

# Buying Guide – Solar Water Heating

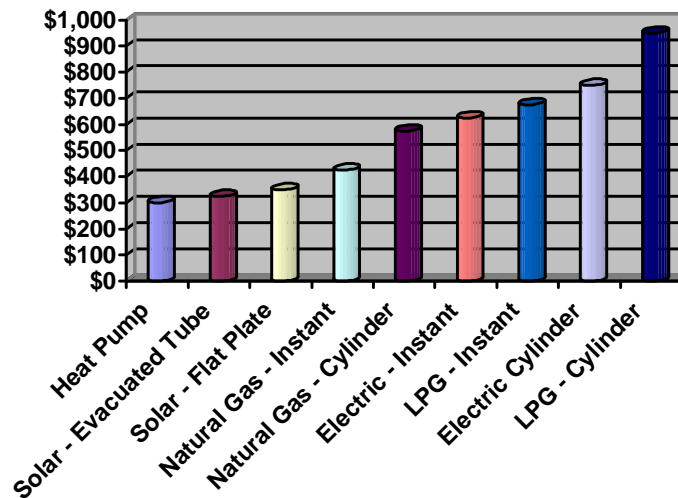
## Introduction

**With solar technology, you can slash your hot water bills.** About 30% of an average home's electricity use goes on water heating. By using the sun's energy to heat your water, you can reduce your hot water bills by up to 75% or \$450 a year. Solar water heating is also environmentally friendly!

**TIP:** Be sure to check whether the system you specify qualifies for government funding (see below)

## Hot Water System Annual Running Costs

**Hot water system annual running costs**



Approximate running costs for a typical family of four. (Data source: [www.energywise.govt.nz](http://www.energywise.govt.nz) February 2008)

## The Benefits of Solar Water Heating

### Reduced energy bills

It's been estimated that, for an average household, an effective system can:

- provide between 50%-75% of annual hot water needs
- reduce annual electricity use by about 2200kWh (An average household uses 10 500kWh per year on all energy)
- provide savings of \$350-\$450 a year (depending on the cost of your electricity or gas supply).

### Environmental benefits

Solar energy is a renewable energy source. By reducing electricity use you'll also be helping to cut greenhouse gas emissions – approx 1.4 tonnes less carbon dioxide emissions a year.

### Government Funding

You may also be eligible for government funding of \$1000 to install one of their specified solar water heating systems in your home. Visit [www.energywise.govt.nz/solar](http://www.energywise.govt.nz/solar) for more details.

## Is it right for my location?

Check the following points to see if solar water heating is suitable in your location:

- You live in a sunnier part of the country and use large amounts of hot water. The National Institute of Water and Atmospheric Research's website has an [online map](#) showing mean annual sunshine hours anywhere in New Zealand and a [web page showing monthly sunshine averages](#).
- Benefits can still be achieved in less sunny areas (and some solar water heaters are designed specifically to work in low-sun areas).
- In colder areas, you'll need a system that is frost-resistant.

- Solar is not a good option if your house is heavily shaded by trees or other buildings, or if you don't have any north-facing roof space where solar panels can be mounted.

## How it works

Solar panels on your roof (or some other sunny place) absorb heat from the sun and use it to heat water. The water is stored in a cylinder, which might be placed on your roof, inside your roof space, or in the hot water cupboard.

On days when there isn't enough sun to fully heat your water, the cylinder will be heated using a '*booster system*' from your electricity, gas or other energy or heat supply. A timer will ensure the water is heated efficiently by your booster system to the required 60°C for at least one hour each day which keeps the dangerous legionella bacteria in check.

## Siting the panels

You'll need an unshaded section of roof approximately 3-5 square metres, ideally facing within 20 degrees of true North. Panels should be tilted towards the sun with the optimum angle depending on your latitude: in Auckland, for example, panels should be about 37% from horizontal and in Dunedin about 46%. If you tilt the panels up more than these figures, you will gain more heat during winter and less during summer. Tilting the panels down will give more summer heating and less in winter. If your roof doesn't slope correctly, your installer can supply a secure frame to give the right tilt.

## Solar water heating options

You will need to consider how big the system needs to be and make decisions about the location of panels and cylinder, and the type of system and cylinder you want to use.

### How big should the system be?

The size of your solar water heating system will depend on your demand for hot water. Use the table below as a rough guide. Keep in mind if you incorporate good energy efficient hot water measures (see below) aim for the lower size:

Household size	Cylinder Size (litres)	Solar Panel Area (m <sup>2</sup> )
1-2 people	180	2 - 3
3-4 people	180 – 300	3 - 5
5-6 people	300 – 440	4 - 6

### **Easy tips for energy efficient hot water use...**

- Use a low flow showerhead
- Reduce water flow from your taps
- Check and fix any leaking or dripping taps or pipes
- If your hot water cylinder is warm to touch use a cylinder wrap (modern 'A' rated cylinders will not require a wrap)
- Wrap at least the first metre of hot water pipe from your cylinder
- Use cold water for washing clothes, rinsing dishes, filling the jug etc
- Turn off the water heater when you go on holiday
- Have showers instead of baths and keep your showers relatively short (5-7 minutes)
- Choose water-efficient household appliances
- Don't run the hot tap unless you need hot water

### **Solar collector panels**

There are two main types of collector panels for solar water heating systems: flat plate panels and evacuated tube panels.

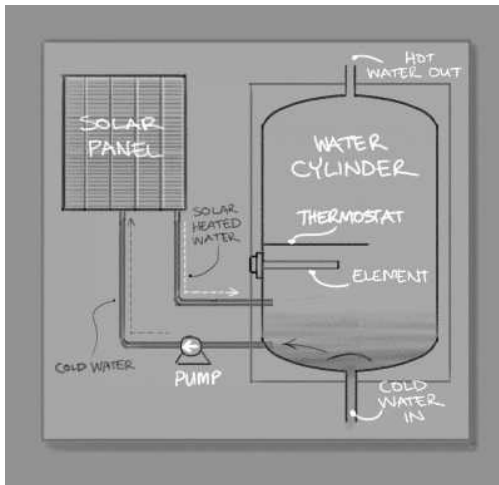
*A flat plate panel* looks similar to a skylight. It absorbs sunlight and transfers the heat into the water or fluid flowing through the collector panel. The common size for a house is one to three panels, between 2.5 square metres and 6 square metres in total.

*An evacuated tube panel* is made up of a series of glass tubes one inside the other (between 1.5m and 2m long) sloping lengthwise up and down the roof. The efficiency of these systems is slightly higher than flat plate collectors, and they will even perform well on cloudy days. In New Zealand's climate, both types of panel are very efficient.

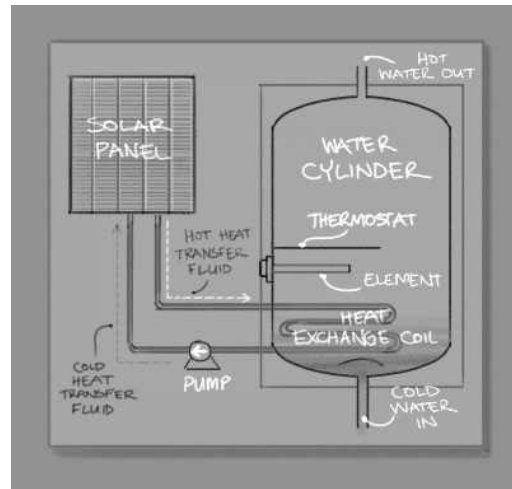
## 'Open loop' and 'closed loop'

In some systems, water is heated as it flows through pipes in the solar panels. These are known as 'open loop' systems.

With 'closed loop' systems, a fluid (usually a mixture of water and glycol) passes through the solar panels and absorbs the heat, which is then transferred to the water through a heat exchanger within the cylinder.



Open loop system with pump circulation.  
Graphic: EECA



Closed loop system with pump circulation.  
Graphic: EECA

## Thermosiphon or 'Passive' systems (Cylinder above the roof)

Systems that use natural circulation by *thermosiphon* are often called 'passive' systems. In this type of system, the hot water cylinder has to be located above the collector panels which are usually on the roof. Cold water or fluid moves down from the cylinder into the collector panels. Then, once it is heated by the sun, it rises back up into the cylinder.



Your roof and framing will have to be strong enough to support the weight of the cylinder if it is on the roof (usually 300kgs+). Some strengthening may be needed.

Natural circulation by thermosiphon has the advantage that it does not require a pump and therefore is not dependent on electricity, whereas a pump system is.

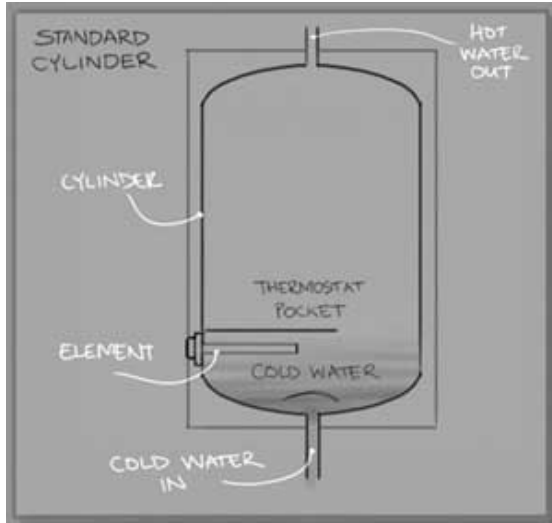
### **Pump or 'Active' Systems (Cylinder below the roof)**

Systems that use pumps to circulate the water or fluid are often called 'active' systems. With a pump system, the hot water cylinder can be located at a level below the collector panels. This can be helpful if you're installing a solar water heating system in an existing home and you want to use the existing cylinder, or if you would rather not see the cylinder on the roof.

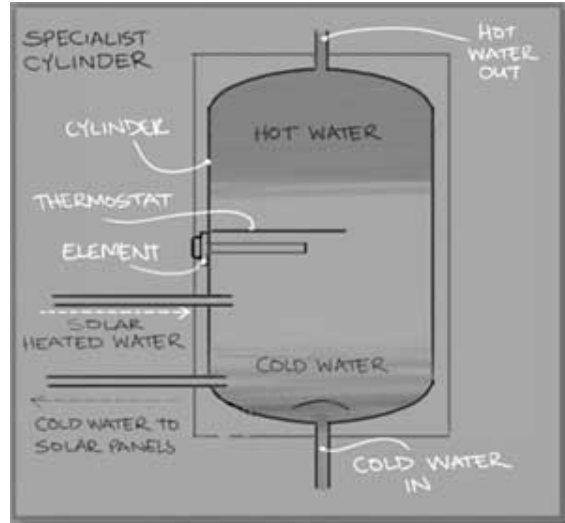


It is essential that the pump is used in conjunction with a controller to ensure the pump operates only when necessary.

### **Hot water cylinders**



Standard hot water cylinder Graphic: EECA



Solar hot water cylinder. Graphic: EECA

The hot water cylinder can be part of the system on the roof or it can be mounted separately in another part of the house. You can use a conventional hot water cylinder or a specialist solar water heating cylinder. The key difference is that specialist cylinders are usually larger and they are specially designed to maximise the use of solar energy.

### **Avoid enamel-coated cylinders**

Enamel-coated steel cylinders can degrade if your water gets above 80 °C, which it might in summer. You won't have this problem with stainless steel or copper cylinders.

### **Other factors**

#### *Insulation*

To get the best performance from your system, all components will have to be insulated including the pipes. This is particularly important where there is a long distance between the cylinder and the hot water taps. It is critical in cold climates.

#### *High temperatures*

All pipes and cylinders will need to be able to withstand temperatures above 100 °C.

## Installing a solar water heating system

### Who does it?

All solar water heating systems must be installed by a qualified plumber who should have specialist training in solar water heating. The installer will also make sure that the system does not compromise the waterproofing of the roof.

The roof may need strengthening for a roof-mounted cylinder. A 300 litre system holds 300kg of water, plus the weight of the empty cylinder and panels.

### What are the legal requirements?

You will need a building consent. Before you apply for the building consent you need to consider these points:

- The panels have to be firmly fixed so they don't blow away in strong winds.
- The panels shouldn't block your neighbour's view or sunlight.
- The roof must be able to support the weight of the solar panels and possibly the cylinder.

### Dealing with suppliers

Seek professional advice from an accredited supplier and installer of solar systems. Visit [www.accreditedsolar.org.nz](http://www.accreditedsolar.org.nz) or [www.solarsmarter.org.nz](http://www.solarsmarter.org.nz) to locate a list of solar water heating suppliers who have provided documentation that indicates their experience and competence to install solar water heating products and their installation practices comply with the *Code of Practice for SWH Manufacture and Installation in New Zealand*.

Obtain quotes and information from several industry-accredited suppliers or installers to ensure you get the best system at a competitive price.

## **Making the most of solar water heating:**

- Don't waste hot water, especially in winter.
- If you can, use hot water before the middle of the day - this gives the sun most of the day to re-heat water in your cylinder before the booster kicks in at night at off-peak power rates.
- Use a timer or programmable control to make sure your booster system isn't heating water you won't need.
- Collector panels that are out of sight should occasionally be visually inspected for leaks. Condensation on the glass or wet insulation indicates the system may be leaking.
- Collector panels should be washed if they get dirty. Check for shading at the same time - trees may grow unnoticed. Debris may gather on or around collector panels, reducing solar absorption.
- implement as many of the 'Easy tips for energy efficient hot water use' as possible and featured in this article

## **Additional Information**

Information for homeowners on solar water heating [www.solarsmarter.org.nz](http://www.solarsmarter.org.nz)

Financial assistance for homeowners

<http://solar.energywise.govt.nz/consumers/financial-assistance>

Accredited suppliers and installers of solar water heating systems

[www.accreditedsolar.org.nz/Suppliers.asp](http://www.accreditedsolar.org.nz/Suppliers.asp)

We do hope you find this information useful. Every success on your *energy efficiency* journey!



**The Horizon Homes Team**