



ENERGY SOURCES- CONVENTIONAL AND NON CONVENTION

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Types of Energy sources

1. Conventional energy sources (or) Non-renewable energy sources
2. Non-Conventional energy sources (or) Renewable energy sources

(1) Conventional energy (or) Non-renewable energy

Conventional (or) Non-renewable energy sources are those, which cannot be replaced continuously.

- Generally, non-renewable energy sources **come out of the ground** as liquids, gases and solids.

Examples: The *conventional (or) Non-renewable energy sources* are Oil, Coal, Petroleum gas, Nuclear energy and natural

Non-Conventional energy (or) Renewable energy

Renewable energy is a source of energy that can never be exhausted and can be replaced continuously

We can obtain renewable energy from the sun, from the water, from the wind, from crop residues and waste

The types of Non-conventional (or) Renewable energies are

Solar energy

Wind energy

Biomass energy

Geothermal

Tidal energy

Hydro energy

Biofuels

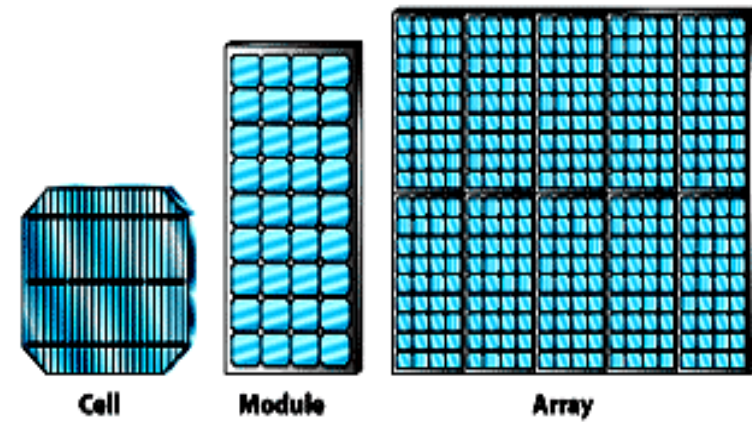
Wave Power

Solar energy



Solar energy comes from the light of the sun, which means it is a renewable source of energy. We can use the sun light to create pollution free electricity

The solar cell is the system used to convert the sunlight energy into electrical energy



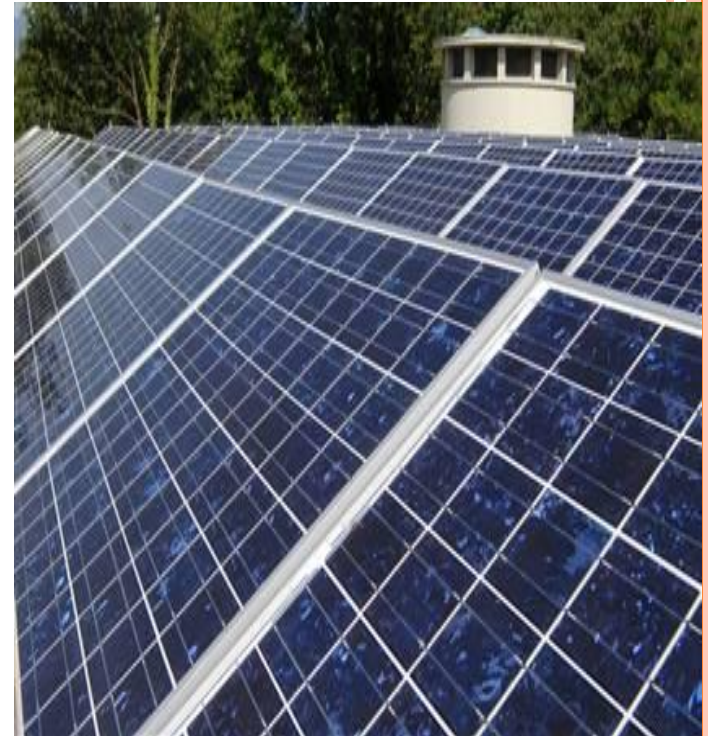
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Solar collectors

- The basic resource for all solar energy systems is the sun.
- Knowledge of the *quantity and quality* of solar energy available at a *specific location* is of prime importance for the design of any solar energy system
- Although the solar radiation is relatively constant outside the earth's atmosphere, *local climate influences* can cause wide variations in *available radiation* on the earth's surface from site to site.

APPLICATION OF SOLAR ENERGY

- Passive heating applications
 - Low temperature application
 - For heating houses, drying, for green houses etc
- Solar thermal energy application
 - Medium to high temperature applications
 - Producing process heat, steam
- Solar to electrical energy conversion
 - By photo voltaic cells
- Flat plate collectors



FLAT PLATE COLLECTORS

- Coated flat heat absorber plate
- Tubes for passage of working fluid
- Transparent sheet on upper side of absorbent plate to reduce thermal losses
- Thermal insulation between absorber plate and casing

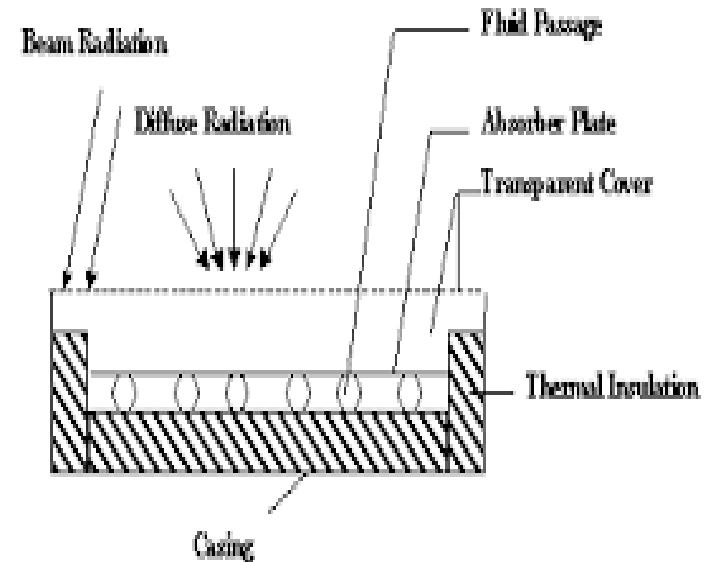
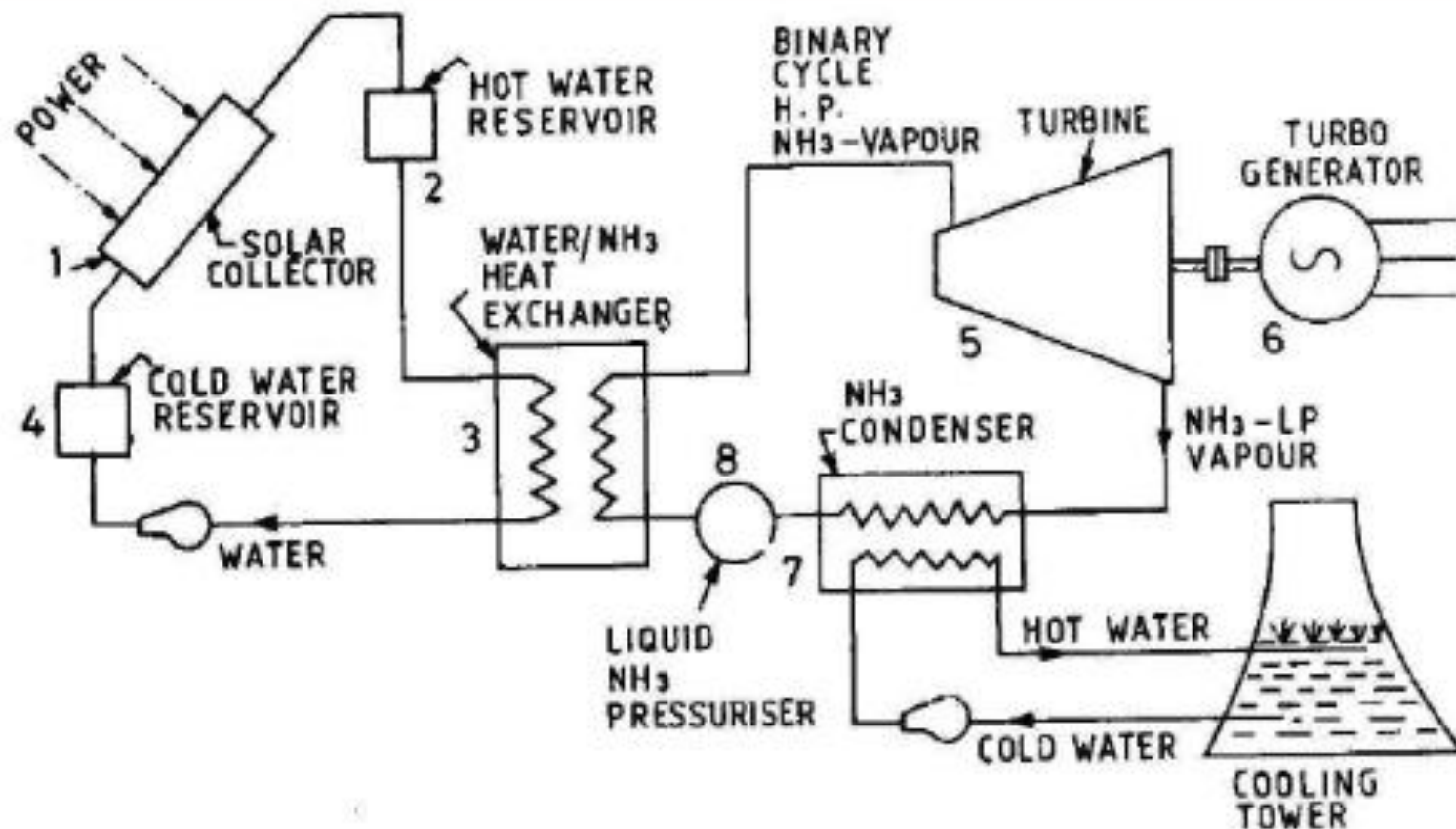


Fig.1 Liquid Flatplate Collector

BINARY CYCLE SOLAR THERMAL POWER PLANT



1. Solar collector

4. Cold water reservoir

7. NH₃ condenser

2. Hot water reservoir

5. NH₃ Gas Turbine

8. NH₃ Pressuriser

3. Head exchanger

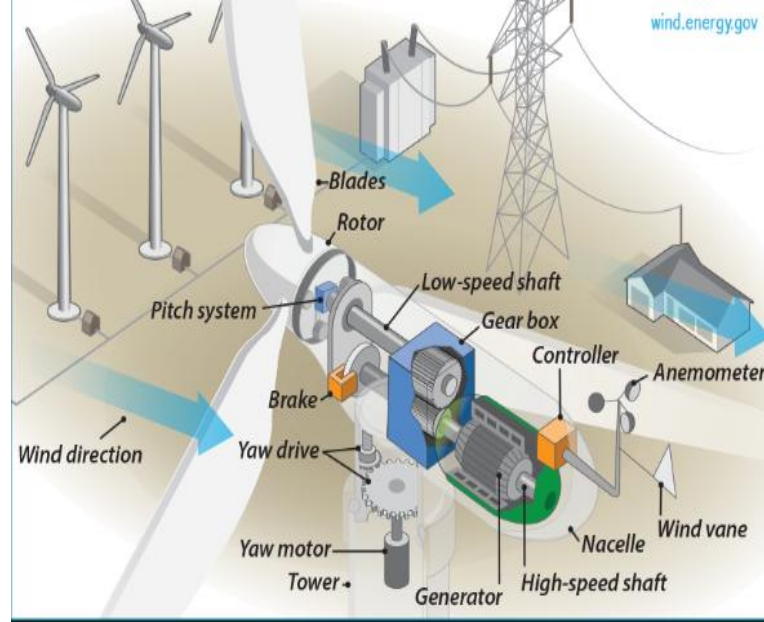
6. Generator

9. Cooling Tower

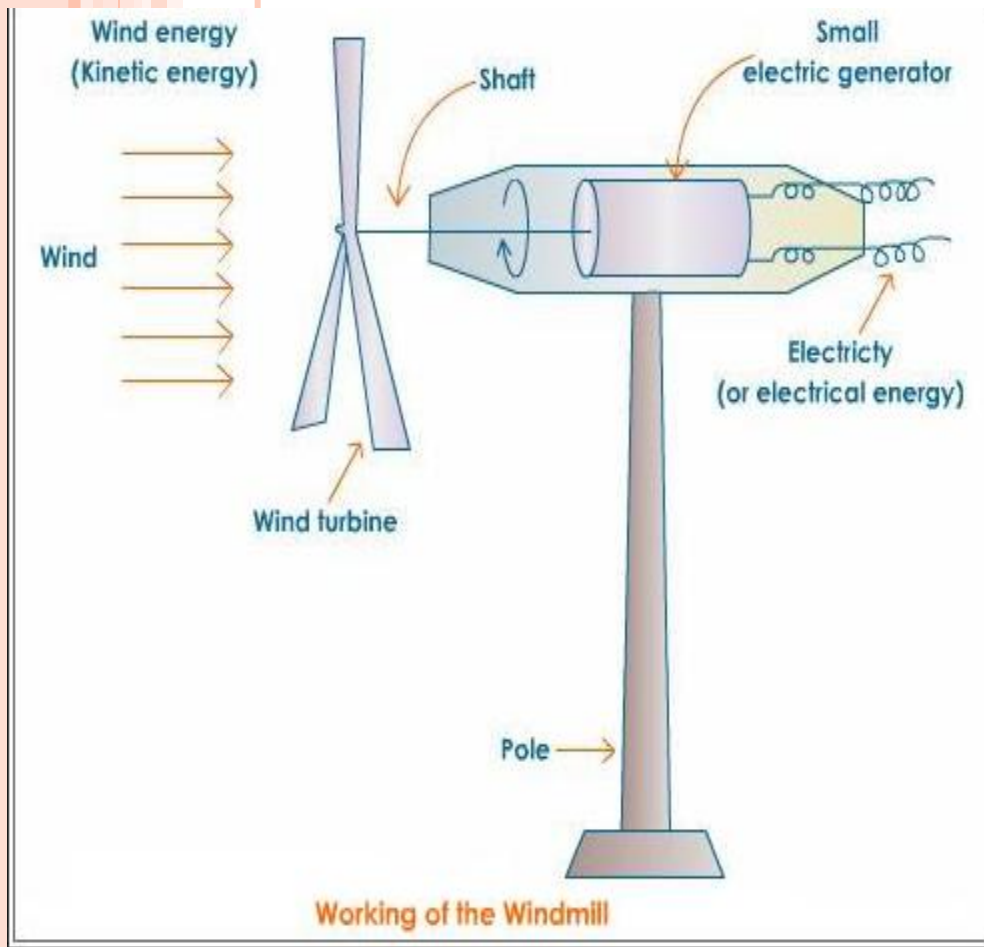
Wind energy



- Wind is simple air in motion.
- Caused by the *uneven heating* of the earth's surface by the sun.
- These winds are used to rotate *turbine blades* which *spins the generator* to produce electricity

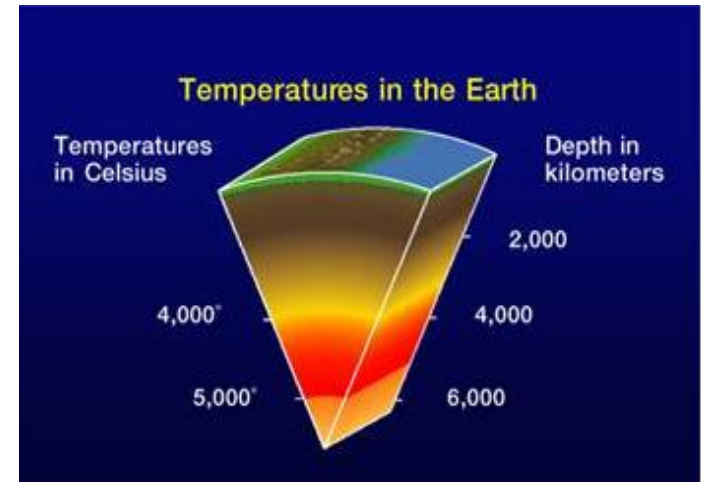


- Wind energy is the kinetic energy associated with the movement of atmospheric air
- Energy in the wind is converted into rotary mechanical energy by the wind turbine.
- Useful in pumping of water, grinding grains etc.
- Wind farm has several wind turbine generator units.
- Clean, cheap particularly for rural areas, farms, remote locations etc



Windmill

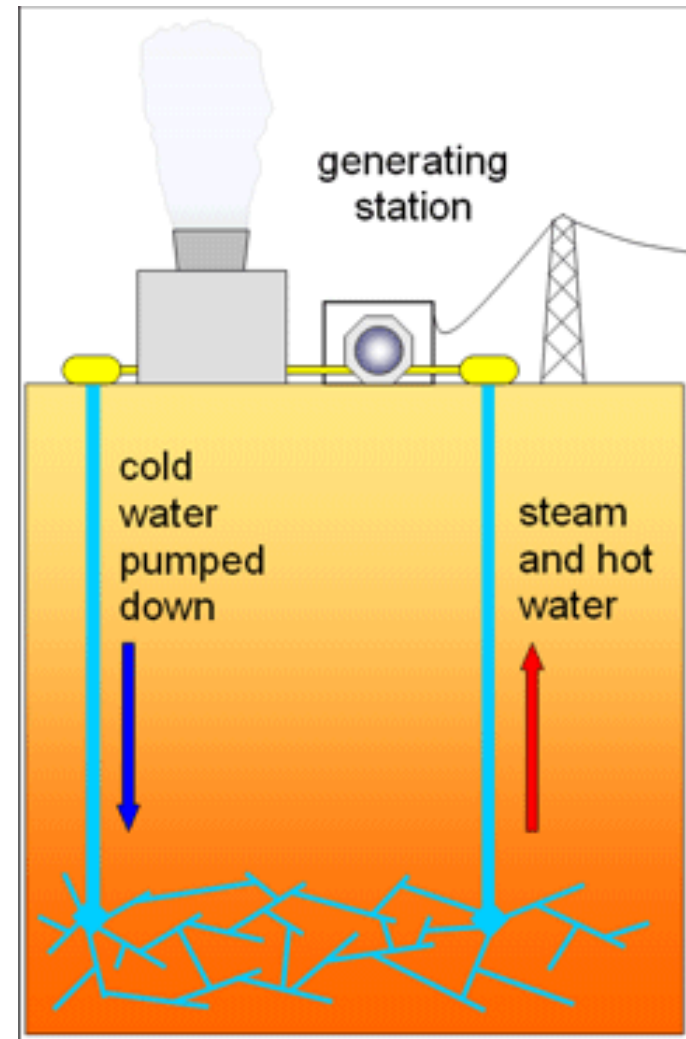
Geothermal energy



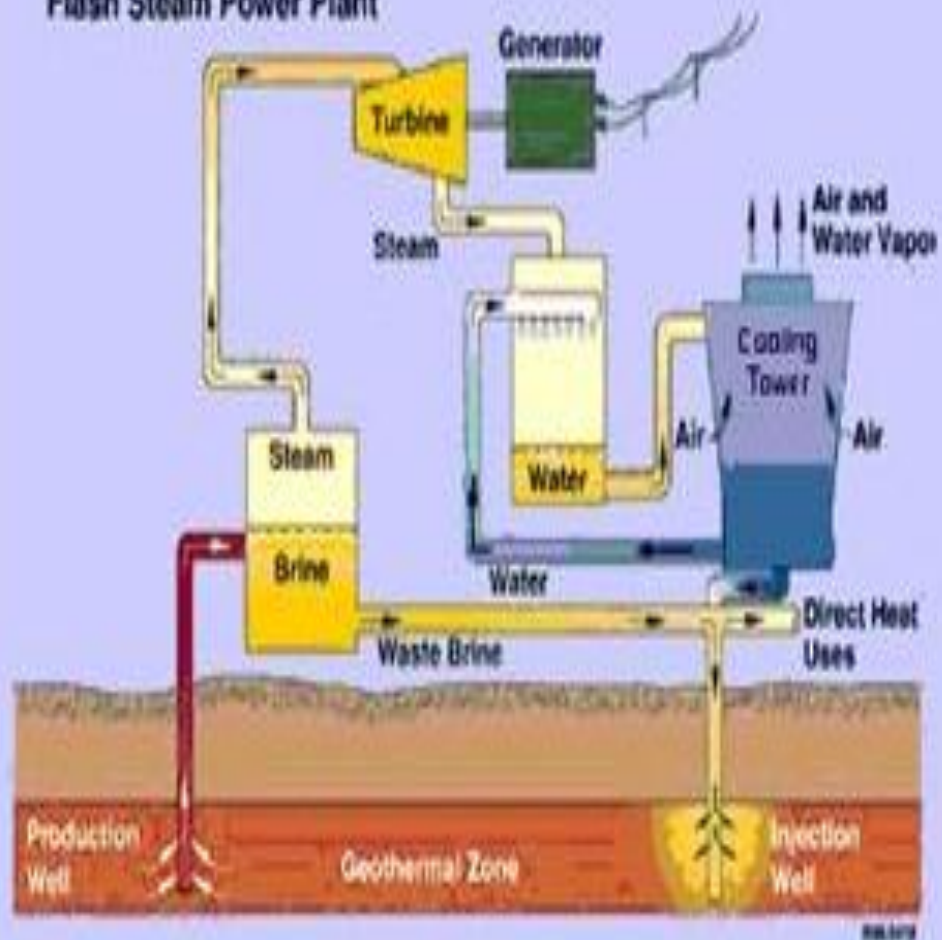
- The word **geothermal** comes from the Greek words geo (earth) and therme (heat).
- Geothermal energy is heat from within the earth.
- The steam and hot water produced inside the earth to heat buildings or generate electricity.
- Geothermal plant covers a vast geographical area.
- Production wells are drilled
- The spent fluid from power plant is reinjected into the ground

GEOHERMAL POWER PLANT

- Smaller unit sizes (5 MW, 10 MW, 15 MW).
Conventional steam thermal power plants- 200 MW, 500 MW, 800 MW.
- Located on geothermal fields
- Covers a vast geographical area
- Production wells drilled at appropriate spacing



Flash Steam Power Plant



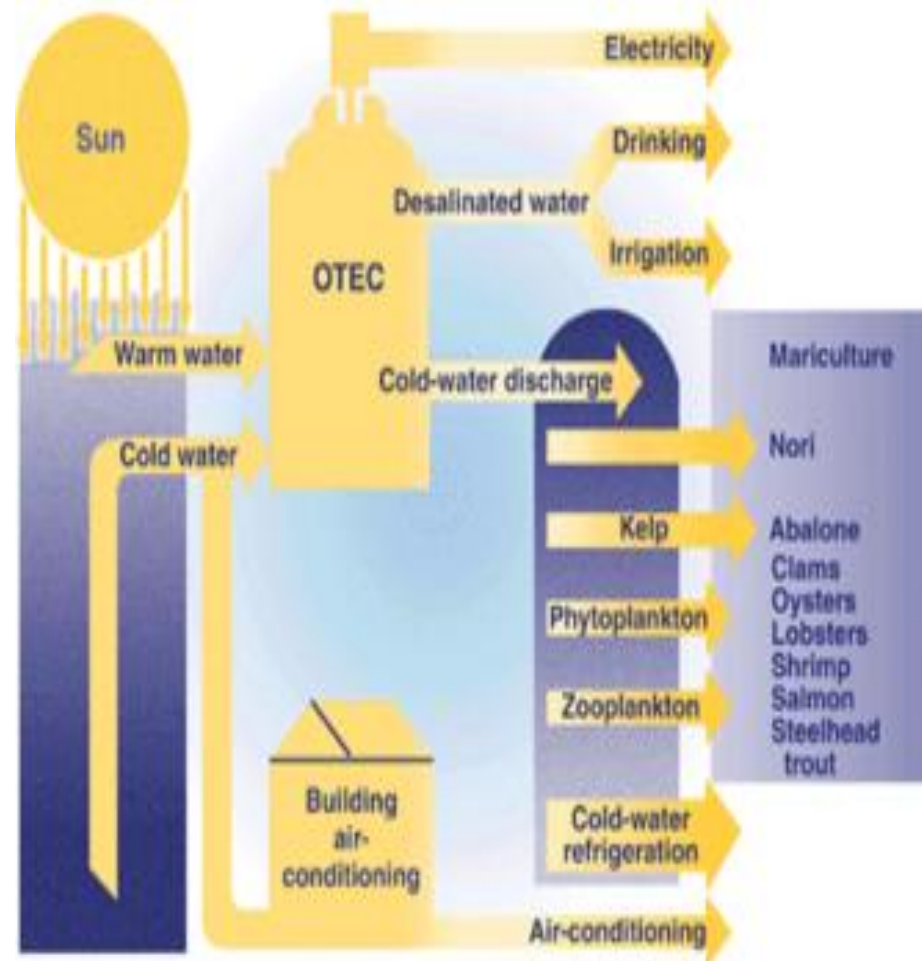
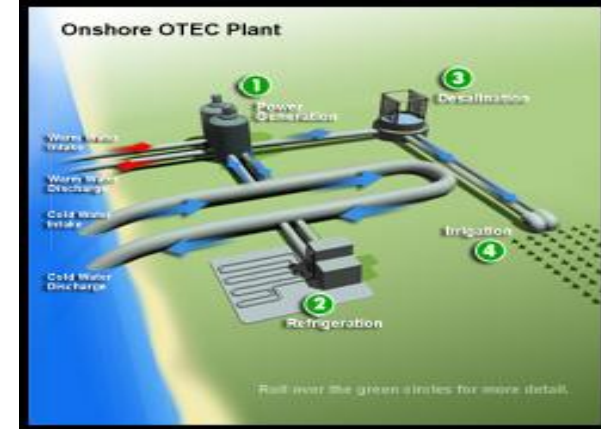
GEOHERMAL POWER PLANT SITES

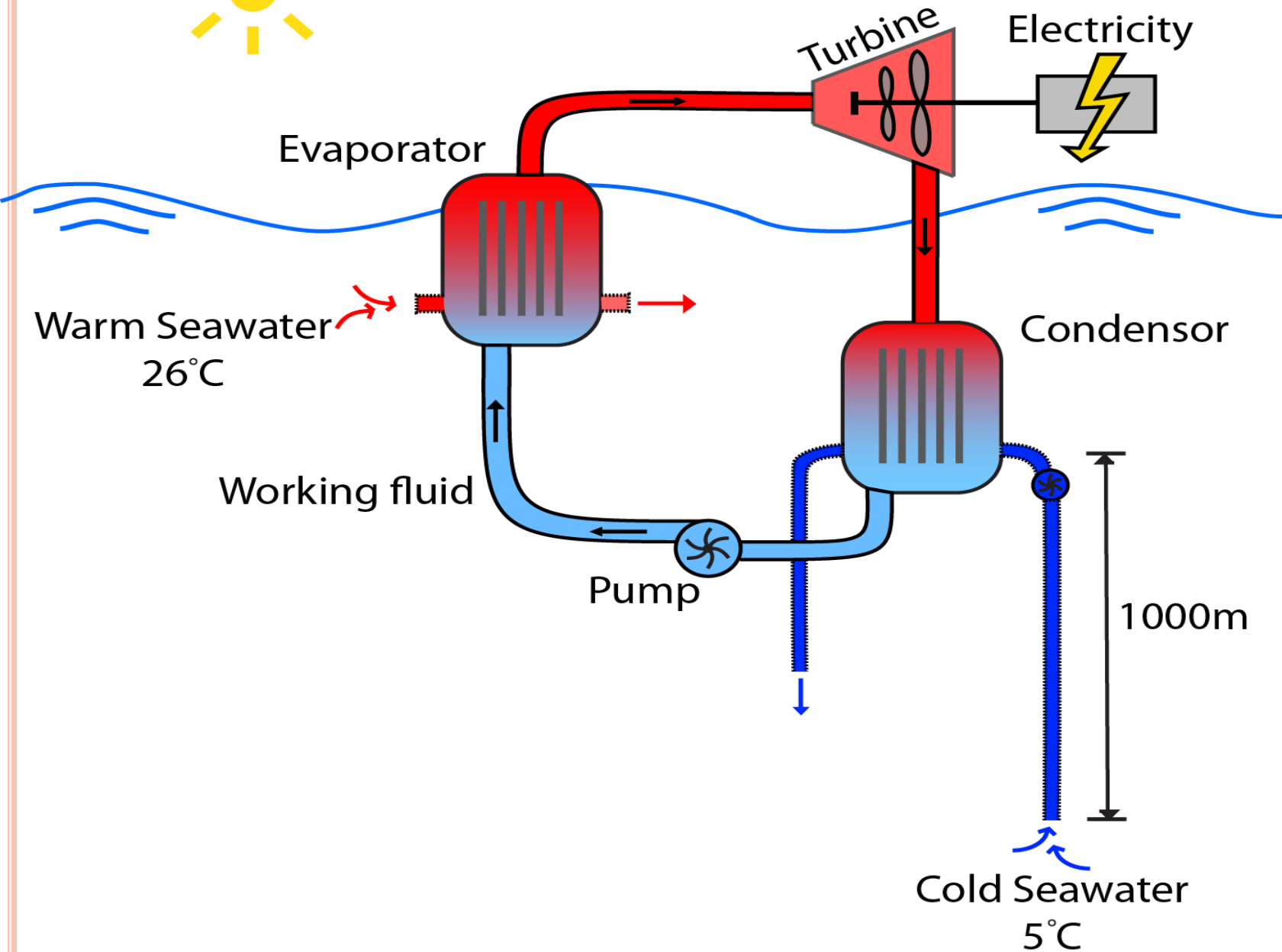
- Most **geothermal power plants** in the United States are in western states and Hawaii,. California generates the most electricity from **geothermal** energy.
- The GSI (Geological Survey of **India**) has identified 350 **geothermal** energy locations.
- The most promising is in Puga valley of Ladakh. The estimated potential for **geothermal** energy in **India** is about 10000 MW.



OCEAN THERMAL ENERGY (OTEC)

- Thermal energy from ocean converted to electrical power.
- Top surface of ocean gets heated up due to solar radiation (source)
- Deep down the ocean, temperature is less (sink)
- Low efficiency

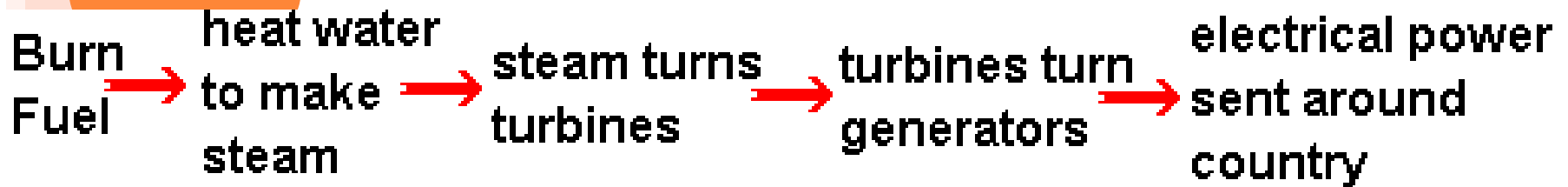




Biogas energy



Biomass energy (or) bioenergy, is the energy stored in non-fossil organic materials such as wood, straw, vegetable oils and wastes from the forest, agricultural and industrial sectors.

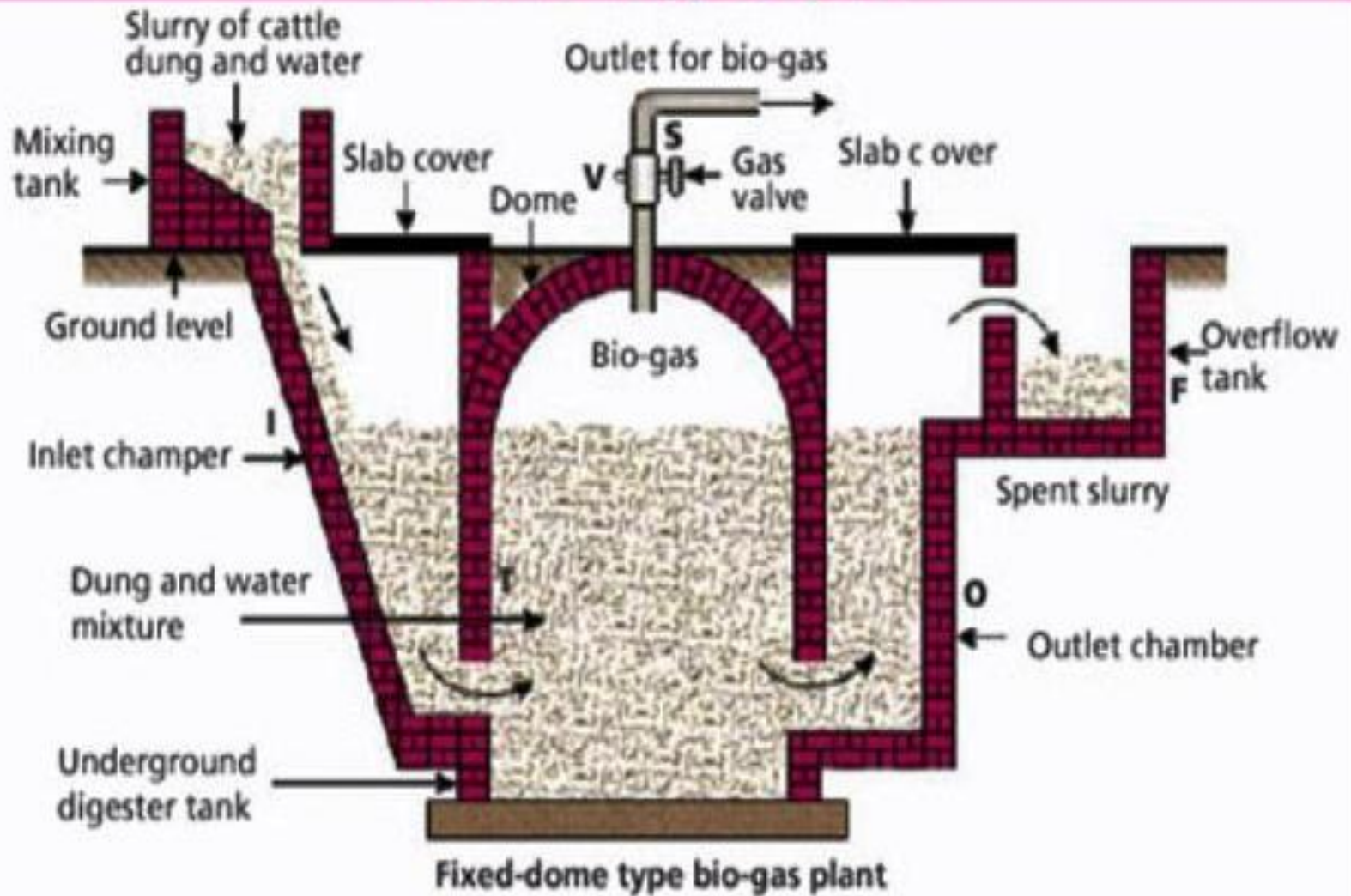


TYPES OF BIOMASS

- Biomass from cultivated fields, crops, forests
- Biomass derived from all kinds of waste material like animal waste, industrial waste etc.
- Biogas- gaseous fuel obtained from biomass by the process of anaerobic digestion (Fermentation)
- Biogas is a cheap source of renewable energy
- The infed is mixed with water to assist anaerobic fermentation process.
- The biogas plant delivers methane rich gas, which can be used as fuel for cooking, for kilns, furnaces, as domestic fuel , running diesel engines etc.



Fixed dome type of plant



FIXED DOME TYPE BIO GAS PLANT:

- The digester and gas collector are enclosed in the same chamber.
- Digester built at ground level or below the ground with locally available material like bricks.
- As biogas liberated, pressure inside the digester increases.
- Biogas collected in the upper dome shaped cavity
- The outlet provided at the top of fixed dome
- Slurry stirred using a stirrer.
- Slurry fed into digester
- Biogas generated due to anaerobic decomposition, collected in the dome
- Biogas delivered via gas outlet pipe
- Residual spent slurry discharged by outlet chamber



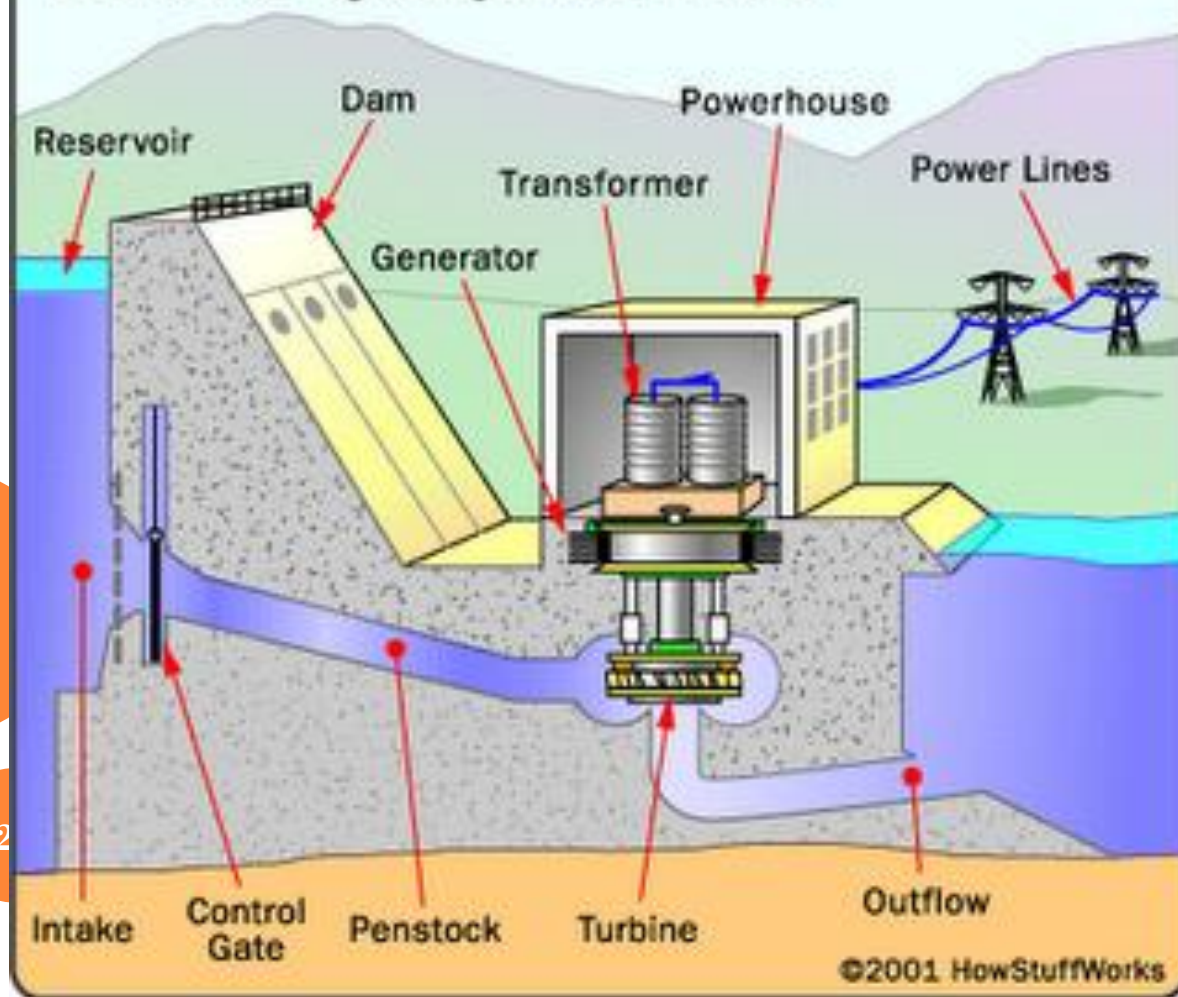
Hydro electric power



Hydro energy is derived from flowing water in rivers, water streams in mountains or from man-made installations where water flows from a high-level reservoir down through a tunnel and away from the dam.

- A *dam is built to trap water*, usually in a valley where there is an existing lake.
- Water is allowed to flow through *tunnels* in the dam, to turn turbines and thus drive generators and the electricity is produced

Inside a Hydropower Plant



NUCLEAR POWER PLANT



- Radioactive elements (like Uranium, thorium) available in nature can be fissioned in nuclear reactor to get enormous amount of heat for formation of steam and subsequently electric energy
- The operation of a nuclear plant is identical to the operation of a thermoelectric power plant operating with coal, oil or gas, except in the way of providing heat to the water for converting this one into steam. In nuclear reactors this process of producing heat is made by the fission reactions of the fuel atoms.

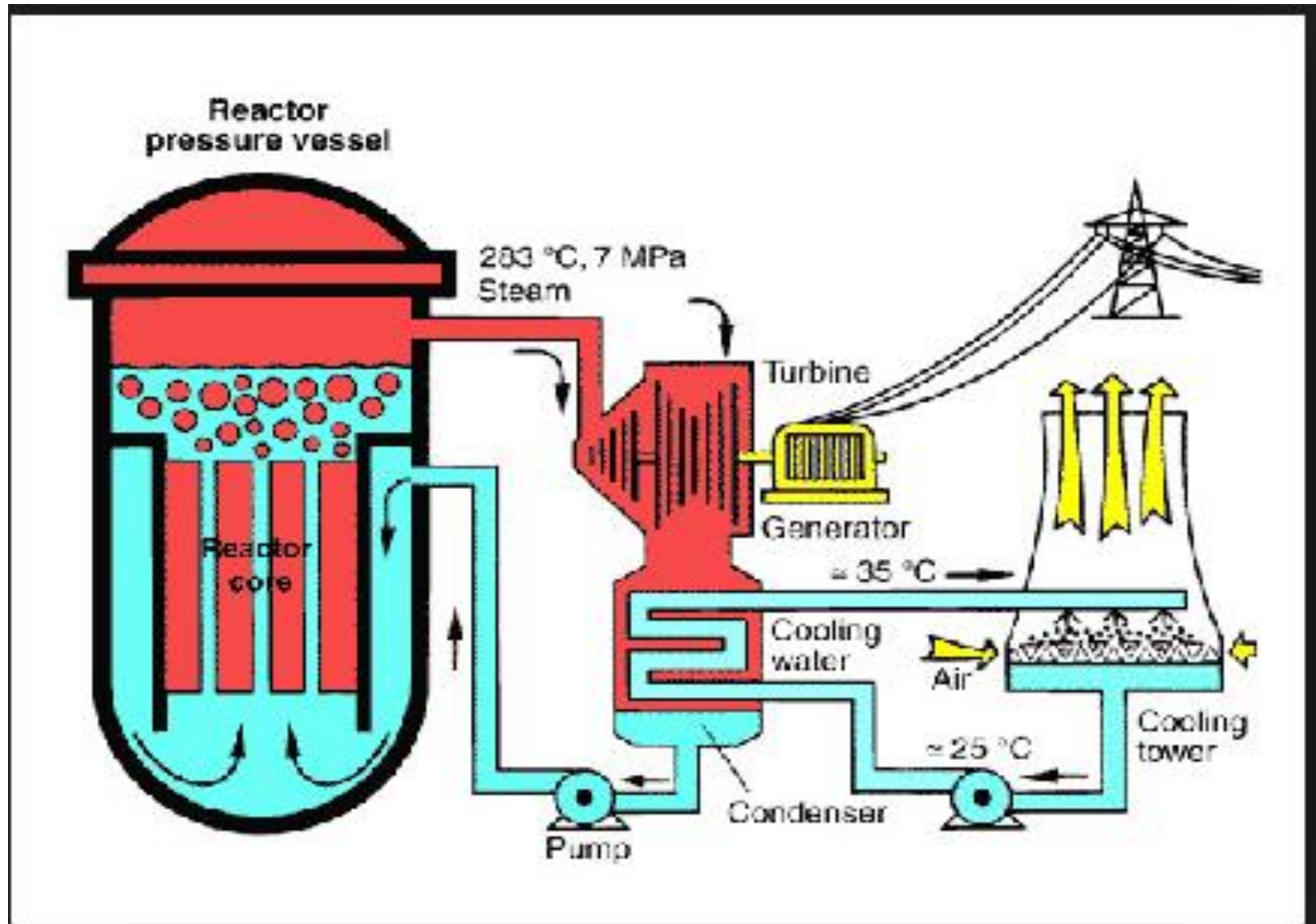


NUCLEAR POWER PLANT

- The basic principle of the performance of a nuclear power plant is based on obtaining heat energy through the nuclear fission of the atoms' nucleus from the fuel. This heat energy, already being steam, will be converted into mechanical energy by a turbine, and in the end this mechanical energy will be converted into electrical energy by a generator.
- The nuclear reactor is responsible for rising and handling this atomic fission that generates a lot of heat. With this heat the reactor converts water to steam at a high temperature and pressure.



NUCLEAR POWER PLANT



Advantage of Non-conventional /Renewable energy resources

- It is fact that the consumption of conventional sources of energy has caused more environmental damage than any other human activity.
- The use of fossil fuels such as oil and coal produce high concentration harmful gases in the atmosphere and creates so many problems such as Ozone depletion and global warming.
- The Non-conventional energy sources, such as the sun and wind, can never be exhausted and therefore are called renewable. They cause fewer emissions and are available locally.