



SILICON CRYSTAL TEAM

MISSION: To find out the difference between polycrystalline silicon technology and monocrystalline silicon technology. Which is better?

PROBLEM: There is more to solar technology than just the material used. Different companies use different designs and technologies to make their solar panels. Comparison between different panel designs is not necessarily a direct comparison between the performance of polycrystalline and monocrystalline silicon.

SOLUTION: Some companies produce solar panels using different types of silicon, resulting in some cheap and some more costly products – but the rest of the technology is the same. The performance of these solar panels can be directly compared.

Key Terms:

Monocrystalline (“one crystal”) silicon is made by creating a single giant crystal of silicon then slicing off thin pieces to use in the solar panel. The silicon must be pure and cooled at exactly the right rate or else a single crystal will not form.

Polycrystalline (“many crystal”) silicon (sometimes called multicrystalline) is made by fusing many small silicon crystals together and slicing thin wafers off for use in the solar panel. At each of the joints between the crystals electric energy can be lost, but polycrystalline silicon is less costly to produce.

Which of the pictures below is of monocrystalline silicon and which is polycrystalline silicon?



Figure 1

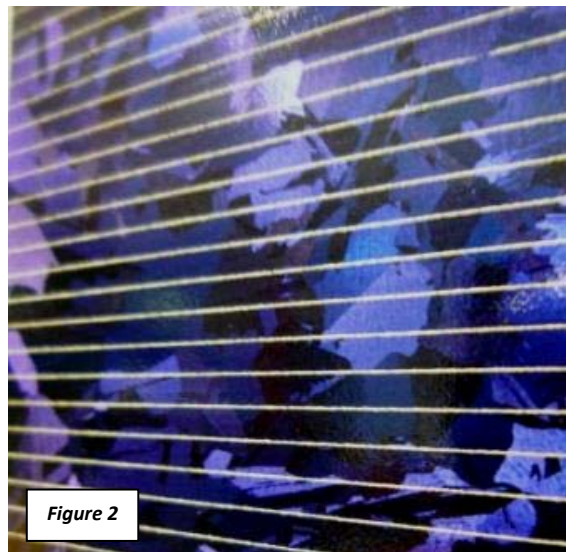


Figure 2

Figure 1

Figure 2



Based on your data for the **BP Solar** ground arrays, which is more efficient?

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Based on your data for the **Sungrid** arrays, which is more efficient?

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Can you tell which is more efficient based on this limited data? Explain your answer.

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Let's compare the two technologies from all the different companies. First we have to come up with a standard number for comparing them. One method is to look at the efficiency. Which does this suggest is more efficient – mono or polycrystalline silicon? What problems are associated with this comparison?

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Solar array efficiency and electricity generation estimates on these signs are often based on ideal conditions and laboratory tests – not the real world. That's why this large testing facility was built – to see what works best for Alice Springs and our typical climate and weather conditions. You can see real time data about how much power is *actually* being generated at any given time by going onto the Desert Knowledge Solar Centre website. These data are also available on the touch screens at the Interpretive Centre (check the map).



ACTIVITY – REAL TIME DATA:

Fill out the data sheet below from data gathered on the touchscreens (or website). Go to the interactive map and select the same systems you just looked at to fill out the chart below.

Array	Company	Type	Current Output (kW)	Powering # Houses	Normalized Output (kW/kW peak)
11	BP Solar (ground)	poly			
12	BP Solar (ground)	mono			
20	Sungrid	poly			
19	Sungrid	mono			
21	Evergreen	poly			
13	Trina	mono			
10	Sunpower	mono			

“Normalised Output” is a term that refers to the amount of power generated in relation to the size of the PV system. Using the normalised output means you can compare the efficiency of PV systems even if they are different sizes.

Are any of the solar arrays producing as much power as indicated by the signs? If not, what might be affecting them?

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Can you tell which type of material is more efficient based on this limited data? Explain your answer.

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