



Sarah Norbury

LEFT These semi-flexible solar panels have been cleverly incorporated into a sprayhood roof

BELOW Two-axis tracking mounts allow solar panels to make the most of the available sun



My panels are a 200W. The peak value of the tracking curve was 1,010 W/m² (from the tabulated results) so the peak output was: 200W x 1,010W/m² ÷ 1,000W/m² = 202W. The result for a horizontal panel returns 181W.

Unfortunately for my master plan, catching the greatest current going into the batteries is like trying to photograph a dolphin; by the time you've seen it, it's gone. The current depends on the load more than the source, so maximum currents are likely to occur when the battery charge is low, and that means in the morning – but the sun is not at its peak then. The best I've seen to date is 13.1A at 13.4V, giving me 170W and an overall system performance of 170 ÷ 200 x 100% = 85%, which represents a system loss of 15%. In other words, 85% of the theoretical electrical output from the panel reaches my battery, which is pretty good.

Energy

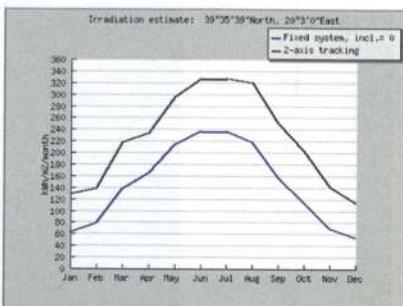
The total area under the curve represents the energy collected in a typical day, and I wanted to quantify the difference between

a fixed horizontal panel and a tilting one. This was fairly simple. I went to the PV estimation tab and filled in the blanks leaving the JRC estimate of system losses at 14% and entering my 0.2 kW solar panels. I entered zero for the angle to generate a horizontal panel output and also selected two-axis tracking since this was the comparison I wanted to make.

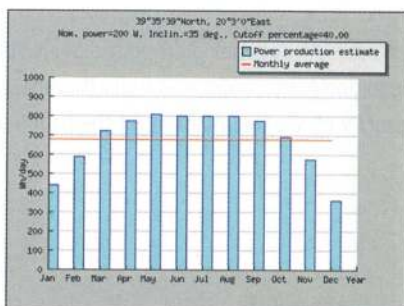
The result is pretty graphic: you gain a minimum of 33% more energy if you can follow the sun; much more in winter.

I calculated my power requirement at 800Wh/day in the summer and plotted how this could be met. The blue bars show the energy produced, and these reach the target value of 800Wh/day throughout the cruising months of the summer.

But the panels will need a bit of help from September onwards and before May.



Irradiation estimates by month for a horizontal panel and a two-axis tracking panel (European Commission JRC)



Power produced from my 200W tracking array compared to my 800Wh/day requirement (European Commission JRC)

Verdict

If you're choosing solar panels, start by working out what space you have available and what your energy requirements are. Then try to find an unshaded location where you can mount rigid crystalline panels, preferably on a tilting mount. Many boat owners will want to mount them on deck, in which case semi-flexible crystalline panels may seem a sensible choice but can be up to 10 times as expensive as rigid panels. For tracking mounts or gantries, rigid panels will be necessary, so crystalline units will again be the best option.

ABOUT THE AUTHOR



David Berry learned to sail in dinghies and now owns a Moody Eclipse, *Aderyn Glas*, which he keeps in Preveza, Greece. Since his retirement from design engineering he has

written an account of his voyage with his wife, Ann, from France to Greece, entitled *Time to go South*.

