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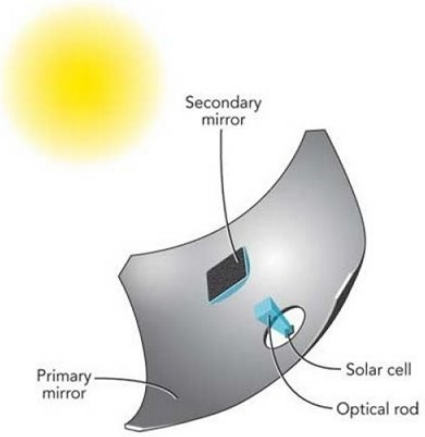
CONCENTRATED SOLAR PV

TASK: To investigate the efficiency of concentrated solar PV technology.

WHAT YOU WILL NEED: Access to a computer and the internet, a calculator, pen and paper.

What is Concentrated PV?

Concentrated PV (CPV) is a form of solar technology which uses parabolic lenses to concentrate and focus sunlight onto small photovoltaic cells. CPV uses less of the silicon material which is used to make the solar cells, and more materials such as aluminium, which is available in greater abundance and is less costly to manufacture.



Left – Two Solfocus concentrated solar PV arrays at the DKA solar centre. Right – how concentrated solar PV works (image from http://www.squidoo.com/concentrated-photovoltaic-cpv-solar-energy)

Go to the **Desert Knowledge Australia Solar Centre** webpage. Click on 'Live Systems information' and it should take you to the map. Click on the number 22 icon. This will show you output data from the Solfocus concentrated photovoltaic array – the same kind of panels that the Alice Springs airport uses.

Q.1. What is the current output of the system? …… kW

Q.2. How does the current output compare with the peak output from the system? What conditions might be affecting the current output of the system?

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Q.3. How many houses could the system currently power? ……

Q.4. Click on 'more information'… Read the details and note down the efficiency of the system in terms of converting sunlight into energy. ……%

Q.5. If one square metre of ground is exposed to sunlight at noon in Alice Springs it receives about 1000 watts of power from the sun. How many watts of power does 650 cm^2 receive? Show your calculations.

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Q.6. This is the amount of sunlight that is concentrated onto 1 cm^2 of photovoltaic cell. Multiply this figure by the number of mirror units in the solar array (Remember – there are two panels, each with 560 reflector units!).

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Q.7. The result you get is equal to the potential available power based on the amount of sunlight received by the array. However, the system is not 100% efficient so not all of this is converted into usable energy. Calculate the amount of power that is actually *converted into electricity* based on the efficiency of the system.

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Q.8. Multiply this figure by the hours of sunlight it will receive in one day – this is usually averaged out to around 7 hours. That will give you an amount of energy in kWh.

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Q.9. This is the energy produced by the solar array in one day. Based on your calculations in the previous task, how much energy does the average household consume in one day?

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Q.10. So how many houses can the concentrated solar array provide power for?

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