

Sizing of a SPV System

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SPV System

- Solar PV system consists of Solar PV module, Solar Charge Controller/Inverter, Solar Battery and Electrical appliances.
- Solar PV module is rated in Watt
- Solar CCR : in Volt Ampere
- Solar Inverter : in kW
- Solar Battery : in Volt Ampere Hour
- Electrical Cable : in mm
- Load : in Watt


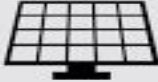



Design and Calculation

- It can calculate either from Solar PV panel to the Load or vice versa.

5 SIMPLE STEPS FOR

SOLAR SIZING

Get to know how to size the different components that make up the Solar PV system

- **1 SOLAR LOAD SIZING**
Calculate the load of the building.
(Total Watt hours per day)
- **2 SOLAR PV ARRAY SIZING**
1) Calculate the power output needed by the Solar Panel unit - Total Watt hours / average daily peak sun hours
2) Calculate the number of Panels needed - Total Watt hours/ rated power output.
- **3 SOLAR INVERTER SIZING**
The Inverter sizing is done by checking that the Inverter Watt rating is same as Solar PV sytem rating
- **4 CHARGE CONTROLLER SIZING**
Hand signals tell motorists and pedestrians what you intend to do. Signal as a matter of law, of courtesy, and of self-protection.
- **5 BATTERY SIZING**
Choose a battery with a capacity equal to or more than that of the Solar panels.

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- Sizing: Load to the Solar PV panel size
- Calculate the 12 V SPV System if one 10 Watts LED light will glow upto 10 hours per Day.
- First step is to calculate power consumption (Load calculation)
- Energy required: $P \times t = 10 \text{ W} \times 10 \text{ hours} = 100 \text{ Wh/day}$
- If it is two numbers of LED lights, then $2 \times 10 \times 10 = 200 \text{ Wh/day}$

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Load	Watts	Hrs	W-Hr
LED Tubelight 1	20	6	120
LED Tubelight 2	20	6	120
LED Tubelight 3	20	9	180
Kitchen Light	10	6	60
Other Lights	20	3	60
Fan 1	70	10	700
Fan 2	70	10	700
Fan Hall	70	12	840
TV	120	8	960
Laptop	70	8	560
Total	490		4300

Sizing of Battery

- Charging of battery: Example: Take 10 AH battery. If the applied Current is 1.25 Amperes, then it would be $10\text{Ah}/1.25\text{A} = 8$ hrs approximately. It is an usual calculation. Discharging: Example: Battery AH X Battery Volt / Applied load.
- Standard battery voltage is 12 Volt
- So, battery ampere hour ?
- For 10 hr/day will be $10\text{hr} \times 10\text{ W} = 100\text{ Wh}$ load,
- Ampere hour of a battery = $100\text{ Wh}/12\text{ V} = 8.33\text{ Ah}$ approximately 9 Ah
- We can choose 12 V, 10 Ah Solar Lead Acid C10 battery for the system.

Sizing of Panel

- To charge a 12 V battery at least 14/15 V voltage required for healthy charge.
- In India, the average Sun hour = 7-9 hour/day
- To charge a Solar battery, current is required
- Solar PV panel Ampere (I) = Battery Capacity/Sun hour
= 10 Ah/8 h = 1.25 A
- So, Solar PV panel will be chosen with minimum current rating will be 1.25 A.
- Therefore, 15W/ 20 W panel is more suitable for the above system design.

Sizing of CCR/Inverter

- Solar Charge Controller:
- Charge controller current rating should be more than ISC value of the Panel. (As $I_{sc} = 1.29$ A of the Panel)
- So it will be- 12 V, 3A/5A PWM type
- Inverter size should be more than power consumption capacity. It will be 100 Watt smart inverter.

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- Electrical cable size would be 1-1.5 mm.

Sl. No.	Equipment Name	Specifications	Quantity
1	Solar Module	20 W, 12 V, 1.29 A	1
2	Charge Controller	12 V, 3 A	1
3	Solar Battery	C10, 12 V, 10 Ah	1
4	LED light	10 W	1
5	Electrical Appliances		