. This solar energy heats water, which circulates through the collectors and into a storage tank, ready for use. The storage

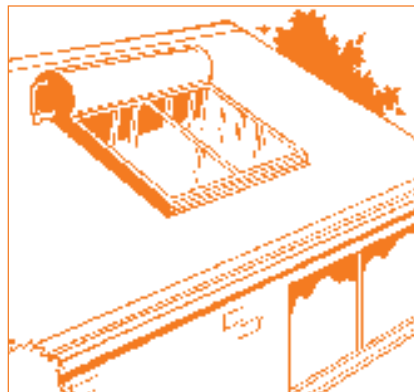
tank is usually fitted with a 'booster' to maintain water temperature during long periods of cloudy or wet weather.

There are two types of solar hot water systems:

- » Thermosyphon
- » Split system (or 'forced circulation').

Thermosyphon system

This is the most common system available. It consists of roof-mounted solar collectors with a storage tank positioned immediately above the collectors. As the heat from the sun is absorbed through the collectors, the water inside becomes hotter and lighter, expanding and rising upwards into the tank. The colder, heavier water is drawn down into the bottom of the collector where it is heated, causing it to move upwards.



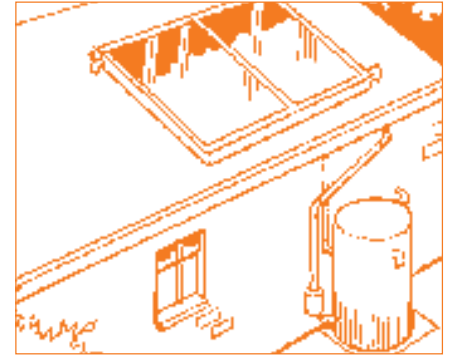
This circular heating motion is called the 'thermosyphon effect'. The greater the difference in temperature between the water in the collectors and the water in the storage tank, the faster the flow between them. A closed circuit system separating the collector circuit from the tank is available for areas prone to frost or hard water (e.g. water from groundwater bores).

Split system (or 'forced circulation')

For householders who prefer their tank at ground level, this system has the solar collectors on the roof and the storage tank on the ground.

These systems require a small electric pump to circulate water through the collectors into the storage tank. As a result, this system is generally more expensive to buy and operate than a thermosyphon system.

Furthermore, the moving parts in the pump can wear out over time meaning these systems require more maintenance than a thermosyphon system.



The pump is regulated by a controller, which reacts according to the difference in water temperature between the collectors and the tank.

The controller unit also acts as a frost protector by sending warm water from the tank into the collectors when it senses that the water is reaching freezing temperatures.

Key components of a solar hot water system

Solar collectors

Solar collectors can be either, flat-plate panels or evacuated tubes that are roof mounted to absorb heat from the sun. For maximum efficiency, collectors should be placed in direct sunlight for all seasons (to account for winter and summer sun direction). In areas south of Rockhampton, solar collectors should ideally face between north-east and north-west to best account for direct sunlight. For systems in southern Queensland where there is insufficient roof space between north-east and north-west, they can still provide acceptable performance, however their performance diminishes as the angle of the panels face further south.