

To properly size a system first answer the following questions. With this information and knowing how much you would like to spend, you can easily pick the system needed. Systems are easy to expand so if your budget is tight you can normally build onto a system later.

- 1. How much energy do you use in a day. Fill out chart below.**
- 2. What type of RVing do you do?**
 - Full timer who boondocks/drycamps 100% of the time.**
 - Full timer who boondocks/drycamps 50% of the time. The other 50% is plugged in.**
 - Weekender who drycamps 100%**
 - Weekender who drycamps 50%.**
 - Other, please explain.**
- 3. Do you have generator and how much do you run it or want to run it?**
- 4. What type of battery do you have and how many?**

Generally you should figure the energy consumed out of the battery during the night (after sunset) relative to energy that can be gained from the solar during the day.

Here is a list of typical energy consumption rates of RV appliances. Add them up and determine the energy usage of your RV. Then match this to the amount of power the solar panels can produce. There is an example of what the average RVer experiences.

Worksheet for Appliance Energy Use in an RV

Entertainment

RV appliance	Amps used per hour	Times x	Hours or % of hour	Energy Used
B/W television	1.5	x		
9" television	3.33	x		
13" DC RCA television	6.42	x		
19" Panasonic TV on standby	1.4	x		
19" Color TV play mode	8.4	x		
VCR	2.5	x		
Digital Satellite Receiver	1.93	x		
Automatic TV Antenna	9.17	x		
AM/FM Radio	1	x		
Cassette/CD Player	2.5	x		
CB Receiver	0.5	x		
CB Radio	1.25	x		

Lights

Fluoro. Thin light, 20 watts	1.6	x		
Fluoro., 1 tube	1.25	x		
Fluoro. Thin, 2 tube, 12"	1.2	x		
Incandescent, 1 bulb	1.3	x		
Incandescent, 2 bulbs	2.6	x		

Kitchen

Three way refrig. on 12V	35	x		
Dometic fridge RM 2807 (gas)	0.35	x		
Dometic fridge (Electric)	29	x		
Refrig./freezer light	1.8	x		
Rangehood & light	3.5	x		
Rangehood fan	12	x		
Microwave, 1380 watts	108	x		
Blender	16.5	x		
Melitta coffee maker	60	x		
Braun coffee maker	82.5	x		
Toast R Oven, 1500W	117	x		

Office

Computer	2	x		
Screen, 13"	8	x		
Ink jet printer	2.91	x		
Laser printer	23	x		
Laptop, 430w/battery charger	2.20	x		

Other

Forced air furnace, SF35	9.5	x		
Fantastic fan, low power	1.8	x		
Fantastic fan, low power	2.3	x		
Bathroom fan	1.5	x		
Vacuum	6.66	x		
Electric Clock	0.33	x		
Hair dryer	125.00	x		
Heart 2500 inverter, standby	0.25	x		
Gas Detector	0.007	x	24	

Example of average energy use by an RVer*					
Appliance	Amps	x	Hours	=	Amp/hrs.
12 Volt DC Appliances					
2 lights, Fluorescent	1.2	x	4	=	4.8
1 water pump	4	x	0.5	=	2
1 furnace fan	9.2	x	1.25	=	11.5
Gas detector	0.007	x	24	=	0.168
AM/FM Radio	1	x	1.5	=	1.5
12 Volt Total -----19.96					
Household 120 volt appliances with an inverter					
Microwave	100	x	0.1	=	10
TV, 19"	8.4	x	3	=	25.2
Satellite Receiver	1.93	x	3	=	5.79
120 volt household Total -----40.99					
Total Amp-Hours Used Per Day ----- 60.95					

Estimates of Energy Produced by Various Wattage Solar Panels.

Watt	Amps	Sun-Hours	Total
120	7.10	6	42.60
80	4.70	6	28.00
40	2.35	6	14.10

Looking at the example this RVer uses about 20 amps per day with DC 12 volt appliances. This load could pretty well be covered with an 80 watt solar panel because it will return about 28 amps per day. (output can vary due to location, time of year and amount of daylight hours). It can never hurt to go with the next higher output panel.

If you add the AC 120 household loads they are using about 61 amps. They would need to use two 120 watt solar panels.

The chart below is a general guideline to size your system. Remember this is per 100 amp hour of battery capacity. Please ask if you are unsure what the amp hour capacity of your battery bank is.

*Assumes panel is tilted toward sun

Solar Sizing Per 100 A/H of Battery Capacity

RV Profile	Solar Panel Size
*Boondocker/drycamper	120 or more watts.
Drycamper w/o inverter	80-120 watts.
Weekenders	40+
**Maintainer for travel trailer, camper, fifth wheel, class 'C' only.	20 watt +.
Maintainer for Class 'A' for dual battery bank, house and engine.	40+ watt panel. With dual battery bank automatic charge controller.

Maintainer Systems

Our "Maintainer" systems consider some general phantom loads. It is designed to keep your battery healthy while it is NOT being used. Load testing at a major Class 'A' manufacturer showed that the house and cranking batteries, with the kill switch on, discharged 8 amps per day!

Minimum Daily DC Phantom Loads in Amps*	
Load	Amps/Day
** Natural Discharge	.160
Digital Clock	.280
Driving Computer #1	.125
Tank Monitor Panel	.162
Propane Detector	.960
Battery Monitor	.070
Refrigerator	.500
***CO monitor	0.96
Sub Total	<u>3.22</u>
Fudge Factor (5%)	0.16
Total	<u>3.38</u>

* Excerpts from November, 1997, FMCA. Class 'A' Motorhomes should consider approximately 8.33 amps per day to recover with a dual battery bank charge controller.

** Assumes 100 a/h battery at 5% natural discharge per month

.*** CCI Controls, LECO model @ .040 amps.

Maintainer A/H Panel Sizing	
"Minimum Daily DC Phantom Loads in Amps" from Table, above.	3.38 amps
Divide by an average of 4 hours per day for solar charging. (3.38 amps/4 hours)	.845 amps
Solar real world factor (.845 x 1.2)	1.01 amps
Solar Panel should be rated at .862 to 1 amp. Called Peak Power Current (Imp) on the solar panel label.	> 1 (Imp)

Maintainer Volts

Our rule of thumb is that if the battery(s) are going to be unused for several months, the charge voltage can be set to about 13.4 volts without consuming the water level.

Do We Need A Charge Regulator ?

In general, when the rated peak charging current in amperes of the solar panel is less than approximately 1.5% of the battery capacity in ampere-hours, a regulator is not typically necessary. In a typical group 24 battery rated at 75 ampere-hours times 1.5% equals a panel of 1.13 or less panel where a charge regulator would not be needed.