



Getting into hot water

After a hard day's cruising sometimes there is nothing better according to **Andy Richards** than having a nice hot shower.

I do not know about you but I like hot showers.

I like hot water to wash up with and sometimes, to save gas, I will fill the kettle with hot water before I boil it for coffee. Problem is that unless I am on shore power or running the motor then the hot water only lasts for a maximum of two days with no use and only one day if guests come and want showers. Guess who gets the cold one at the end?

I have done a lot of work to get us power independent, with solar photovoltaic (PV) panels and a wind generator, but the idea of starting engines to have a warm shower seems very wasteful. We live in Queensland where there is an abundance of solar energy and we have solar hot water on our house so why not on the boat?

The concept of solar hot water is not new and is very simple. Start with a tank of water, circulate it through some sort of dark tubes that are exposed to the sun and the water in the tubes gets hot.

You can see it in many places from black plastic camping showers though to domestic rooftop systems for heating swimming pools. Pick up a garden hose that has been sitting in the sun for an hour and check the temperature of the water as it comes out.

If you look in your local phonebook you will probably find many systems and providers for the domestic land-based systems, however finding a system suitable for a boat is another issue.

The most efficient systems are vacuum-glass tubes. They work well but are not suitable for boats as they are big, heavy and likely to shatter. The flat panels used on houses are too big and heavy and I do not like the glass panel they often use.

After much searching I found a US-based company, Heliatos Solar, that manufacture a panel specifically designed for a marine environment. They are a size that suits the space I have and they also use materials that are boat-friendly.

Heliatos are currently in the process of setting up an Australian agent but due to timing we had to source ours direct from the US, which made them more expensive due to freight costs.

What did I need?

The concept is very simple, draw cold water from the bottom of the hot water tank using a small circulation pump. Pump this water through the panels exposed to the sun and then inject it back into the hot section of the hot water tank. Just a simple loop!

ABOVE: Nestled neatly between solar PV panels are the two Heliatos panels and the small solar panel to power the pump.

So this is what we used to install solar hot water on our boat: 2xHeliatos MH-38 solar panels: they are about 61 centimetres square and made from architectural grade aluminium alloy 6063 with the top panel ultra-violet (UV) resistant twin wall polycarbonate. Depending on where you are, you may get away with one panel. We have the space so opted for two panels.

1xhot water holding tank: we have an IsoTemp basic 24 litre hot water tank fitted in the starboard engine bay of our Fountaine Lipari. This has a 240 volt element for shore power and a loop for heating via the engine. It is well insulated and seems to stay hot for at least a day or two depending on use.

One small 12 volt circulating pump and a small 10 watt PV panel to suit: we chose a Topflow TS5 15PV pump. This model will run directly from a 10 to 15 watt PV panel, so if there is enough sunlight to heat the water in the panels, then the pump will run to circulate the water with zero drain on the batteries. No need for a controller as these pumps are optimised to run directly from the PV panel. The PV panel was picked up at a local solar shop.

I also needed pipe and fittings, some insulation for the pipes, tape, suitable electrical cable and cable ties. All these are easily sourced from almost any hardware or basic plumbing supplies.

The only other thing required is some suitable real estate on the boat to mount the panels. Obviously the panels must be exposed to the sun, so similar to solar PV panels. Avoid shading as much as possible.

We had commissioned a targa to mount additional PV panels and a wind generator, so we had a suitable space between the PV panels to mount the water panels and the PV panel for the pump.

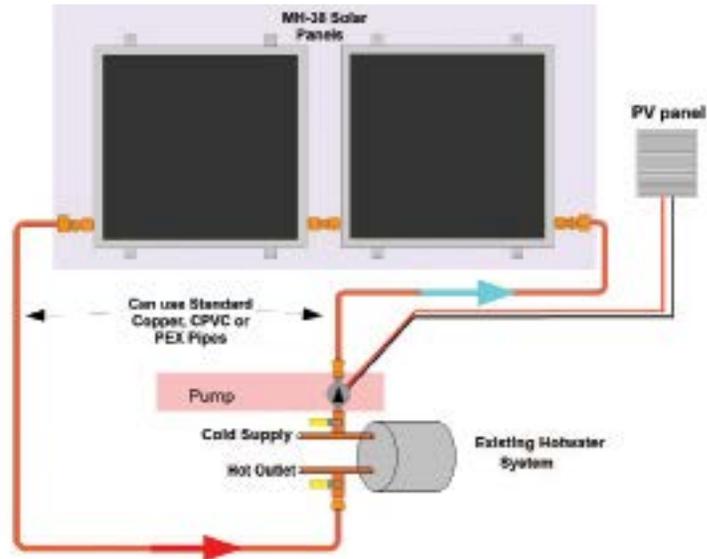
Installation

One of the hardest parts of the installation was running the pipes from the panels to the pump and hot water tank.

I used 3/8" nylon flex Barfell pipe. It is small and flexible enough to thread through our targa from the hot water system to the panels without kinks or the need for lots of connectors. Plus the required fittings are very easy to source.

Mount the panels and PV cell onto a frame: we only needed the frame as we are mounting on a targa. You can mount directly to a suitable coach top. Just remember you have to run pipe to them and they should be exposed to as much sun as possible.

Mount the frame to the Targa: connect the pipe and fittings and run the pipe to the hot water tank. Insert the pipes into the insulation on the way and do not forget the cable from the PV cell. The insulation is optional but it



does affect efficiency through heat loss if not insulated and also protects the pipes from UV.

Turn off the cold supply and drain the reservoir: our IsoTemp water heater has a convenient draining tap incorporated into the pressure relief valve. Tip: turn off the power to the heating element the night before so when you need to drain it is cold.

Assemble the pump, tap and tee pieces: use plenty of plumber tape to avoid leakage. Observe the flow direction on the pump. Fit the pump, tap and tee to the cold inlet on the hot water tank. Fit the return tap and tee to the hot side of the water tank. Connect the panel feed pipe to the cold side only. Turn on the cold supply and let it fill the pipes and panels until it runs out the return line.

ABOVE: Simple schematic of the installation.

BELOW LEFT: Putting the aluminium frame together.

BELOW RIGHT: The final connections to the IsoTemp holding tank showing the hot side outlet bottom left and cold side inlet top right.



Stop the cold supply and connect the return line to the hot side: turn on the cold supply and bleed the system of air, usually at the highest point at the panels. Turn on a hot tap to bleed the hot circuit of any air and to ensure the reservoir is full.

Open all the stop valves and check for leaks.

Connect the PV cell to the circulation pump observing polarity, red to red, black to black. We fitted a small inline switch only so I could turn it off if needed, although you could just cover the PV panel.

Wait one hour, just enough time to clean up and enjoy a nice hot shower courtesy of the sun.

We were extremely surprised and pleased with how well this works. Within 30 minutes the water was so hot you could not put your hand under the hot water.

Overall cost was under \$800 and is a project that does not require great technical skills to complete. Most parts were readily available in Australia and the most important part (sunlight) we have in abundance in Queensland.

Everyone's boat is different and this setup worked for our boat. The hardest part is the connection to the existing hot water system. Boat builders rarely seem to put things in places that make it easy to work on them.

Our setup is simple; others may need the heat exchange system, or glycol system that Heliatos offer. Solar hot water systems generally do not like to freeze; probably not an issue in most of Australia, but this may be an issue if heading to colder climates.



All the connectors and pump required for the installation.

cruisinghelmsman Andrew Richards



Andy Richards has an engineering background but currently working in healthcare IT. He and his wife Elaine currently live aboard their 2014 Fountaine Pajot Lipari 41 Evolution catamaran *Twoflower* in Manly Queensland. They sail most weekends in preparation for retirement and a full time cruising lifestyle in about two years.

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