Solar Array Sizing Worksheet

Use this worksheet to determine your solar requirements. We have included an example column and a column for your system.

1. Locate your site on the average yearly insolation map on page 12 and list the average full sun hours from the chart below it.
2. Take the daily corrected total loads in watt hours from your load calculation sheet.
3. Divide line 2 by line 1. This is the number of watts we need to generate per hour of full sun.
4. Find actual power produced by your selected module and enter here (rated amperage x battery voltage during charging). Example: Using KD-135s, one module produces 7.63 amps. 13 volts is a common charging voltage for 12 volt systems. Actual power = amperage x charging voltage, or 7.63 x 13 = 99.2 watts per one module.
5. Divide line 3 by line 4. The result is the number of modules required for your system. When rounding this number, remember that sets of 2 modules are needed for a 24 volt system, sets of 4 for 48, etc.

	EXAMPLE		ACTUAL FIGURES	
		YEARLY AVERAGE		YEARLY AVERAGE
1)	Average Sun Hrs.	5.0		
2)	Watt Hrs./day	1000		
3)	Watt Hrs./hour	200		
4)	Module Selection	(7.63x13)		
	Each Module Output	99.2		
5)	Number Modules Required	2		

In some locations, almost twice the number of modules are required in the winter because they have half as much available sunlight in winter than their average. In northern climates this is often aggravated by a larger winter time demand for more lights, etc. For this reason we often size residential solar power systems (in the interest of cost-effectiveness) to provide 100% of summer or yearly average loads and meet the winter shortfall with a generator. Remote telecommunication PV systems are generally sized to winter conditions.

Battery Sizing Worksheet

Use this worksheet to determine your battery requirements. We have included an example column and a column for your system.

1. Determine total watt hours per day required from your load calculation.
2. Determine days of storage required. This approximates the greatest number of cloudy days in a row expected (3 to 7 is common for residences, 7 to 14 for remote communications and monitoring sites).
3. Multiply line 2 by line 1.
4. Determine planned depth of discharge. 80% is the maximum for lead acid deep cycle batteries, 50% a common amount for optimum longevity. Divide line 3 by .80 or .50, respectively.
5. Derate your battery for low temperatures by multiplying line 4 by the factors in the table below using the lowest expected weekly average temperature.

Battery Temp. (F°)	Multiplier	Battery Temp. (F°)	Multiplier
80	1.00	40	1.30
70	1.04	30	1.40
60	1.11 (example)	20	1.59
50	1.19		

6. Find the watt hour capacity of your selected battery. This is voltage times ampere hour capacity. Example; MK-8L-16 deep cycle, 6 volts x 370 amp hours = 2220 watt hours.
7. Divide line 5 by line 6. The result is the number of batteries required.
8. Round number of batteries to fit system voltage. Example; A 24 volt system requires sets of 2 when using 12 volt batteries; sets of 4 when using 6 volt batteries and sets of 12 when using 2 volt cells.

	EXAMPLE	ACTUAL FIGURES
1)	1000	
2)	7	
3)	7000	
4)	(.50) 14,000	
5)	(1.11) 15,540	
6)	2200	
7)	7.06	
8)	8	

Rule of thumb: We recommend that your battery bank's watt-hour capacity (at the 20 hr rate) be at least 10 times more than your daily corrected watt-hour figure from the load evaluation form on page 10.