

INTENDED APPLIANCES FOR SMALLER SYSTEM

AC				
Appliance	Number of units	Power (W)	Total Hrs/day	Whrs/day
70watt laptop day	3	70	10	2100
Inside lights day	3	15	10	450
Standing fan day	1	40	10	400
Inside lights night	5	15	5	375
Outside lights night	2	15	12	360
70watt laptop night	1	70	5	350
Standing fan night	1	40	14	560
Total		2950 Wh AC	Day Total	4638.3648 Wh DC
		1645 Wh AC	Night Total	2586.478 Wh DC
		4595 Wh AC	Overall Total	7224.8428 Wh DC

System derate value (according to manufacturer)

0.85

PV panel wattage 200 watts DC 0.2 kw

Battery capacity 24 V 100 AH

From 2 batteries connected in series

Power stored in battery 2400 Wh DC

Safe use 50% 1200 Wh DC

Time to fully charge battery 2.2 Days approx (if system not in use)

a) Amt generated by the panels for immediate use 682.300 W AC (approx) 1072.80 W DC

Calculated from PV Watts site by finding the specific date and adding all the power per hr over a 24 hr period this time

b) Amt available from battery once fully charged 1200 Wh DC 763.20 Wh AC

The safe amount

c) Total amt available per 24hr period 2272.80 Wh DC 1,445.50 Wh AC

Battery and panels

d) Deficit (the shortfall) - how much we need and are not getting -4952.04 Wh DC system trip -3149.5 Wh AC

CURRENT SYSTEM SETUP WOULD NOT ALLOW SUPPLY TO MEET DEMAND

FIRST ALTERNATIVE SYSTEM DESIGN (If we reduced consumption and then bought 6 more batteries of same rating)

Appliance	Number of units	Power (W AC)		Total Hrs/day	Whrs/day
70watt laptop day	2	70	8	1120	9a-5p
Inside lights day	1	15	8	120	9a-5p
Standing fan day	1	40	8	320	9a-5p
Inside lights night	1	15	5	75	6p-11p
Outside lights night	2	15	12	360	6p-6a
70watt laptop night	1	70	2	140	6p-8p
Standing fan night	1	40	8	320	10p-6a
Total		1560 Wh AC	Day Total	2452.8302 Wh DC	
		895 Wh AC	Night Total	1407.2327 Wh DC	
		2455 Wh AC	Overall Total	3860.0629 Wh DC	

PV panel wattage 200 watts 0.2 kw

Battery capacity 12 V 1200 AH

From 10 batteries connected in parallel

Power stored in battery 14400 Wh DC

Safe use 50% 7200 Wh DC

Time to fully charge battery 13.4 Days approx (if system not in use)

a) Amt generated by the panels for immediate use (every 24 hrs) 682.300 W AC (approx) 1072.80 W DC

b) Amt available from battery once fully charged 7200 Wh DC 4,579.20 Wh AC

c) Total amt available per 24hr period 8272.80 Wh DC 5,261.50 Wh AC

d) Amt used from battery by end of the day 1380.03 Wh DC 877.70 Wh AC

e) Number of days to deplete battery if system used non stop 2.6 Approx no. of days to safely use battery power 5.2 Approx no. of days to completely use battery power

CURRENT SYSTEM DESIGN WILL RELY HEAVILY ON BATTERY POWER DURING THE WEEK, AND THERE WILL NOT BE SUFFICIENT TIME TO RECHARGE BATTERIES DURING THE WEEKEND

Approximate cost of 10 batteries (each 12V, 100 AH), which would be needed if we wanted to increase that side of the system to match demand \$2,000

SECOND ALTERNATIVE SYSTEM DESIGN AND USE (If we reduced consumption and then ordered double the current panel size)

Appliance	Number of units	Power (W AC)	Total Hrs/day	Whrs/day	
70watt laptop day	2	70	8	1120	9a-5p
Inside lights day	1	15	8	120	9a-5p
Standing fan day	1	40	8	320	9a-5p
Inside lights night	1	15	5	75	6p-11p
Outside lights night	2	15	12	360	6p-6a
70watt laptop night	1	70	2	140	6p-8p
Standing fan night	1	40	8	320	10p-6a
Total		1560 Wh AC 895 Wh AC 2455 Wh AC	Day Total Night Total Overall Total	2452.8302 Wh DC 1407.2327 Wh DC 3860.0629 Wh DC	

PV panel wattage	600 watts	0.6 kw	
Battery capacity	24 V	100 AH	From 2 batteries connected in series
Power stored in battery	2400 Wh DC		
Safe use 50%	1200 Wh DC		
Time to fully charge battery	0.7 Days approx (if system not in use)		
a) Amt generated by the panels for immediate use (every 24 hrs)	2046.900 W AC (approx)	3218.40 W DC	
b) Amt available from battery once fully charged	1200 Wh DC	763.20 Wh AC	
c) Total amt available per 24hr period	4418.40 Wh DC	2,810.10 Wh AC	

Approximate cost of an additional 400 W of panels, which would be needed to match daytime demand Less than \$1000

CURRENT SYSTEM DESIGN WOULD BE CHEAPER THAN ADDING BATTERIES, AND MORE EFFECTIVE SINCE MORE POWER IS USED DURING THE DAYTIME

ADDITIONAL TIPS TO IMPROVE ENERGY EFFICIENCY

1. Switch all light bulbs to LED, which consume a fraction of the power required by CFL's
2. Unplug all computers that are not in use, even just charging the battery consumes a lot of power
3. Use fan as infrequently as possible, try opening windows and doors to allow air to naturally ventilate the space (netted screen doors would help with mosquitoes)
4. Try to work within one room as much as possible, so fewer lights are required
5. Leave on as few outside lights as possible at night
6. Be aware of anything else you might plug into the sockets, our system has only been designed with the above use in mind