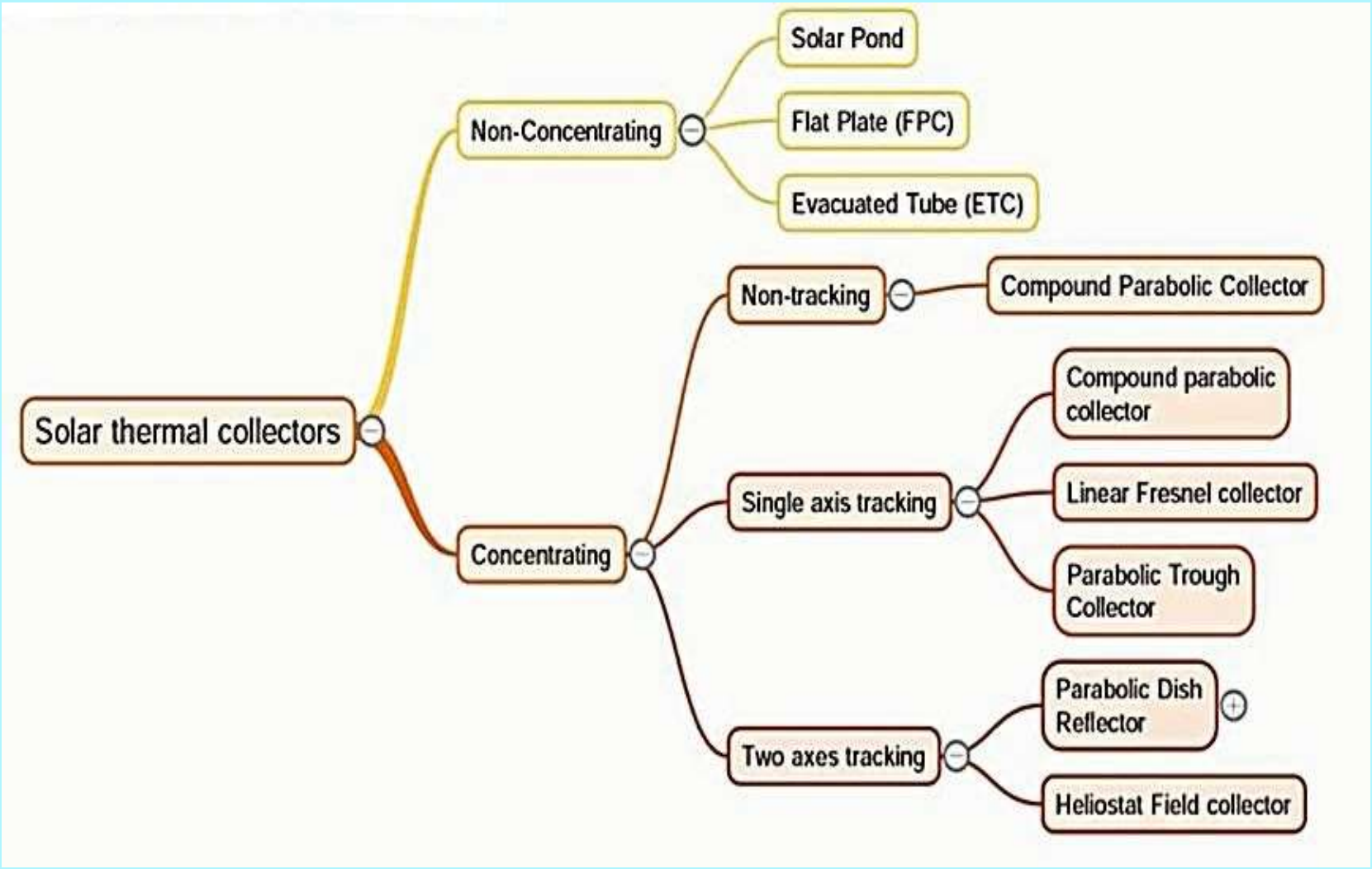
Unit 2:- Solar Energy

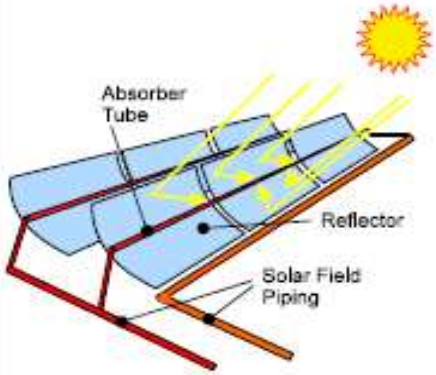
Lecture 6

- Solar Thermal Power
- Concentrated Solar Power
- Solar Thermal Flat Panels
- Parabolic Trough Solar Power Plant
- Linear Fresnel Reflector
- Single and Two Axis Solar Tracking
- Two Axis Solar Tracking
- Parabolic Dish Sterling Engine
- Solar Wind Energy Down Draft Tower
- Concentrated Solar Power Tower
- Evacuated Tube for Hot Water & Electricity
- Photo Voltaic with Thermal
- Energy calculations.

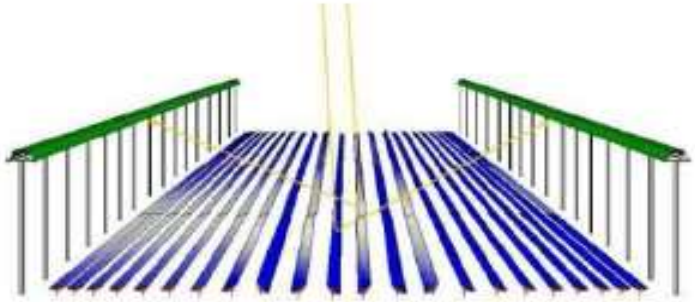
Solar Thermal Power



Concentrated Solar Power

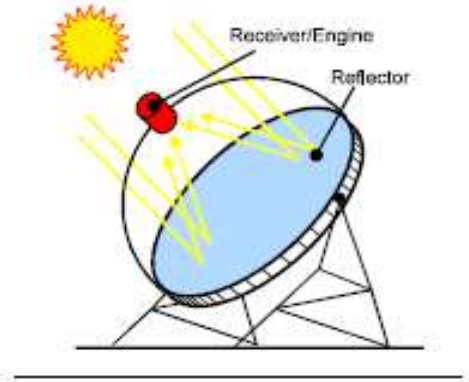


Parabolic troughs



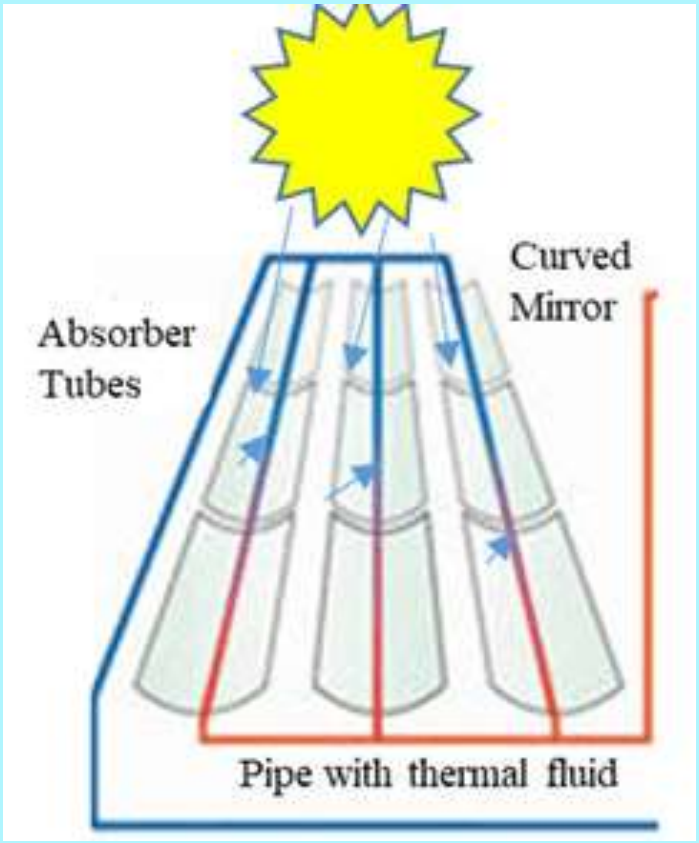
Linear Fresnel Reflectors

Central Receiver / Heliostats

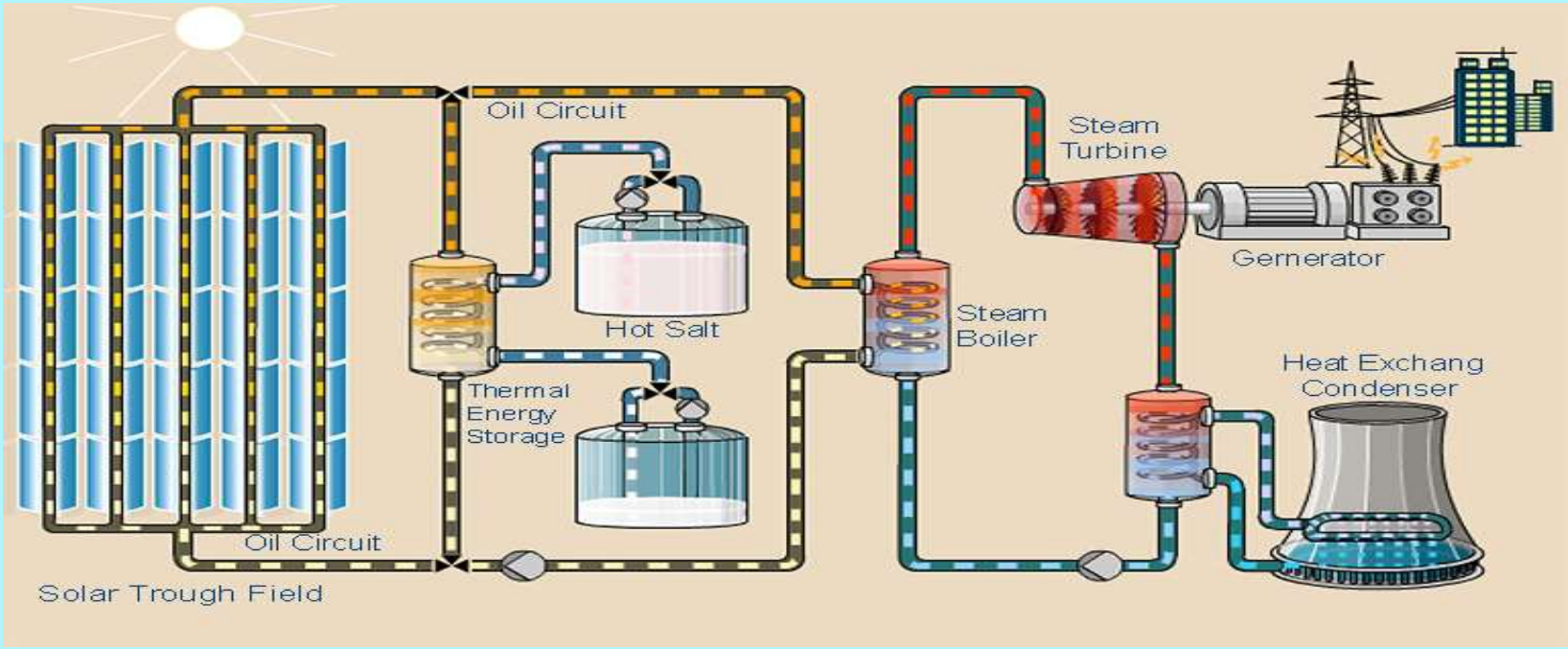


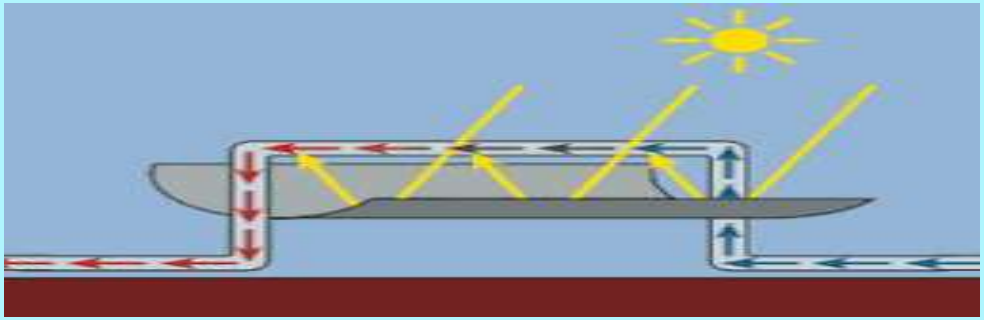
Parabolic dishes

Solar Thermal flat Panels

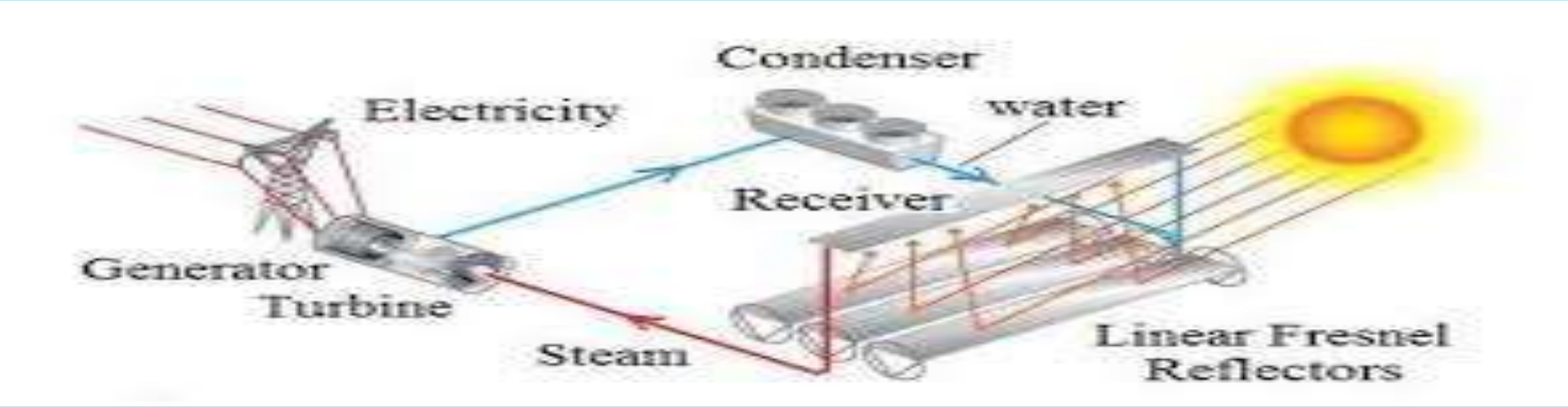


Parabolic Trough Solar Power Plant

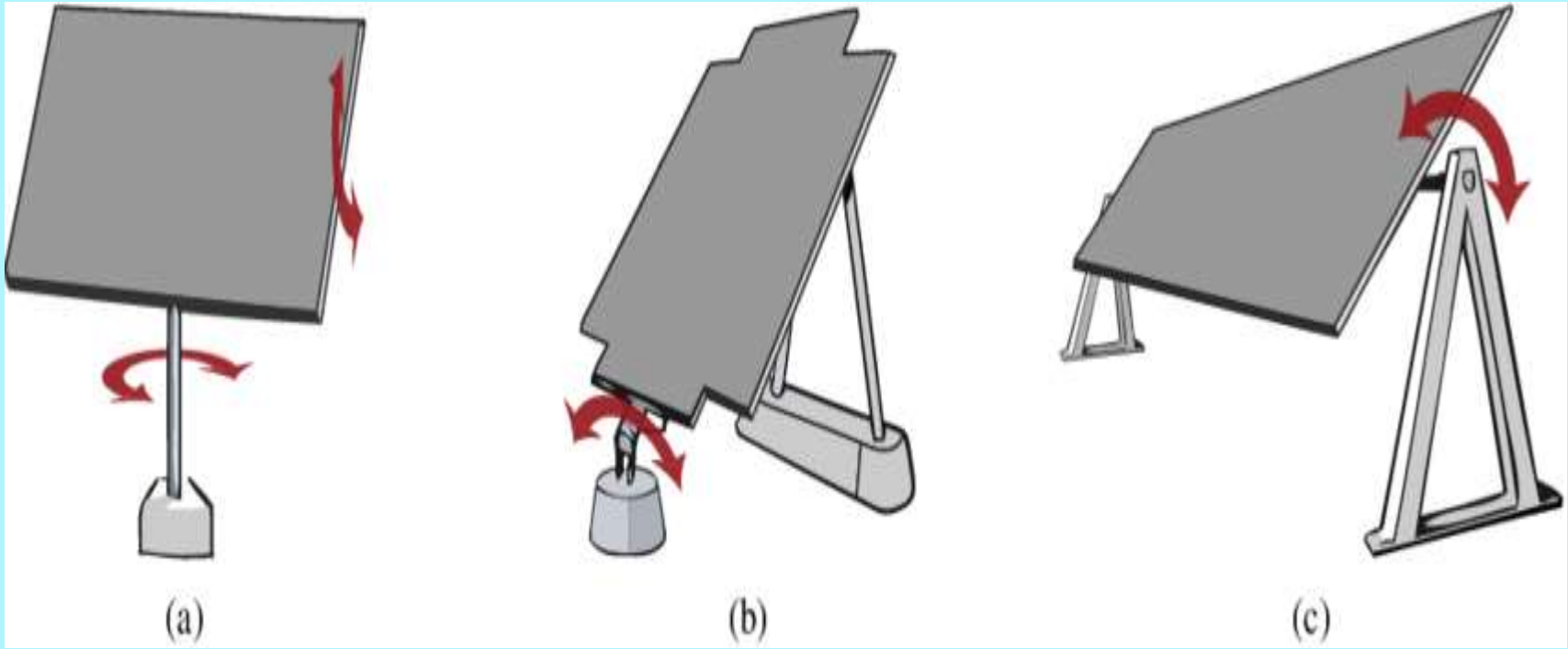




Linear Fresnel Reflectors



Single and Two Axis Solar Tracking

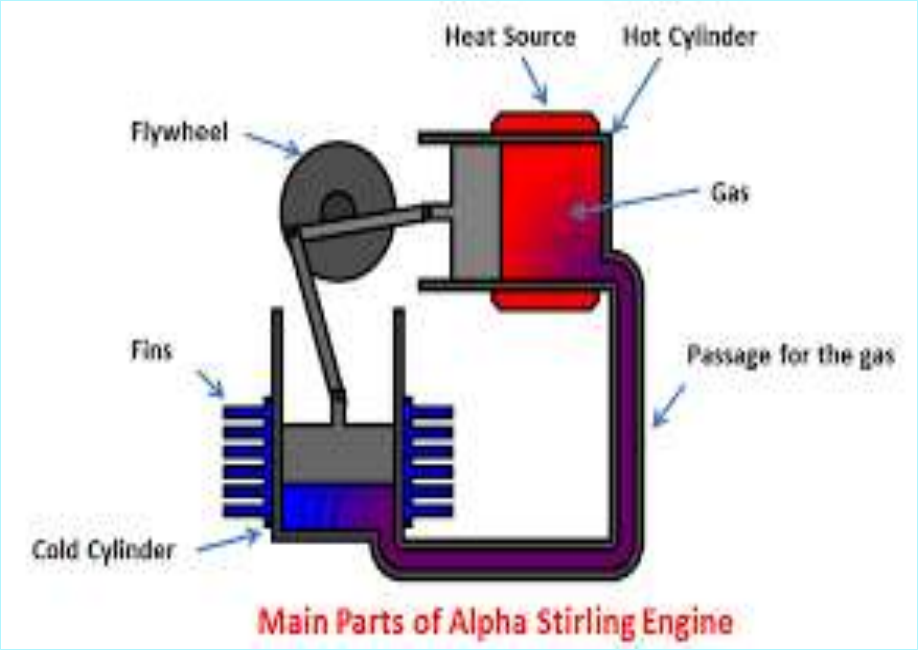


Shown are different solar trackers used in both PV and CPV; (a) dual-axis tracker, (b) polar aligned single-axis tracker, and (c) horizontal single-axis tracker.

Two Axis Solar Tracking

Dual-axis Tracker

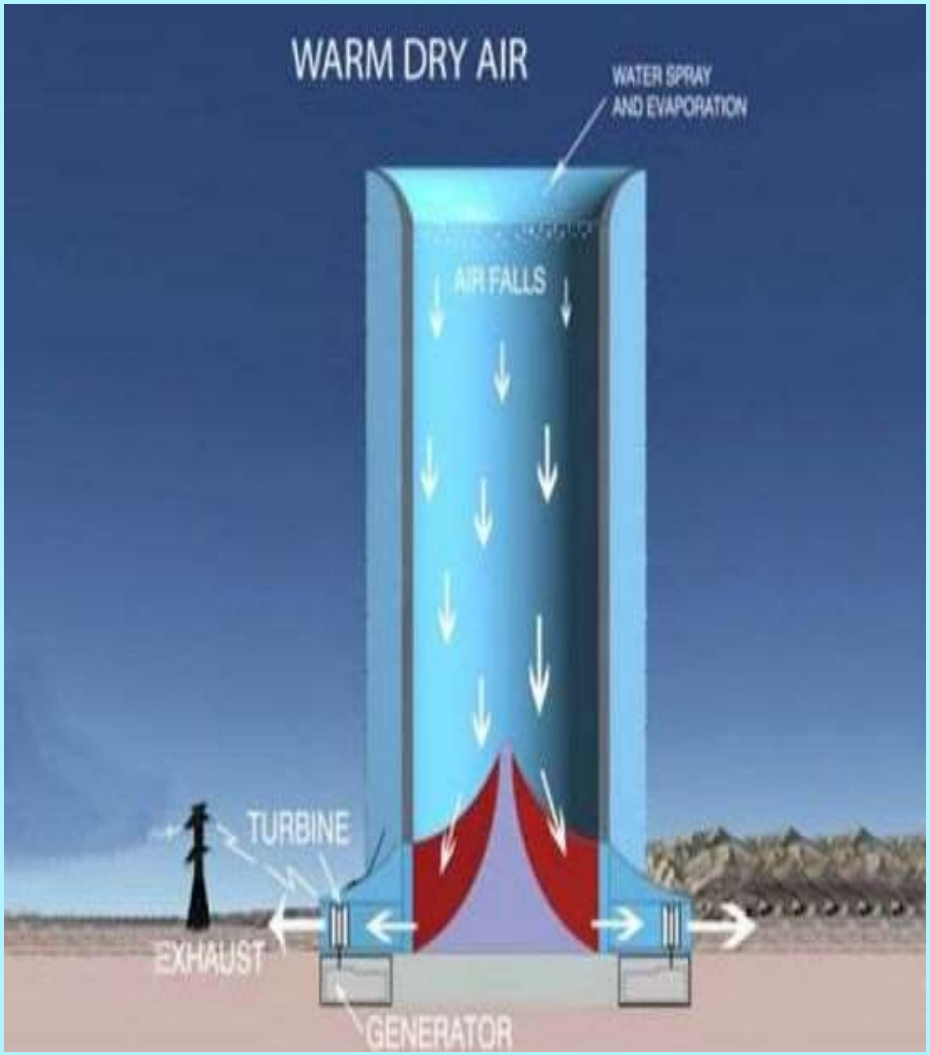
Parabolic Dish Sterling Engine



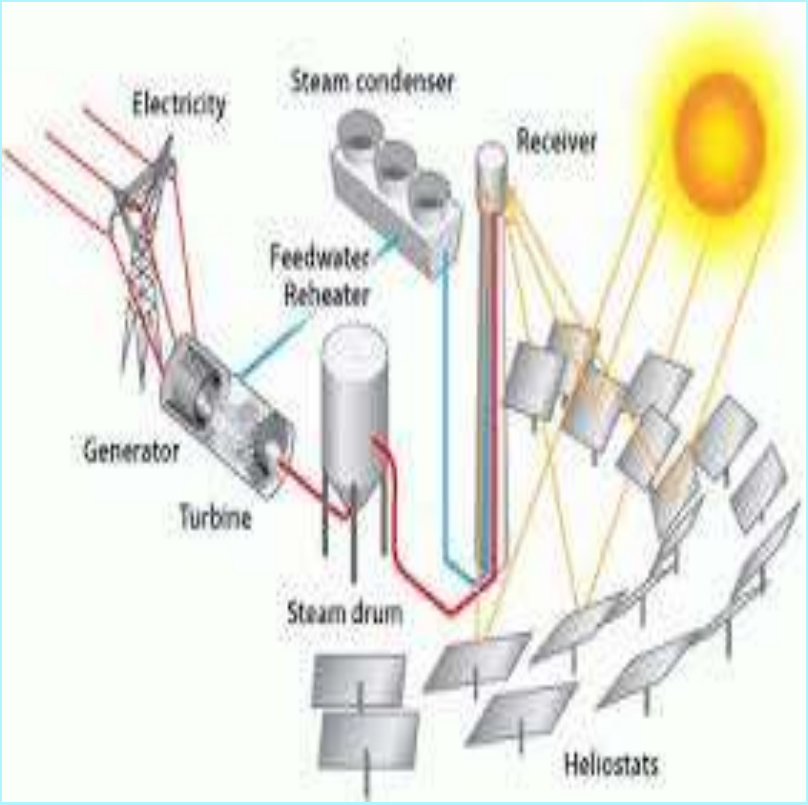
Sterling Motor Engine

Parabolic Dish Sterling Engine

Solar Wind Energy Down Draft Tower



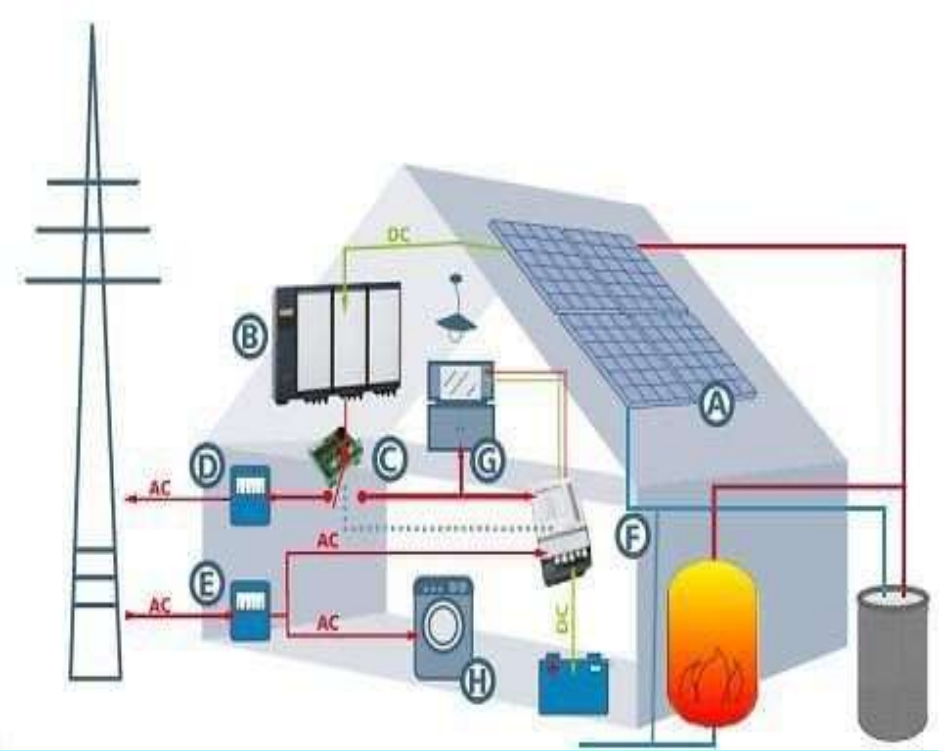
Concentrated Solar Power Tower

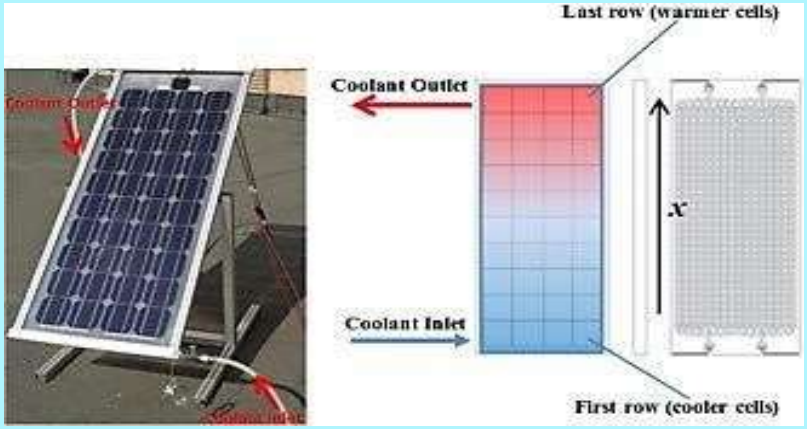


Concentrated Solar Power Tower

Evacuated Tube for Hot Water & Electricity

Photovoltaic with Thermal





How much of Solar Energy is converted into Electrical Energy in Photovoltaic Cells?

The energy conversion efficiency is a measure of how much of the solar energy is converted into electrical energy. The calculation for the energy conversion factor is,

$$\eta = (Pm / (E * A)) * 100$$

Where,

η = Energy conversion factor, percent.
Pm = Maximum power output, watts.
E = Solar energy, insolation, watts per square meter.
A = Area of the solar cell, square meters.

For example, what is the energy conversion efficiency of a 175-watt solar panel that measures 0.75 x 1.50 meters, if the solar insolation is 1,000 W/m^2?

Since the area of the solar cell is 0.75 * 1.50 = 1.125 m^2, the efficiency is,

$\eta = (175 / (1.125 * 1{,}000)) * 100$
$\eta = 15.6\%$.

This particular unit converts 15.6% of the available solar energy into electrical energy.

Thank You