Power Consumption Table

These figures are approximate representations. The actual power consumption of your appliances may vary substantially from these figures. Check the power tags, or better yet, measure the amperage draw with a clamp-on ammeter.

Multiply the hours used on the average day by the wattage listed below. This will give you the watt hours consumed per day, which you can then plug into the load evaluation form on the next page.

Remember that some items, such as garage door openers, are used only for a fraction of an hour or minute per day. A 300 watt item used for 5 minutes per day will only consume 25 watt hours per day.

Where a range of numbers are given, the lower figure often denotes a technologically newer and more efficient model. The letters "NA" denote appliances which would normally be powered by non-electric sources in a PV powered home.

We strongly suggest that you invest in a true RMS digital multimeter if you are considering making your own power. Also helpful are clamp-on type ammeters. It actually makes sense to know where your power is being used, even if you are not producing it, and if you are, these meters are essential diagnostic tools.

appliance	watts	appliance	watts	appliance	watts
Coffee Pot	200	Garage door opener	350	Compact fluorescent	
Coffee Maker	800	Ceiling fan	10-50	Incandescent equivalents	
Toaster	800-1500	Table fan	10-25	40 watt equivalent	11
Popcorn Popper	250	Electric blanket	200	60 watt equivalent	16
Blender	300	Blow dryer	1000	75 watt equivalent	20
Microwave	600-1500	Shaver	15	100 watt equivalent	30
Waffle Iron	1200	Waterpik	100		
Hot Plate	1200	Well Pump (1/3-1 HP)	480-1200	Electric mower	1500
Frying Pan	1200			Hedge trimmer	450
		Computer		Weed eater	500
Dishwasher	1200-1500	Laptop	20-50	1/4″ drill	250
Sink waste disposal	450	PC	80-150	1/2″ drill	750
		Printer	100	1″ drill	1000
Washing machine		Typewriter	80-200	9″ disc sander	1200
Automatic	500	Television		3″ belt sander	1000
Manual	300	25″ color	150	12″ chain saw	1100
Vacuum cleaner		19″ color	70	14″ band saw	1100
Upright	200-700	12″ black and white	20	7-1/4″ circular saw	900
Hand	100	VCR	40	8-1/4″ circular saw	1400
Sewing machine	100	CD player	35		
Iron	1000	Stereo	10-30	Refrigerator/Freezer	
		Clock radio	1	20 cu. ft. (AC)	1411 watt-
Clothes dryer		AM/FM auto cassette player	8	16 cu. ft. (AC)	hours/day*
Electric NA	4000	Satellite dish	30		1200 watt-
Gas heated	300-400	CB radio	5		hours/day*
		Electric clock	3	Freezer	
Heater				15 cu. ft. (Upright)	1240 watt-
Engine block NA	150-1000	Radiotelephone		15 cu. ft. (Chest)	hours/day*
Portable NA	1500	Receive	5		1080 watt-
Waterbed NA	400	Transmit	40-150		hours/day*
Stock tank NA	100				
Furnace blower	300-1000	Lights:			
Air conditioner NA		100 watt incandescent	100		
Room	1000	25 watt compact fluor.	28		
Central	2000-5000	50 watt DC incandescent	50		
		40 watt DC halogen	40		
		20 watt DC compact fluor.	22		

Note: TV's, VCR's and other devices left plugged in, but not turned on, still draw power.

* The daily energy values listed here are for the most efficient units in their class and the information was obtained from *Consumer Guide to Home Energy Savings* by Alex Wilson and John Morrill.

Load Evaluation Form

Please copy if more than one sheet is required.

If your home is connected to the utility grid, your energy usage has already been calculated for you in kilowatt-hours per month on your electric bill. If you are building a new home and would like to size a renewable energy system to power it, fill out the following form as completely as you can. Just break down your electrical appliances by room (kitchen, living room, bathroom, etc.), check if they are AC or DC, list how many you have, their wattage and then estimate how many hours per day and days per week you use each particular appliance. If you can do that for each and every electrical appliance in your home, then your Kyocera Dealer can calculate your daily corrected watt-hours and design your system.

Name:

Appliance	AC	DC	Qty.		Wattage		Hrs. Per Day		Days Per Week	÷		Avg. Watt Hrs. / day
				X		X		X		/7	=	
				X		X		X		/7	=	
				X		X		X		/7	=	
				X		X		X		/7	=	
				X		X		X		/7	=	
				X		X		X		/7	=	
				X		X		X		/7	=	
				X		X		X		/7	=	
				X		X		X		/7	=	
				X		X		X		/7	=	
				X		X		X		/7	=	
				X		X		X		/7	=	
				X		X		X		/7	=	
				X		X		X		/7	=	
				X		X		X		/7	=	
				X		X		X		/7	=	
				X		X		X		/7	=	
				X		X		X		/7	=	
				X		X		X		/7	=	
				X		X		X		/7	=	
				X		X		X		/7	=	
				X		X		X		/7	=	
				X		X		X		/7	=	

Highest AC loads in watts:	Total AC connected wattage at one time:	Total watt-hr per day:

Total watt-hr per day:		Load correction factor*		Corrected watt-hr per day:
	X	1.25	=	

*The load correction factor is required as batteries are not 100% efficient and other losses occur in a system. We increase the load value by 25% to compensate for these losses.

Solar Array Sizing

Worksheet

Use the worksheet on the right 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 6 and list the nearest figures.

2. Take the daily corrected total loads in watt hours from your load evaluation 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. (rated amperage x battery voltage during charging). Example: Using KC130TM's, one module produces 7.1 amps. 13 volts is a common charging voltage for 12 volt systems. Actual power = amperage x charging voltage.

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
Step	yearly average	yearly average
1	5.0 sun hours per day	
2	1000 watt-hours per day	
3	200 watts	
4	(7.1x13) =92.3	
5	2.17	

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).

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		

3. Multiply line 2 by line 1.

4. Determine planned depth of discharge. 80% is the maximum for lead acid deep cycle batteries, 50% is a common amount for optimum longevity. Divide line 3 by .80 or .50, respectively.

5. Derate your battery for low temperatures by multiplying the answer in line 4 by the factors in the table below using the lowest expected weekly average temperature.

6. Find the watt hour capacity of your selected battery. This is voltage times ampere hour capacity. Example; Surrette S-460 deep cycle, 6 volts x 350 amp-hours = 2100 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.

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 12.

Step	Example	Actual Figures
1	1000 watt-hour	
2	7 storage days	
3	7000 watt-hours	
4	7000 /0.50 = 14,000	
5	14,000 x 1.11 = 15,540	
6	2100 watt-hours	
7	7.4	
8	**8**	

Rule of Thumb: Most battery manufacturers recommend no more than 4 parallel strings in a battery bank.