



SUSTAINABLE LIVING TASMANIA

Solar Hot Water

Sustainable Living Information

Water heating accounts for between 25 – 30% of the average Tasmanian household energy bill. So if you are looking for ways to reduce your greenhouse gas emissions, using the sun to heat your water can make a huge difference. Remember that with Basslink, every unit of electricity saved is a unit we have not had to buy from mainland coal-fired power stations or that we can sell as renewable power.

Many people assume that solar hot water heating is unviable in cooler climates like Tasmania's. But solar can provide around 50-60% of your hot water needs in Tasmania. As long as your house has adequate exposure to sun, you install adequate frost protection (or choose a system that does not require it) and a gas or electric booster for winter months, there is no reason why you can't enjoy solar hot water all year round.

The initial purchase price of a solar hot water heater will be more than a conventional system but the savings on your electricity or gas bill will pay for this difference, normally between 4 and 10 years.

Flat plate

Conventional '**flat plate**' solar hot water systems consist of solar collector panels bonded to a series of pipes, connected to a water storage tank. As the sun shines on the collector panels, the water in the pipes becomes hot due to conduction from the collector plate. This hot water rises through the panel and through to an insulated storage tank. Cooler water from the bottom of the tank enters the panel to displace the heated water. The tank is usually located next to the panel on your roof (**close-coupled**) but can be on the ground away from the panel (**remote-coupled or split system**).

If you go for a roof top tank, you need to consider the following: 1) whether your roof is strong enough to carry the weight of a hot water cylinder; 2) a horizontal tank does not perform as well as a vertical tank; 3) in Tasmania, roof top tanks can experience greater heat loss due to exposure to low temperatures and wind.

Remote, or split systems are less visually intrusive and have the advantage of easier access to the tank, thermostat and element for maintenance. Hot water will need to be pumped to your tank, and this will use electricity. Also, ensure circulation pipes need to be well insulated to minimise heat loss.

Frost protection

Flat plate systems require frost protection in Tasmania, as the water in flat plate collectors can freeze during a frost and cause damage. There are several options for frost protection – talk to your supplier or see the Alternative Technology Association publication *Solar Hot Water* for more information.

Evacuated tubes

A new system available on the market is based on '**evacuated tube**' technology. This uses tough cylindrical glass tubes rather than flat plates, which are evacuated (rather like a thermos flask). Heat is transmitted via a copper tube containing an inert non-toxic liquid which turns into hot gas when heated by the sun. This heat is transferred by conduction to water pumped through a small manifold which sits on the roof. Because of the cylindrical design, there is always a surface area directly facing the sun, meaning the heat can be collected throughout the day, rather than just when the sun is directly above. Evacuated tube systems are considered to be particularly good for cooler climates. As the evacuated

tubes do not lose heat on cold sunny days, they can withstand extremely low temperatures and do not require frost protection.

Position

For optimum performance solar hot water panels should face true north. In Tasmania this is about 16 degrees to the left of magnetic north on a compass. But any orientation between North West and North East is usually satisfactory. Ensure that the panels are not shaded by buildings, hills or trees for at least three hours before and afternoon - particularly in winter when the sun is low in the sky.

The collector should ideally be pitched at approximately the same angle as your latitude – in Tasmania this is around 45 degrees to the horizontal. This helps gain best performance from the collector in winter, when it is needed most. So long as the roof is above 30 degrees, then the collector can be placed straight on the roof with some loss of performance. Less than 20 degree slope requires a frame to tilt the collector up to face the sun. (This is easier with collectors that are not connected to a heavy rooftop tank.)

Size of system

Consideration needs to be given to the size of the solar installation. This is largely a cost consideration. Over-sizing your system will extend the payback period. Under-sizing may mean too much electric or gas boosting, especially in winter. Most solar collectors will give you excessive hot water, that can't be used up during summer months, so its optimum size is mostly tailored around the cooler months. The optimum system size depends on the numbers of people in your household and their hot water usage habits. You may also need to take into account a growing family. Most suppliers use a 'number of bedrooms and number of residents' formula, but this is based on

Australian households. A smaller system may suffice for a more frugal household.

Boosters

Solar hot water systems normally have an electric or gas booster element for winter months or periods of insufficient sunshine. Electric or gas boosters can be manually operated or controlled by a thermostat which kicks in when the tank temperature falls below a certain level. This needs to be carefully thought out, as inappropriately operated boosters can defeat the purpose of having a solar hot water heater in the first place. If they come on before sunrise when the temperature of the water falls, the water will be hot by the time the sun comes out, therefore wasting the available solar energy.

Options to minimise unnecessary boosting include: 1) Installing a timer on the booster, 2) Turning down the thermostat to low setting (55 degrees), 3) Switching off booster during Summer months, 4) Choose when to undertake household activities that require hot water usage, 5) Choosing a hot water cylinder that has its heating element higher up the tank. Talk to your supplier about the options for controlling boosters. This is best thought out before installation. In areas with a good sustainable firewood supply, a wood-fired booster can heat water through a 'wetback'.

Mixing valves

In summer, solar hot water heaters can produce extremely hot water. If there are children in your household, you will need to install a mixing valve to dilute the hot water going into bathrooms to a safe temperature of 50 degrees.

Solar boosted heat pumps

Heat pumps work like a refrigerator in reverse. They draw their heat from the atmosphere, and can be used effectively to heat hot water as well as air. Heat pumps use approximately one third of the energy of a standard electric hot water system. They

are particularly appropriate for dwellings that are too shaded for solar installation. Heat pumps can be made more efficient by including a solar booster, in the form of roof-mounted collector panels. The fluid in the panels is a refrigerant, not water, so does not require frost protection. The other advantage of solar boosted heat pumps is that they can heat water all year round, day or night, and therefore don't require an electric or gas booster. In the cool climates of southern Australia, greenhouse gas emissions from solar boosted heat pump systems can be similar to or even less than those from a solar water heater with an electric booster, and can provide 70% of your hot water needs. Because their greenhouse performance is similar to that of solar systems, heat pump hot water systems attract a similar renewable energy rebate.

Rebates

The Prime Minister announced on 27th January 2011 that as part of the response to the flood disaster the Government will redirect projected surplus funding from this program. These surplus funds have become available as a result of lower than anticipated levels of demand for the Rebate in 2010. Enough money remains within the program to support current rebate demand levels. All Solar Hot Water Rebate applications will continue to be processed as normal. Depending on future levels of demand, eligible households will still be able to access the Rebate in the 2011 and 2012 Financial Years. See:

<http://www.climatechange.gov.au/government/programs-and-rebates/solar-hot-water.aspx>

The Hobart City Council offers a \$500 rebate for solar and heatpump hot water.

See: http://www.hobartcity.tas.gov.au/HCC/STANDARD/PC_1234.html.html.html#BM_5

Update to Feb 4, 2011

Sources

Solar Hot Water booklet, Alternative Technology Association (Available from Sustainable Living Tasmania)

Your Home Technical Manual (Available from Sustainable Living Tasmania or www.yourhome.gov.au)

Chris Harries, Sustainable Energy Advocate

Suppliers

Flat plate systems

Nu Energy

4-6 Effingham St, Moonah 7009

Ph. 03 6272 4366 enquiries@nuenergy.com.au

Edwards

Grant Chugg Plumbing

PO Box 1865 Launceston 7248

Ph. 03 6326 3423

Solahart - Solahart (CGA) Tas

159 Main Rd, Moonah 7009

Ph. 03 6272 8188 www.solahart.com.au

aaron_cgatas@iprimus.com.au

Manion Plumbing

18 Invermay Rd Launceston 7250

Ph. 03 6334 0617

Evacuated Tube systems

Apricus - Eco Tasmania

100 Elizabeth St Hobart 7000

6231 4082/ 0403 565 782

mark@ecotasmania.com / www.ecotasmania.com

Ultra Greensun Solar

Hobart – www.ultragreensun.com.au

(03) 6248 1406 rolandb@bbwmail.com.au

Sackett Services - Hills Solar System

37 Derwent Park Road, Derwent Park 7009

(03) 6272 7776 www.sackettservices.com.au

Solar Water Wise –Greenland Systems

309 Liverpool St, Hobart 7000

Ph 1300797173 email: info@solarwaterwise.com.au

www.greenlandsystems.com.au

Grant Thompson Plumbing Services – Hills Solar

32 Tingira Road, Blackmans Bay TAS 7052

Ph 6227 1571 email thompson@our.net.au

Solar boosted heat pumps

Solco – Conergy Solar Hot Water & Grid Systems

Colin Mendoza, Jessups Retravision

108 Charles St, Launceston 7250

0418 298 848

Also see Solahart for heat pumps