

Solar Assessment Worksheet



This worksheet will help you to determine how much power your off grid solar system needs to generate. Simply monitor all of your necessary grid down devices with the <u>Kill-A-Watt Meter</u>. There are three types of loads you need to measure. When measured and added together you will know the total amount of power you need to generate in watt/hours per day. Your location will determine how many peak sun hours per day you will receive on average. If for example, if you calculate that you need 1,000 watt/hours per day, our first recommendation is you give yourself 50% spare capacity to account for cloudy days and winter, or 1,500 watt /hours. If your area receives 4 hours of peak sun on average per day and you need to generate 1,000 watt/hour, then divide 1000 by 4. The answer gives you the wattage in solar panels you will need, in this case 250W. Since we are looking for 50% more, multiply your answer by 1.5. The answer of 375 would require (<u>4) 100 watt panels</u> or the equivalent. To determine the number of peak sun hours in your area, <u>check out this page</u> or call Renogy at 800-330-8678.

Load Type 1- Continuously plugged in, intermittently running- refrigerators, freezers, sump pumps, etc. Plug into the Kill-A-Watt meter and let run for 24 hours. Press the KWH button and record results. The meter will give results in Kilowatt Hours, a reading of .64 is equal to 640 watt/hours. You will need to note how much power each device uses instantaneously (press the watt button) as well in order to size your inverter.

Device	Instantaneous Load (Watts)	Total Consumption (KWH)
Total		

Load Type 2- Devices for which you control the usage and consumption is constant- Light bulbs, Fans, Radios, Coffee pots. etc. Plug these devices into the Kill-A-Watt meter. Note how much power the device uses instantaneously by pressing the Watt button. Record this measurement then multiply it by the hours per day you intend to use the device.

Device	Instantaneous Load (Watts)	X Hours	Watt Hours Consumption
Total			





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Load Type 3- Intermittent Usage, Variable Wattage- Some things like washing machines, coffee makers, computers, and rechargeable devices are only used intermittently AND they take variable amounts of power while running. For example, a washing machine may only run for an hour, but at different points in the cycle it will draw more or less power. Plug these devices into the Kill-A-Watt Meter and record the total usage during one cycle (one pot of coffee, on hour of computer usage, one charging of a table, etc). You must note the PEAK usage during the cycle for inverter sizing and total usage for the generation portion. While running, press the WATT button on the meter and note the highest reading. When the cycle is complete, press the KWH button and record the consumption.

Device	PEAK LOAD (WATTS)	Total Consumption (KWH)
Total		

ADDING IT UP to determine your system generating requirements- This is where things can get tricky. The simple answer is to add the totals from all three tables, this would give you the total amount of power in Watt/Hours you need to generate. After completing this series and adding the costs together, if you have the budget, than this is your answer. In my case, I don't have a bottomless wallet, so I had to make some decisions. Certain loads might be requirements, say you need your lightbulbs and freezer. Items like the freezer need to be plugged in near constantly. You may need consider these as a baseline. My critical freezer load actually requires around 650 watt hours of energy each day (a little less than I said in the video). Because my system should generates 1,500 watts on average, on sunny days that leaves me with an extra 850 watt hours to spend. I can pick and choose from the list. You can also decide to vacuum on Mondays, wash clothes on Tuesdays, a couple hours of movies on Wednesdays, and sit and twiddle your thumbs on Thursday because its cloudy and raining.

INVERTER SIZING- Inverters convert DC power stored in the batteries to AC power that can be used by devices and appliances. Inverters are limited to the amount of power they can handle at once. To determine the size of the inverter you need, look at the WATTS (peak or instantaneous) column. Decide which devices need to run in conjunction AT THE SAME TIME. Add these together. For the person that has the budget, add every item in each column together. For people whose wallets creak when opening (like mine), again, take your baseline, add it together, then look at your list and decide which items HAVE to run at the same time. With my 1000 watt inverter I can run the freezer (85 watts), some 7 watt lightbulbs (28 watts), and make a pot of coffee (800 watts). For some loads I might have to unplug the freezer for a short time to maximize the amount of power I can get from the inverter.



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Measuring Items You Can't Plug Into the Kill-A-Watt meter- Some items you can't plug into the meter. For these items..sorry folks..it's time for some math. Don't worry, its simple math. The first thing to do is locate on the device a tag that lists the amount of power it draws. It probably isn't going to tell you in watts. You will probably see a listing for volts and amps. To convert this to watts, multiply the volts times the amps.

Exp. Tag says 120VAC .4A Multiply 120x.4=48

48 is your answer in Volt Amps. To convert to watts, multiply by .85 (don't ask, just do it).

48 x .85= 40.8 Watts

Just like in the previous examples, 40.8 watts is the instantaneous load the device will draw. If you leave the device on for an hour, it will draw 40.8 Watt/Hours.

Some electric motors like to throw you for a real loop, they list the power in horsepower. This table will give you an idea of the wattage with which you can figure your usage:

Horsepower	Watts
1/8	93
1/4	185
1/3	250
1/2	375
3/4	560
1	745
2	1490
3	2235

You'll notice we've mentioned and worked with Renogy on this project. When I begin a project for the Tin Hat Ranch I look for the vendors that will supply the best products for a reasonable price with good customer service. In other words, the stuff you see in our videos and on our website is the stuff I buy for myself. In the case of a small to medium off grid solar system Renogy is one of the best. They've actually got folks that you can call and talk to through every step of the process, from pre-sales to after sales technical support. I used every aspect of their support and the experience has been great. While you can use the information in this form to determine your solar needs and go anywhere with it, I suggest giving Renogy a shot. <u>Click here for their website</u> or give them a call at 800- 330-8678.