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CHOOSING THE RIGHT SOLAR ELECTRIC SYSTEM FOR YOU

Introduction

Solar systems save money on electricity bills used from grid electricity and allows mankind to be good environmental stewards. Energy efficiency measures achieve the same things too. To find out more about how to save energy, you may visit https://www.energymadeeasy.gov.au/energy-efficiency/saving-energy.

Assumed knowledge:

- Solar panels do not generate electricity when there is no sunlight (e.g. at night or when covered with an object that blocks out all light) and produce less when shaded, e.g. with clouds, trees, nearby buildings and objects, dust and bird droppings.
- There are no storage components involved in a grid-connected system, so no energy is stored. Therefore, electricity generated is either used or will be sent back to the grid. You may want to consider getting a hybrid system.
- A feed-in-tariff/electricity payback is the credits/money that the government or your electricity utility offers to you for the excess energy that is sent back to the grid. This is calculated in $/kWh.
- This guide is designed for net meters, not gross meters. With net meters you pay for or are paid for the net amount of electricity that you consume or generate, respectively. The net amount of electricity is the difference between the electricity generated from your solar system and the electricity you consume. If this net amount is negative, you are using electricity from the grid and so you pay the retail cost of electricity (in $/kWh), multiplied by the amount (in kWh). If the net amount is positive, for a new system installed you may be paid the electricity buyback rate from your retailer, if they have one. For more information about net and gross meters see http://www.energy.nsw.gov.au/sustainable/renewable/solar/solar-scheme/questions.

A hybrid system is a grid connected system that also has storage with a battery and a regulator to control the battery, like a standalone solar system. More information about a standalone solar system can be found in the PDF document “CSE Guide - standalone photovoltaic (PV) system”. The advantage of a hybrid system is that the energy stored can be used to power your household even when the sun isn’t shining and your system isn’t generating electricity. In order to do this, a hybrid system needs to be bigger than a grid connected system. You can then enjoy more savings from electricity bills and be an even better environmental steward. Because a hybrid system needs to be bigger than a grid connected system, the upfront cost is also larger. To find out about the costs for a hybrid system, you can look at the PDF “Hybrid Price List”, which we should have attached in the first email we sent to you along with this document. If you

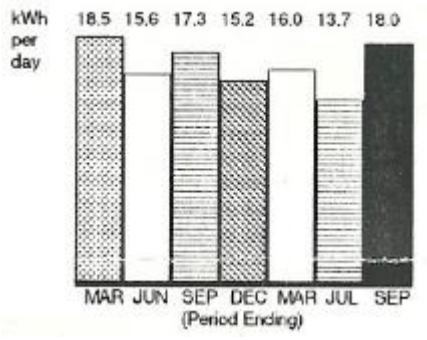
are not able to afford the upfront cost, you may want to get a finance plan, which will also allow you to start making savings on electricity bills.

To find out which system you need, simply complete these two steps.

1. Measure the amount of energy you use during the day (from sunrise to sunset). Preferably measure on a day when energy usage is high. [1]
2. Compare and match the energy you used against the average amount of energy each different system size generates.

Estimation method:

Check the **column graph in your bill** where it shows the average daily energy load for each month (e.g. 18 kWh/day).



If you use electricity to operate pumps for a swimming pool, air conditioning or a large amount of lights during the day, as a rule of thumb[2] take half of your average daily energy load and match that to the right solar electric system.

E.g. $\frac{18\ \text{kWh}}{\text{day}}\ X\frac{1}{2} = 9\ \text{kWh}$

Which means you will need a system that generates 9 kWh/day. In this case, a 2.5 kW system is recommended. (You can locate the generation data for different systems in the price list).

Otherwise if you don't use any large capacity electrical appliances during the day then you may take only one third of your average daily energy load.

E.g. $\frac{18\text{kWh}}{\text{day}}\ X\frac{1}{3} = 6\ \text{kWh}$

6 kWh matches with a 1.5 kW system.

[1] The advantage of sizing a system that meets when you have high energy usage during the day is that you will save more on electricity bills.

[2] This is a very rough estimate, taken based on experience with existing customers. Normally a third of a customer's energy usage comes from daily use, such as fridges, TVs, computers, laptops, washing machines, appliances used on weekends etc. It increases to a half if we assume that pool pumps, air conditioning and a large amount of lighting are used during the day.

Detailed Method:

While the following method takes more time to do than the above method, it lets you have a better understanding of how you use electricity during the day and how you can match the right size solar system for your needs.

Find your meter (usually located outdoor in a metal box attached to the walls, an example is shown in Figure 1) and record all the numbers during sunrise. (You can find sunrise times online, e.g. Google "sunrise time").

Figure 1: Meter box

Figure 2: Meters

Note: For a typical household, there are 1 or 2 meters. There are some houses with 3 meters. Relax and simply record all the numbers like this (it is very, very likely that your numbers will be different!):

Table 1: Meter records at sunrise

	Meter 1	Meter 2	Meter 3
Sunrise	001943 kWh	002769 kWh	091444 kWh

Put these numbers aside and record again during sunset. Calculate the differences and then add them all up and you will get the amount of energy you used during the day. Use this number and match it to the system size.

Table 2: Energy used per day found from meter recordings at sunrise and sunset

	Meter 1	Meter 2	Meter 3	
Sunrise	001946 kWh	002769 kWh	091444 kWh	
Sunset	001948 kWh	002772 kWh	091448 kWh	
Difference	2 kWh	3 kWh	4 kWh	Total: 9 kWh

See Table 3 for a detailed case scenario for an average household with a 3 kW system installed. Please note that the installed solar meter updates every 30 minutes.

Table 3 Energy usage for a 3 kW system

Time	Electrical appliance								
	Washing Machine	Computer	Fridge	TV	Aircon./ Heater	Solar Generation	Total used	Total unused	From grid
0500 – 0530					500 Wh	0 Wh	500 Wh		**-500 Wh**
0530 – 0600					500 Wh	0 Wh	500 Wh		**-500 Wh**
0600 – 0630			26 Wh		500 Wh	**632.83 Wh**	526 Wh	**107 Wh**	
0630 – 0700			26 Wh		500 Wh	**632.83 Wh**	526 Wh	**107 Wh**	
0700 – 0730			26 Wh		500 Wh	**743.42 Wh**	526 Wh	**217 Wh**	
0730 – 0800	626 Wh		26 Wh			**743.42 Wh**	652 Wh	**92 Wh**	
0800 – 0830	626 Wh		26 Wh	100 Wh		**1046.02 Wh**	752 Wh	**294 Wh**	
0830 – 0900	626 Wh		26 Wh	100 Wh		**1046.02 Wh**	752 Wh	**294 Wh**	
0900 – 0930		150 Wh	26 Wh	100 Wh		**1124.35 Wh**	276 Wh	**848 Wh**	
0930 – 1000		150 Wh	26 Wh	100 Wh		**1124.35 Wh**	276 Wh	**848 Wh**	
1000 – 1030		150 Wh	26 Wh	100 Wh		**1327.10 Wh**	276 Wh	**1051 Wh**	
1030 – 1100		150 Wh	26 Wh			**1327.10 Wh**	176 Wh	**1151 Wh**	
1100 – 1130		150 Wh	26 Wh			**1187.33 Wh**	176 Wh	**1011 Wh**	
1130 – 1200	626 Wh	150 Wh	26 Wh	100 Wh	500 Wh	**1187.33 Wh**	1402 Wh		**-215 Wh**
1200 – 1230	626 Wh	150 Wh	26 Wh	100 Wh	500 Wh	**1150.46 Wh**	1402 Wh		**-252 Wh**
1230 – 1300	626 Wh	150 Wh	26 Wh	100 Wh		**1150.46 Wh**	902 Wh	**248 Wh**	
1300 – 1330		150 Wh	26 Wh			**1033.73 Wh**	176 Wh	**858 Wh**	
1330 – 1400		150 Wh	26 Wh			**1033.73 Wh**	176 Wh	**858 Wh**	
1400 – 1430		150 Wh	26 Wh	100 Wh		**875.52 Wh**	276 Wh	**600 Wh**	
1430 – 1500		150 Wh	26 Wh	100 Wh		**875.52 Wh**	276 Wh	**600 Wh**	
1500 – 1530		150 Wh	26 Wh	100 Wh		**419.33 Wh**	276 Wh	**143 Wh**	
1530 – 1600		150 Wh	26 Wh	100 Wh		**419.33 Wh**	276 Wh	**143 Wh**	
1600 – 1630		150 Wh	26 Wh	100 Wh		**319.49 Wh**	276 Wh	**43 Wh**	
1630 – 1700		150 Wh	26 Wh	100 Wh		**319.49 Wh**	276 Wh	**143 Wh**	
1700 – 1730		150 Wh		100 Wh		0 Wh	250 Wh		**-250 Wh**
1730 – 1800		150 Wh		100 Wh		0 Wh	250 Wh		**-250 Wh**
					Total	19.72 kWh[3]	12.1 kWh	9.7 kWh	-1.97 kWh

[3] 1 kWh = 1000 Wh