163 Sonego Lane
Greenlands
Stanthorpe
Qld 4380
t 07 4683 3241
m 0428 329 190
thesolarworkshop@halenet.com.au
ABN 91 937 819 573

Solar Power System Design

Thank you for your enquiry. In order for us to design an appropriate power system for you, we need you to fill out the attached forms, in as much detail as you can. The results of this service and any subsequent solar power system installed depend upon the accuracy of the information you provide.

What This Service Provides

This assessment takes into account any inefficiencies in the battery storage systems, losses in transmission cables and inverter inefficiencies as well as local climatic and insolation data.

The results of this assessment will allow for seasonal variations in usage and power consumption. We will recommend:

- ***Battery Storage***. The battery voltage (eg 12V, 24V, 48V etc) and the battery capacity you should use. This capacity would normally assume 4 or 5 days storage to a maximum of 70% depth of discharge.
- ***Solar Panels/Wind Turbine***. The type, size and number of solar panels that would be cost effective and whether they would meet all your requirements, or whether a wind turbine may make a useful contribution (this is very site specific and may not be applicable to your situation)
- ***Backup Generator***. The recommended power backup, which may be a petrol/diesel generator and would incorporate a 240 volt power supply and separate battery charger.

Required Information

System Location

It is important for us to know the location of the proposed stand-alone power system for several reasons.

- The latitude will enable us to calculate the variation of daylight hours, which we use to vary the lighting loads for each month of the year.
- Insolation is the amount of sunshine that reaches your solar panels. We need your location to extract accurate insolation figures to apply to your system design.
- The maximum and minimum temperatures for your location throughout the year will affect the power consumption of refrigerators and performance of solar panels.

Lighting

- The system design will account for the fact that lights will be used more in winter than summer, so you need to provide a daily average figure not a minimum or maximum.

Refrigeration

- Please state fridge/freezer make and model (if known) and size in litres. See notes below.

Pumping

- Water usage tends to be the opposite of lighting. More water is needed in hot weather and consequently pumping demands are higher. Again please use an average figure.

Other Appliances

- Unless specifically noted it will be presumed that all other appliances will not have seasonal variations in their usage. Please provide daily average figures.

How To Complete This Form

The tables on this form are hopefully self explanatory, but here is a quick guide for the technically challenged. The first column simply ask for the number of lights in a room or the number of appliances of a particular type you wish to use.

The next column "voltage" asks whether the particular device uses either 12/24 volt DC power (direct from a battery bank) or 240v AC (normal grid power, but supplied through an inverter). With improvements in technology and wider acceptance of Renewable Energy systems, there are fewer DC appliances available. DC devices are usually more efficient, and often more robust, but generally only available for smaller systems (ie those that have a battery voltage of 12 volts).

Lighting is available in both AC and DC and each type has its own advantages. AC lights are cheap and widely available, however they require an inverter to be always running and should the inverter break then you could be left in the dark. For smaller systems we recommend DC. More expensive initially, and less widely available, DC lights are much more efficient. If in doubt as to the voltage of your particular device please give as much detail as you can.

The hours per day column is where you can give an estimate of how many hours you use each device. How many hours do you watch TV, how long is the light in the kitchen on, do we really need to leave that outside light on all night? How long does the washing take. This is the time to really think about your usage habits.

The wattage column needs the power consumption of each appliance or light. A 60 watt light globe uses, funnily enough, 60 watts. Every appliance has a plate attached that indicates its power consumption, usually on the bottom or back. This plate will usually have a voltage figure, and either a number of amps or the wattage. Since the volts multiplied by the amps equals the watts, either of these figures is enough information.

The watt hours column is simply the wattage of the device multiplied by the number of items and the number of hours per day. It is not necessary for you to do the sums unless you really like sums, this column is calculated automatically by our design software.

Efficiency

Whilst its true that you can do anything with renewable energy technology, the limiting factor is usually cost. When generating your own power any and all efficiency gains will be rewarded by lower establishment costs and greater ongoing savings. There are credible alternatives to many of societies modcons that could save you many thousands of dollars over the life of your system.

- ***Lighting.*** Direct DC lighting using compact fluorescent bulbs are many times more efficient than normal incandescents.

- ***Cooking and Heating***. Any appliance which uses electricity to make heat is inherently inefficient. We recommend that you consider using wood or gas for all your cooking and heating needs.
- ***Hot Water***. If every house in Australia had a solar hot water system on its roof we would drastically cut down on our electricity needs and our greenhouse gas emissions. Solar Hot water is distinctly different to solar power. Boosting of solar hot water can be by instantaneous gas heater or from a wood stove. Please contact us for a quote to supply Solar Hot water for your property.
- ***Refrigeration***. Our experience suggests that in a domestic situation the fridge usually accounts for about half of the daily loads, so it pays to use the most efficient model you can and put some thought into its placement in the house.
  Power consumption for refrigeration is proportional to ambient temperature so it pays to find the coolest location to place the fridge.
  Direct DC fridge/freezers are much more efficient than standard AC (mains) fridges. To run a normal fridge requires a large inverter to cope with the high start up loads. Direct DC fridges use a standard fridge cabinet and replace the 240volt compressor with an efficient DC motor and compressor. Whilst costing more initially, savings are made in needing fewer solar panels and less battery storage.
  Gas fridges are another option, cheaper initially and so lowering the establishment costs, however the ongoing (and increasing) cost of gas must be considered.

Alternative Energy Sources

Every site and situation is unique and whilst this document has concentrated on photovoltaic inputs, you may have other sources of renewable energy on your block. You may have a permanent creek from which you could run a micro hydro, or you may have long periods of constant wind. You may even have a plentiful supply of firewood and wish to consider a steam engine (a personal dream of mine). In many instances a hybrid system is the way to go, with a mix of energy sources.

Contacts.

Please contact Jonathan Rihan at The Solar Workshop if you have any queries or wish to discuss other options.

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Solar Power System Sizing Form

Name: ……..

Address: ……..

……..

Postcode ……Phone: …….. Mobile:…….

Location of Proposed Power System:……..

Lighting Loads

Location/Comments	Number	Voltage	Hours per day	Wattage	Watt-hours/day
Kitchen					
Dining Room					
Living Room					
Bedroom 1					
Bedroom 2					
Bedroom 3					
Bedroom 4					
Bathroom					
Hallway					
Laundry					
Outside lights					
Garage					
Shed					
Others please specify					

Load Assessment Worksheet

Appliance	Quantity	Voltage	Watts	Hours	Watt hrs/day
Television					
Video player					
Radio					
Stereo					
Computer					
Printer					
Washing Machine					
Vacuum cleaner					
Fridge					
Freezer					
Sewing machine					
Iron					
Food mixer					
Microwave					
Power tools					
Domestic pump					
Transfer pump					
Others please specify					

Please add any notes or comments below: