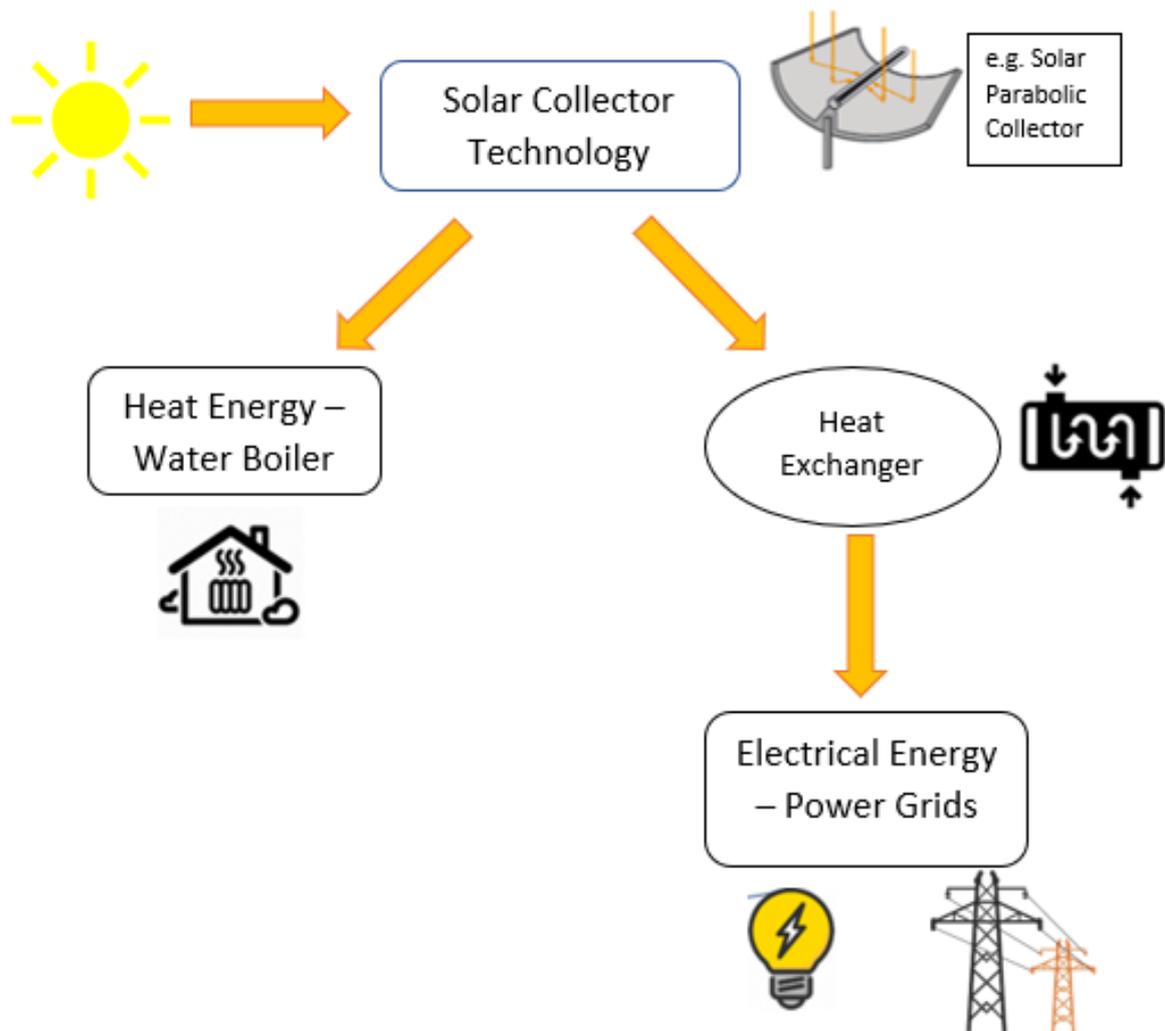




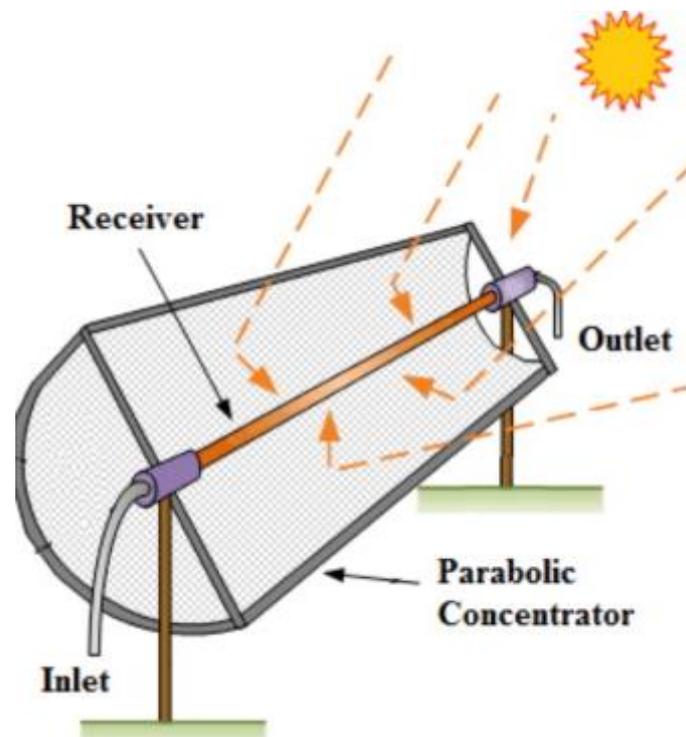
Solar Power and Technologies

In Mechanical Engineering, one of my favourite topics of investigation is Energy Conversion technologies, where one of the renewable technologies continuously being developed is Solar Technology.



Solar Power can be used to generate electricity and heat energy for fluids. Modern Solar Power technologies began to be developed in 1954 where solar-panel cells, precisely known as 'Photovoltaic (PV) Solar Cells', could be used to generate electricity in industrial plants. The idea is that heat energy is transferred from our Sun to the land and sea in the form of solar radiation, which can be collected using solar panels. These can convert heat energy into electrical energy and supply electricity to our homes and the electrical grids.

Solar Collectors are another set of technology which use heat exchangers to transfer the heat energy in two ways: 1) by directly heating the water which can be used in boilers at home and 2) by converting the heat into kinetic and then electrical energy to be used at homes, offices, schools and industrial plants as well.



Here is a Parabolic solar collector, one of the simplest forms of harnessing solar energy, where the reflective surface directs the solar radiation onto the pipe containing the fluid, e.g. water, to be heated.

Activity: Make your own Solar Collector at home to heat water!

We can use our engineering skills to make our own solar collector at home using the following items:

1. A cardboard tube (e.g. from kitchen rolls)
2. 30cm aquarium tubing or similar
3. Tin foil or Aluminium foil
4. Sticky Tack
5. Glue or double-sided tape
6. Black paint or black insulating tape
7. Modelling clay
8. 2x Plastic/Styrofoam cups
9. Thermometer
10. Desk Lamp

Instructions:

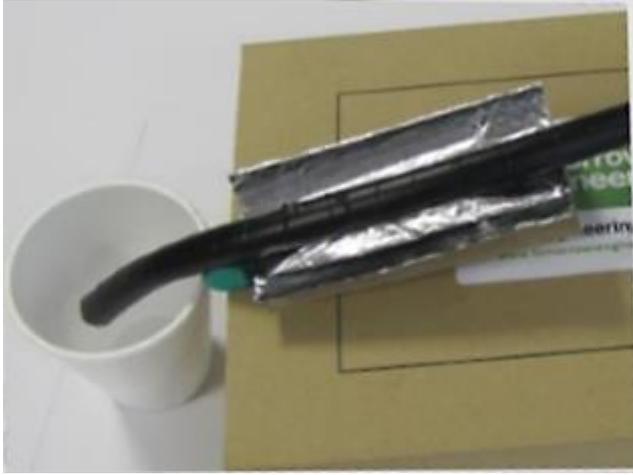
1. First, paint the aquarium tube black or cover with black insulating tape.
2. Then cut the cardboard in half to form two U-shaped halves.
3. Cover one of the halves of cardboard with tinfoil/aluminium foil using glue or double-sided tape.
4. Now stick the non-shiny (plain side without foil) part of this half-cardboard with the other half cardboard using glue or double-sided tape.
5. Then place and secure the aquarium tubing along the centre of the aluminium covered side of the cardboard (parabolic collector). You may decide to use glue to secure it.

6. Use a pencil to create one pencil-hole in both the plastic/Styrofoam cup. This should be 6mm up from the bottom.
7. Now insert the end of the aquarium tube in the pencil holes- one for each cup. Seal these with modelling clay if necessary.
8. One of the cups is now the collector and the other source cup, which will contain water at the start, should be placed at a higher level/height to the collector.
9. Place a desk lamp 3cm above the tinfoil/aluminium cardboard collector.
10. In a separate container measure and record the starting temperature of the water which you will add into the source cup. Then start the experiment by pouring water into the source cup (higher height) and allow it to transfer into the collector cup. Then repeat this and measure the temperature of the water every 30 seconds.

Experimental set-up Images:



Overview of Experimental Set-up



***Top view of Cardboard
Solar Collector***



Aquarium Tube Sealing