

Solar Publication

A regular and saveable module to build knowledge of solar power, build on Zimbabwe's experiences and build the Zimbabwean Solar Industry

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Installation

What should you look for / expect to get in a good installation? What will give you long term value? How will you know corners aren't being cut? How do you tell cheap from inexpensive?

In this issue on Installation, we will break it down to the three main parts of a solar system. Panels, batteries and inverters.

Panels

Where will you put them? They do not always have to be on the roof! But they do need to be in the sun, for as long as possible. They will never reach their factory rating, but it can get close.

With 1500W of panel on my roof, the best I have ever done is 1200W. Another array of 4300W of panels I know, his best is 3800W. On bad, heavily overcast days, I can be lucky to get 150W off all of them. Solar power puts us back in touch with nature! And you need enough space to put them. One by two meters (depending on the type of

panel), by number of panels you can get, is the space you will need.

Each panel is made up of cells. These cells, while stand-alone units, are wired by the manufacturer into a panel, with one output. Usually 12V but many other voltages are available, usually in multiples of 12. Panels will be installed, and wired by the installer into strings. Again, usually multiples of 12 (24, 36, 48...) These strings will feed into the inverter's charge controller, or a separate one if you have it.

Panels will generally only give off what is required of them. If you



touch the outlet wires together, there will be a spark. And a serious fire hazard - more reason to have a competent electrician involved!

Technical assistance has been sought and is acknowledged!
Technical inputs received with pleasure

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However if you take an outlet wire in each hand, you will feel little to nothing. (However it is not recommended you try this!) Panels only produce when there is a load on them.

Which brings up the point – there should always be an isolator between the panels and the charge controller/ inverter. In case of a fault. Either a fuse or an MCB breaker (a DC MCB).

Shadow

Shadow is probably the biggest killer of capacity. Look at your property. Over the course of a day, and over the course of a year. Where does your most sun fall? And on overcast days, what back-up do you have? Back to Zesa (and how will it be done, automatically or manually)? Back up of excess panels, or excess battery?

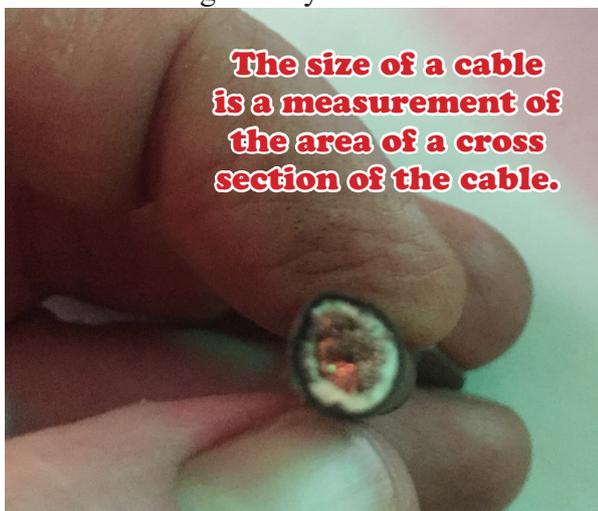
Facing

Facing, after shadow, is the next important factor in placement. Straight north is optimum, even though for about one month a year the sun is to the south of us! If they are going on your roof, facing will be restricted by how your house is built. But this can be overcome! Tracking systems are available, however it is almost always more cost effective to invest in more panels and face them in another direction. So put 3 panels on a north east facing roof, and 3 panels on a north west facing roof, and you are most likely to get more watts for less cost than 3 panels on a special frame or tracking device that points north.

Airflow

The panels must be raised off the roof, or anything solid it is mounted on. There should be a gap, for airflow, of 100mm. Panels get hot

(85° on an average sunny day, so be careful when you wash them!) And heat makes them inefficient. The hotter they are, the less power they will produce. Some irony there – if you want them working at their best, take them in out of the sun! But get them away from anything to allow air to flow. The addition of fans etc. is generally not cost ef-



fective, just let airflow and thermal currents do the job.

The angle should be 20°. (Most correctly 17.5°!) However, if your roof is 30°, the extra frame material to take it to 20°, not to mention the visual ‘irregularity’s not likely to be cost effective. If you lived under a flat roof and were putting panels there, an angled frame would be important and worth your while – and it would increase airflow.

Cables

When making connections, it is important to use the correct cables. Thickness. Not only will poor cabling result in harder charging, it will heat, and be a fire danger. Solar Cable should always be used (and solar cable is much more expensive than regular cable!). It must be DC not AC.

Consider power from a 12V battery, to a 250V appliance, - a 500W freezer. The power from the battery will be 47 amps. The power into

the freezer will be 2 amps. Amperage is more critical than Watts or Volts in regard to cable, and lower voltage = higher amperage, which means thicker cable. So think about where the heavy cable needs to be (and how heavy it needs to be!)

The distance the current travels along these heavy amperage cables is another important consideration. It should be (depending on many things!) 6mm from the panels to the charge controller / inverter. If the distance is about 5 to 10m of distance.

The ‘6mm’ in the cable size description refers to the surface area of a cross section of the cable. So a 6mm cable is actually 6 square millimetres, or 6mm².

For some smaller, shorter distance, lower amperage jobs, 4mm cable may be used, but in general, 6mm is your minimum cabling required. Everywhere (a chain is as strong as it’s weakest link). And it must be DC, or Solar cable. The expensive one.

Master Switch

Should your system be connected to Zesa? Should your whole place be connected to Solar?

Where does your charge come from? If Zesa, then it needs to be connected. If it is stand alone, to save grid costs, it should not be.

Will system run your whole house? On just the flick of a switch? If you can afford this much system, so be it.

If your system does not produce enough to run everything (including all those little standby things you did not calculate for), you need to manage your system, so connecting it with one switch to everything may not work out well.

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