SunWize Power & Battery

SunWize Power Systems – Guidelines for Choosing the Right Product

Under the right circumstances a solar electric (photovoltaics or PV) system will prove more cost effective than other power technologies. This is especially true when powering equipment that has a relatively small power requirement and is located in a remote location without access to utility power.

While you may be aware of PV technology and its overall capabilities, you may not have a good feel for whether a PV system is an appropriate choice for your specific application. The size and cost of a PV system can be the better choice when compared with alternatives, or it may prove too large or too expensive. It is helpful to have a rule-of-thumb guide that quickly shows you the size and expense you can expect from a PV system. Doing so let's you decide to pursue a PV solution in greater depth or to pursue other power options, such as extension of the utility grid or deployment of an active generator set.

It's important to note that any rule-of-thumb guidelines are representative of a typical scenario, and are subject to fluctuations up and down. You should use the guides offered below with the understanding they are meant to give you a rough estimate, but are not meant to identify a specific system configuration for your application.

A quick analysis of a PV system for a particular load will produce the physical size of the PV array and the cost of a complete PV power supply (PV array, battery storage, control subsystem, enclosures, mounting structures, interconnect wiring, etc.). To perform this analysis you must start with the equipment to be powered (the load - see SunWize engineering bulletin #1/10 *Understanding the Load*).

Once you have calculated the load in terms of a continuous amount of watts operating 24/7, you can use the following guidelines to determine the size and cost of the required PV system.

SunWize® Power Station

Step 1

DETERMINE IF THE LOAD CAN BE POWERED BY PV

SunWize manufactures two primary product lines of PV systems, the smaller Power Ready System and the larger Power Station. For site locations with average solar radiation levels (typical of Washington, DC) the two product lines are capable of powering continuous wattage loads of up to 75 watts for the Power Ready System and 290 watts for the Power Station.

SunWize® Power Ready System

The wattages can be at any standard DC voltage of 12, 24 or 48 volts. For loads that are AC reduce the figures by 15%, equal to 64 watts for Power Ready Systems and 247 watts for Power Stations.

Note: Wattage figures go up for sites with excellent solar radiation levels (typical of the Southwestern US), and they go down for sites with poor solar radiation levels (the Northeast and Northwest continental US). It is possible to install multiple Power Stations in parallel for loads greater than 290 watts.

Step 2

DETERMINE THE PV ARRAY RATING AND SIZE

a. Once you calculate the continuous wattage for your load, multiply that number by 13.5. The resulting figure is the wattage rating for a PV array in that average site location (e.g.: Washington, DC). For example, a load of 45 watts continuous (at 12, 24 or 48 volts DC) will have a PV array rating of 45 x 13.5, or roughly 600 watts.

Note: PV array wattage is the nameplate rating based on an industry set of measurement standards known as Standard Test Conditions (STC).

b. The PV array size, in square feet, is estimated by using the continuous wattage figure. For the example above this is 45 watts = 45 square feet. That is a lucky coincidence, due to the fact that most solar module technologies have a power density in the range of 13 to 15 watts per square foot. If you use a power density figure of 13.5 watts/sq.ft. you are right back at the continuous load wattage figure.

(continued)

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Step 3
DETERMINE THE COST OF THE TOTAL PV SYSTEM

The cost of a PV system can vary based on the complexity of the design, the amount of battery autonomy required, the addition of optional equipment, the integration of load equipment into the power system enclosures, the level of pre-assembly, the packaging techniques used for domestic or international shipping, etc. The figures used below represent a fairly broad range for small, simple systems up through large, complex systems.

Using the array wattage derived in Step 2a, multiply that figure by $10 and by $17. The resulting numbers represent the low end and high end costs for a complete PV system. Continuing with the example given above, the 600-watt PV array will have a total power system cost in the range of $6,000 - $10,200.

In general, smaller arrays represent simpler systems in the low end of the cost range. Larger systems tend to be more complex requiring specialized load conditioning components (DC:AC inverters and DC:DC converters) and involving special integration considerations. Those will approach the high end of this cost range. The 600-watt PV array example used above is typically in the middle of that range at $8,000.

IS PV THE RIGHT POWER SOLUTION?

What you know by the application of these 3 simple steps is:

- You have a load requiring 45 watts of continuous power, making it suitable for a Power Ready System.
- It will require a PV array of 600 watts that is 45 square feet in size.
- The cost of a 600-watt PV power system is $8,000.

Armed with this data you can quickly determine if PV is the appropriate technology to power your 45 watt load. In a matter of minutes you have a rough estimation from which you can efficiently and effectively assess your power system challenge.

Contact SunWize for more information about solar power or utility connected backup power systems.

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