

Solar Hot Water - Frequently Asked Questions

Does Tasmania get enough solar energy to make it viable?

Absolutely! Tasmania has the same latitude as northern Italy and well within the latitude band in which solar energy gain is viable and profitable.

Solar hot water systems are in widespread use in much less favourable climatic conditions - such as Northern Europe and Alaska.

The development of the evacuate tube solar technology has enabled solar hot water to become even far more financially attractive in cooler climates such as ours.

Is my home suitable for solar?

Most Tasmanian homes are suitable for solar energy. All you require is an unshaded roof facing roughly north (any aspect between north-west and north-east will give good results). Even an easterly facing roof can work without too much loss of efficiency.

The solar collector should be mostly unshaded by large trees and buildings, especially between the hours of 9 am to 3 pm.

If your roof aspect is very limited, there are always solutions, and the lightweight of the Apricus collector combined with the flexible mounting frame options means we can be very flexible with its placement.

(Some houses do get too much shade for adequate solar gain. If your house has limited solar access for some reason, then consider installing a hot water system driven by a heat pump technology. These are extremely efficient and can reduce your hot water bills by substantial amount as well.)

Are evacuated tube solar systems better than flat plate ones?

Evacuated tube collectors work more efficiently than flat plates for three reasons.

- 1) They perform well in both direct and diffuse solar radiation.

2) The vacuum in the tube minimizes heat losses to the outdoors, making these collectors particularly useful in areas with cold, cloudy winters. On a cold windy day a flat plate collector will lose almost as much heat as is gained.

3) Because of the circular shape of the evacuated tube, sunlight shines directly into the absorber for most of the day. At acute angle sunshine tends to reflect off flat plate collectors, resulting in a drop off in efficiency.

In warm climates the performance of the two systems is fairly comparable. In cooler climates, like Tasmania's, evacuated tubes work better in winter - when it really matters.

What size solar system do I need?

Here you need to consider a number of factors, such as the size of your house (how many rooms?), the size of your household (how many residents?), your lifestyle choices (long hot showers?) and your budget.

You also need to consider any likely changes to any of these factors in future years (growing families, possible sale of house, children leaving home etc).

Household hot water consumption can vary from 70 litres per day to several hundred, depending on usage patterns.

If you under-invest, you are likely to need excessive electric/gas boosting which will end up costing you more than your saving in capital cost.

If you over-invest, you may produce more solar heat than you can use up and will also increase your payback period.

The difference in price between a 22-tube system and a 30-tube system is generally less than \$300, so if there is doubt and you can afford it, it is generally better to opt for the larger system.

In Tasmanian conditions for a typical household (3 people or more) it is generally recommended to install a 30-tube system.

Remember that solar hot water cylinders are normally designed to store water for use over 2 days, rather than one, thus allowing you hot water even if the following day is cloudy.

What size hot water cylinder do I need?

This largely depends on the size of the solar system you install. You can roughly work on the basis of 10 litres of water storage for each solar tube that you install.

For Tasmanian conditions, we recommend a minimum cylinder size of 250 litres. Large families (5+) should go for a 315 litre cylinder.

If you fit a smaller cylinder, you may have hotter water, but less of it, and you will lose some system efficiency.

If retrofitting to an existing smaller cylinder (say 170 litres) you can expect some loss of efficiency. However, this is not advisable if you install a larger solar system because you will waste much of your solar gain.

A larger cylinder will enable you to store more heat during periods of inclement weather and will enable you to maximise the efficiency and solar gain from your system.

How much of my hot water energy will be provided by solar power?

In summer months you can expect most of your hot water supply to come from the sun (about half the year).

But the technology works well in cooler climates too, and you will get significant heat even on cooler days that have light cloud cover, so expect solar gain throughout the year.

While evacuated tube technology works efficiently even on very cold sunny days, keep in mind that the solar intensity is 5 times less in Winter than in Summer. For this reason, it is best to optimise your system for winter conditions by tilting the solar tubes to a slope of 45 degrees. By doing this you will get maximum efficiency in winter whilst avoiding excessive heat wastage in summer.

Low cost stainless steel frames are available if your roof is not steep enough.

(In Summer, you can expect to get 25kWh of heat per day from a 30tube array, whereas in July you can expect 5kWh per day on average. Even in the winter, it is possible to preheat the water to 40C

or more if the sun comes out. The booster will then take it up to your desired temperature.)

How much heat energy can I store in my cylinder?

By way of example - a 270 litre cylinder of water heated to 65°C will hold around 14.3 kw/h of energy storage. (This is equivalent to running a 1 kilowatt heater for 14.3 hours.)

The Apricus system will boost the cylinder temperature to 80 degrees, so a fully charged hot water cylinder will give you ample heat capacity for a typical home.

What rebates are available?

In these times of climate crisis, renewable energy rebates are being offered by various levels of government. The Apricus system is built to Australian standards and qualifies for rebates.

In all cases you will have to apply for and recover the rebate only after purchase and installation, so you will need adequate finance to cover the purchase costs.

At present the following rebates are available in Tasmania:

1. Renewable Energy Certificates (RECs): This rebate varies according to the size and performance of the system you purchase. RECs are a market-driven item, and so you should check on the latest prices. In most cases where installation is happening straight away, this can be taken as a point-of-sale rebate (i.e off the upfront cost).

2. Federal Government rebate: Most people are eligible for a \$1,600 rebate, which is no longer means tested. Some conditions apply: e.g. newly constructed houses are ineligible.

3. State Government rebate: Unlike other state jurisdictions, the Tasmanian government offers no solar rebate. But there's hope!

4. Hobart City Council rebate: Hobart council offers a rebate (off your next rates bill) of \$500 if you install a solar hot water system. This trial scheme applies until end of 2011.

How long will it take to recover my investment?

In most cases, within a few years. Your actual savings will depend very much on your lifestyle and household hot water consumption pattern.

A thumbnail estimate can be made by noting down your annual hot water bill and expect this to be at least halved. Then calculate the pay-back period by dividing this annual saving into the all-up cost of the solar system - taking into account renewable energy rebates you can apply for.

For a typical home, expect a recovery within 5 years at current prices. Some homes opt to turn off the booster during warmer months and this measure can dramatically shorten your payback period.

However, keep in mind too that grid power prices are mooted to escalate sharply in coming years, and this will further shorten your payback period.

Going solar is an ethical choice, as much as a financial one. But there has never been a better time to go solar even for your hip pocket!

Can I take other steps to improve the system's performance?

There are many other ways you can improve the performance of any hot water system, by building an insulated box around the cylinder, dropping the ensuring the HWC thermostat is set to 60 degrees (so that it does not cut in unnecessarily), or by making sure your hot water pipes are well insulated.

Go to www.sustainablelivingtasmania.org.au , Sustainable Living Tasmania's website to see the many and varied ways you can save energy in your home.

Why not have the hot water cylinder on the roof?

There are several reasons for this.

1. Rooftop thermosiphon solar systems work satisfactorily, but a vertical cylinder works more efficiently (owing to temperature stratification in the tank).
2. Research also shows that circulating the water faster, via a small pump, improves the solar system's efficiency by drawing heat from the

solar collector more rapidly. This more than compensates for the small amount of power used by the circulating pump.

3. A rooftop hot water cylinder is extremely heavy, making it much more difficult to tilt the solar array to the optimum 45 degree slope.

4. Many roofs are not strong enough to handle the weight of a rooftop hot water cylinder, requiring structural work before being able to install. By contrast, a 'split' evacuated tube solar system weighs no more than an adult person and is suitable for virtually all roof structures.

Where should the hot water cylinder be sited?

Ideally, as close to the solar panel as possible - to limit heat losses.

You will need to identify a route for the hot water pipes to get from the solar system down to your household plumbing. Your plumber may advise on the best way to do this.

How much power does the circulating pump use?

Think of the circulating pump like your heart. It is very small and operates on very low power (40-100 watts). In addition it is very quiet.

The pump will only switch on intermittently when there is hot water to deliver to the cylinder. It does not operate at other times, including at night. You can forget it is there.

How hot will the water get?

This partly depends on the size of the hot water cylinder / solar combination that you choose.

In any event, the Apricus solar system is designed to automatically shut down once the hot water cylinder gets up to a preset temperature (factory set at 80°).

(There is also a legal requirement that all hot water systems must be fitted with a temperature-limiting valve for safety purposes. This will generally limit the water to around 50° out of the tap).

If your system is electrically or gas boosted then any shortfall in temperature will be 'topped up' by the booster, if you don't like the thought of fluctuating hot water temperature.

How fragile are the glass tubes?

Care must be taken in transit and during installation, because a severe impact (dropping) can shatter them. However, once installed they are as durable as your house windows are.

The evacuated glass tubes are constructed from a special, tough borosilicate glass and will withstand all normal day-to-day environmental hazards such as hailstones and animals.

In the event that a tube is broken it can simply be removed and replaced with a new one. The tubes are inexpensive and the system will carry on working (at slightly lower efficiency) if any tubes are removed.

What is the difference between stainless and enamel steel hot water cylinders?

Both are of high quality construction.

The stainless steel cylinder is Australian made and will last a lifetime and can be located outside because they are fully weatherproof. These are generally the recommended choice, but do cost more.

The enamel steel cylinder, like most hot water cylinders on the Australian market, relies on a sacrificial anode to prevent corrosion. They have a long service life, but only if the anode is replaced from time to time (approx 5 years). In reality many households forget to do this, despite the best of intentions, resulting in a shortened cylinder life.

Important: If installing an enamel steel cylinder you must make sure there is at least 800mm clear space above the cylinder so that the anode can be withdrawn and replaced.

Are the systems guaranteed?

The major component, the solar manifold, has a 15 year warranty, as do the stainless steel mounting frames. Most other components are guaranteed for 10 years*. This includes the tubes, heat pipes and the stainless steel (Everlast) hot water cylinders.

The lower cost (non-stainless steel cylinders) will also give you a long service life, but only of the sacrificial anode is replaced every 6 or 7 years. For this reason, these cylinders carry a lesser 5 year guarantee.

The pump and controller are of high quality and carry the manufacturers guarantee.

* Note that guarantees apply in relation to manufacturing faults - not if the system is maltreated or mishandled or accidentally broken.

Can I install the system myself?

Whilst you can reduce installation costs by fixing the solar system to your roof yourself, the installation must be signed off by a registered plumber to qualify for rebates and to avoid voiding the warranty.

The solar collector is relatively simple to fit; and a comprehensive installation manual can be provided.

Warning: do not take risks. If you are not competent with heights then it would be unwise to self install.

Are there trained plumbers available?

Depending on where you live and who you purchase the system through, you may need to organise your own plumbing installation.

Any competent plumber can install the Apricus system, so if you have a friendly plumber, talk it over with him/her.

Some plumbers have installed a number of these systems and are already familiar with them, and this experience can reduce installation costs. A list of experienced plumbers in your area can be downloaded from our www.ecotasmania.com .

Is it better to boost with gas or electricity?

From an environmental standpoint, there is not a lot in it.

Hydro electricity is renewable, so ought to be favoured. However, the reality at present is that every unit of electricity that is saved means less a unit less of thermal power imported from Victoria.

You can choose to use bottled gas or mains gas (slightly different equipment needed for installation).

A gas-boosted system will be more costly to purchase and install and may require more maintenance.

(Note that when coupled to solar, a gas-boosted system requires a hot water cylinder to be installed.)

Does the system work with low-pressure hot water systems?

In most cases, yes. But the header tank or water pressure must be high enough to enable the system to function properly.

In some low-pressure installations an optional larger pump may be required. It is best to refer to a plumber on this.

What about freezing in cold weather?

One beauty of evacuated tube systems is that they will not freeze, thus eliminating this perennial problem with solar collectors.

The manifold is surrounded by moulded rock wool insulation and cannot freeze except in exceptionally cold conditions, well below freezing.

How much maintenance is required?

Very little maintenance is required for solar water heating systems.

You should occasionally check the light on the controller.

On rare occasions a glass tube may lose its vacuum and therefore its performance. If it does, the silver coating in the bottom of the tube will go clear, however the tube will also usually get a large build up of condensation between the glass walls, and look white, making it easily identifiable. A glass tube can be easily replaced by the owner, and replacements cost \$25.

Do I need to get an electrician?

It depends on your installation, and most plumbers will be able to tell you what your electrical requirements are.

Do I need planning permission?

Unless you live in a heritage area, such as Battery Point, or unless your building is heritage listed, then you will not require planning permission. HCC residents will (as of June 09) require a plumbing permit, however we can provide the paperwork for this, and it is free.

Can I power the pump with solar energy?

Yes, the system uses very little power (less than 100 watts intermittently). However the automatic temperature monitor (controller) plugs into a 240 volt power outlet, so your 12 volt system will need an inverter for this to operate.

Can I heat my house with evacuated solar tubes?

Heating a house is a lot larger task than heating an insulated cylinder of water. 'Hydronic' space heating is possible, but not very viable unless integrated with another technology - the problem being, that space heating is mostly required in winter and at night, precisely at the wrong times of year and day!

These factors mean that an enormous volume of hot water storage (several thousand litres) would be necessary for space heating purposes, and this means very large tube arrays.

In practice you can provide a significant amount of supplementary heat in the spring and autumn (and some people have implemented such systems). You would also need to fit many more solar tubes to your roof.

By contrast, solar water heating is effective even in winter, as the amount of heat required is considerably less than that required to heat a house and it can be effectively stored throughout the night for use the next day.

We suggest you contact an expert in this area to discuss this, and point you in the direction of some of these experts.