

S03: Solar Design**Handout – Basic selection of a system****Selection of a system based on constraints and customer requirements**

“For optimum economic benefit (pay back period)”	“Limited by retailer”	“Carbon Neutral”
<p>Size system to the buildings demand and time of use.</p> <p>(Big savings when not having to buy power (2018/2019 figures):</p> <ul style="list-style-type: none"> • Domestic ACT: • 25.036c/kW.h (22.76 ex GST) • Commercial ACT: • 30.558c/kW.h (27.78 ex GST) • Domestic NSW (capital region): • 31.317c/kW.h (28.47 ex GST) <p>(Medium pay back when putting in a bigger system to get a 11c/kW.h return)</p> <p>Western and to a lesser extent Eastern facing roofs are suitable.</p> <p>Note: Consider energy efficiency improvements that may also have an excellent pay back period including: (roughly in order)</p> <ul style="list-style-type: none"> • Draft proofing • Ceiling insulation • LEDs • Replace old fridge/freezer • Reverse Cycle Air conditioning • Heat Pump Hot water • Timers and sensors (equipment best to run around 12pm) • Electric/hybrid vehicle • Wall/floor insulation • Induction cook-top (and turn off the gas connection) 	<p>ACT - ActewAGL and Origin Energy will not offer a 11c/kW.h feed in tariff if the install capacity (DC Power of the solar panels) is greater than 10kW. Existing systems are excluded from the 10kW limit.</p>	<p>Power generated must equal power consumed, time of use could be ignored.</p> <p>Client may consider not claiming/selling STCs to ensure ‘additionality’ of the environmental initiative.</p>
	“Limited by distributor”	“A specific size system”
	<p>ACT - Evoenergy will not connect the installation if the export power (AC Power from the inverter) is greater than 5kW per phase .</p>	<p>Client may want the same size system as a friend or a specific package deal.</p>
	“On grid with some off grid”	“Cost”
	<p>In order to avoid retailer or distributor limitations. Portions of the installation can be off grid and connect to specific loads such as air-conditioners.</p>	<p>I only have \$... available</p>
	“To never pay an electricity bill again”	“Fill the roof”
	<p>Option 1:</p> <ul style="list-style-type: none"> • Put in a bigger system and use the grid as a battery <p>Issues:</p> <ul style="list-style-type: none"> • Sell for 11c/kW.h and buy for 25.036c/kW.h (uses the grid as a 'battery' for 14.036c/kW.h) • Maximum 5kW export per phase <p>Option 2:</p> <ul style="list-style-type: none"> • Put in batteries <p>Issues:</p> <ul style="list-style-type: none"> • Around the same price as option 1 with the ACT Government rebate – however battery prices will rapidly come down. <p>Note: This is achievable and best coupled with energy efficiency measures.</p>	<p>Client may want to use all available roof space for power generation.</p>
		“Keep old system going”
		<p>Replace/upgrade inverter on 40-50c/kW.h feed in tariff premises. Cannot install additional panels.</p>
		“Upgrade System”
<p>A bigger system is desired.</p>		
“To be off-grid”		
<p>This is possible in suburban Canberra however the pay back period is low. On grid with batteries is a cheaper option to fix seasonal demand issues. If no grid is available, more than likely this is the cheapest option available. Also NSW electricity prices are higher than Canberra making the pay back period more attractive.</p>		

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Tilt angles and orientation

Period		Feed in Tariff	Metering type	Considerations	System design	Orientation (Geographic)	Tilt angle
Past	March 2009 to June 2013	40-50c/kW.h for 20 years	Gross	To maximize annual exports (Feed in tariff was considerably higher than purchase price)	To maximize average annual yield	North	Equal to latitude
Present	July 2013 to present	11c/kW.h (was 7.5c until 2017)	Net	Size system to the buildings maximum demand and time of use (Fast pay back period when not having to purchase power at 25.036c/kW.h) (Slow pay back period when selling to grid for 11c/kW.h)	For maximum all day power (lower overall power)	Bi-facial panels: Some facing West some facing East	Equal to latitude
					For maximum evening power (lower overall power)	West to North West	Equal to latitude
					For maximum morning power (lower overall power)	East to North East	Equal to latitude
					For maximum power (mostly between 10 am and 2pm)	North	Equal to latitude
Future		11c/kW.h	Net Time of use metering	Decreasing price of batteries will make storage cheaper	To maximize average annual yield	North	Equal to latitude
				Generate any time of day and store for peak times Minimal power required to be purchased at peak times Can sell battery power to grid at peak times Can use and store power from electric vehicles	To maximise generation all year round (keep batteries charged in winter)	North	Equal to latitude +22.5 degrees for the middle of winter

Note:

Each year the retail price of electricity from fossil fuel sources rises (resource based economy) and the cost from renewable sources decreases (manufacturing based economy). Currently producing domestic and commercial power with solar is cheaper than buying it retail, this gap will continue to widen each year.

It won't be long until storing power with batteries is cheaper than selling to the grid and buying back later.