Solar PV

Solar panel is designed to absorb the sun's rays as a source of energy for generating electricity or heating. Solar Photovoltaic panels constitute the solar array of a photovoltaic system that generates and supplies solar electricity in commercial and residential applications.

Most of solar PV now is based on some variation of silicon. Different kind of solar PV is made by silicon with different purity. The panel that made by high purity silicon have high efficiency, which means the solar energy can be converted to more electricity, while the silicon purifying process is expensive. There are two common types of solar panel, monocrystalline and polycrystalline. Monocrystalline has colouring and uniform look, which indicate high purity. In contrast, polycrystalline PV is made by melted raw silicon, so both material purity and efficiency are lower than Monocrystalline. While due to manufacture flow of polycrystalline is easier relatively. So from a financial standpoint, polycrystalline would be a better choice for the new renewable system.

Table: Advantages and Disadvantages of Solar PV

Advantage	Disadvantage
• Easy to install and disassemble • Long use life (around 20 year) • Good extensibility	• Not for the region where short duration of sunshine • High requirement for weather

• No need to special service • High reliability • Economic, no energy consumes	• Low efficiency (theoretically maximum 25%, generally 10%-15% depends on solar PV material) • Large area occupied
Materials of solar PV	
Monocrystalline silicon IPCE is around 17%, This type of solar PV has the highest efficiency, but manufacture cost is higher than other types. Generally monocrystalline can work around 25 years. **Polycrystalline silicon** IPCE is around 15%. It is cheaper and simpler but less use life than mono one, which type of solar PV we choose depends on the budget. The lifetime is 25 years.	
Best storage for solar PV: Battery What kinds of the battery are appropriate for the solar PV? & How to match?	

Available: http://energyinformative.org/best-solar-panel-monocrystalline-polycrystalline-thin-film

Community solar project

Available: http://home.solarlog-web.net/105.html?c

Looked at some community solar project, and most of them are using polycrystalline. So I recommend we also use polycrystalline.

Solar Choice: Average solar PV system prices - October 2016						
	1.5kW	2kW	3kW	4kW	5kW	10kW
Adelaide, SA	$3,465	$4,014	$5,176	$5,861	$6,870	$13,477
Brisbane, QLD	$2,981	$3,583	$4,263	$5,191	$6,031	$13,320
Canberra, ACT	$4,382	$4,781	$5,981	$7,131	$8,181	$13,995
Darwin, NT	$6,527	$7,293	$8,670	$10,518	$12,485	$21,743
Hobart, TAS	$3,804	$4,410	$5,904	$7,185	$8,141	$15,413
Melbourne, VIC	$3,380	$3,994	$4,837	$5,628	$6,501	$13,636
Sydney, NSW	$3,078	$3,545	$4,732	$4,989	$6,046	$13,223
Perth, WA	$2,283	$2,784	$3,385	$4,202	$4,769	$14,155
All	$3,737	$4,300	$5,368	$6,338	$7,378	$14,870

Prices for each system size are colour-coded. (Dark red for highest, dark green for lowest, yellow for middle.)

Solar system prices for September: $/W medians, highs & lows

Solar Choice: Solar PV system price, $/Watt - October 2016							
		1.5kW	2kW	3kW	4kW	5kW	10kW
Adelaide, SA	Median	$2.26	$1.97	$1.69	$1.43	$1.35	$1.34
	High	$2.80	$2.30	$1.96	$1.71	$1.57	$2.15
	Low	$1.89	$1.77	$1.52	$1.16	$1.15	$1.02
Brisbane, QLD	Median	$1.90	$1.75	$1.41	$1.29	$1.19	$1.32
	High	$2.24	$2.35	$1.77	$1.50	$1.98	$2.15
	Low	$1.47	$1.25	$1.07	$1.08	$0.96	$0.90
Canberra, ACT	Median	$2.84	$2.33	$1.94	$1.73	$1.59	$1.38
	High	$3.58	$2.88	$2.28	$2.03	$1.86	$1.86
	Low	$2.10	$1.77	$1.60	$1.44	$1.32	$1.02
Darwin, NT	Median	$4.35	$3.65	$2.87	$2.63	$2.35	$2.23
	High	-	-	-	-	-	-
	Low	-	-	-	-	-	-
Hobart, TAS	Median	$2.50	$2.16	$1.93	$1.77	$1.61	$1.53
	High	$3.32	$2.84	$2.45	$2.32	$2.08	$2.15
	Low	$1.97	$1.63	$1.42	$1.38	$1.25	$1.20
Melbourne, VIC	Median	$2.15	$1.94	$1.56	$1.36	$1.26	$1.36
	High	$3.14	$2.56	$2.14	$1.76	$1.59	$2.15
	Low	$1.54	$1.34	$1.18	$1.03	$0.94	$1.00
Sydney, NSW	Median	$2.00	$1.73	$1.50	$1.23	$1.20	$1.31
	High	$2.97	$2.40	$1.86	$1.44	$1.63	$1.87
	Low	$1.40	$1.28	$1.19	$1.11	$0.97	$0.90
Perth, WA	Median	$1.52	$1.39	$1.13	$1.05	$0.95	$1.42
	High	-	-	-	-	-	-
	Low	-	-	-	-	-	-
All	**Median**	**$2.17**	**$1.90**	**$1.59**	**$1.41**	**$1.31**	$1.38
	High	**$3.58**	**$2.88**	**$2.45**	**$2.32**	**$2.08**	**$2.15**
	Low	**$1.40**	**$1.25**	**$1.07**	**$1.03**	**$0.94**	**$0.90**

Prices above are colour-coded across highs, lows & medians for all cities and system sizes. (Dark red for highest, dark green for lowest, yellow for middle.)

Available: http://www.solarchoice.net.au/blog/news/residential-solar-pv-system-prices-october-2016

The reasons we choose PV (alternatives)

Analysis

- Assumptions

  Type: Polycrystalline

  Efficiency: 14.13%

  (http://www.solarchoice.net.au/blog/monocrystalline-vs-polycrystalline-solar-panels-busting-myths/)

  Capital cost ($/kw): $1390/kw (solar system)

  Lifetime: 25 years

- Unknown:

  Orientation

  Number of modules

  Inverter

  Cash Flow Statement (NPV)

Analysis of Costs and Benefits

Solar energy is a widely used technology in the world which is stable. Solar energy is not only sustainable, it is renewable and this means that we will never run out of it. Solar energy is one of the clean energy which is beneficial to the environment. When the solar system is set, they do not need lots of maintenance. There is only a little maintenance required by the system each year to ensure they are in working order. The technology of the solar energy

is still developing. The efficiency of the solar panel will be improved gradually. Thus the solar energy may be used much more widely and will cost less in the future.

Risk

- Consider weather. Solar energy depends on the weather a lot. If the weather is not good enough, and there is not enough illumination, the electricity might not meet the requirement.

- Manual Operation Risk. One of the major risks of solar energy involves the handling of the equipment and the materials that are used for producing it. People who handle such equipment can get burned or electrocuted so they need to be very careful while doing so, in order to avoid some unfortunate and highly serious injuries.

- Toxic materials. The panels that are used for providing solar energy are known as photovoltaic (PV) panels and the materials that are used to create these panels are made of highly toxic materials. But people do not have to repair a lot which minimize the contact to the materials.

Available: http://www.buzzle.com/articles/solar-energy-risks.html