



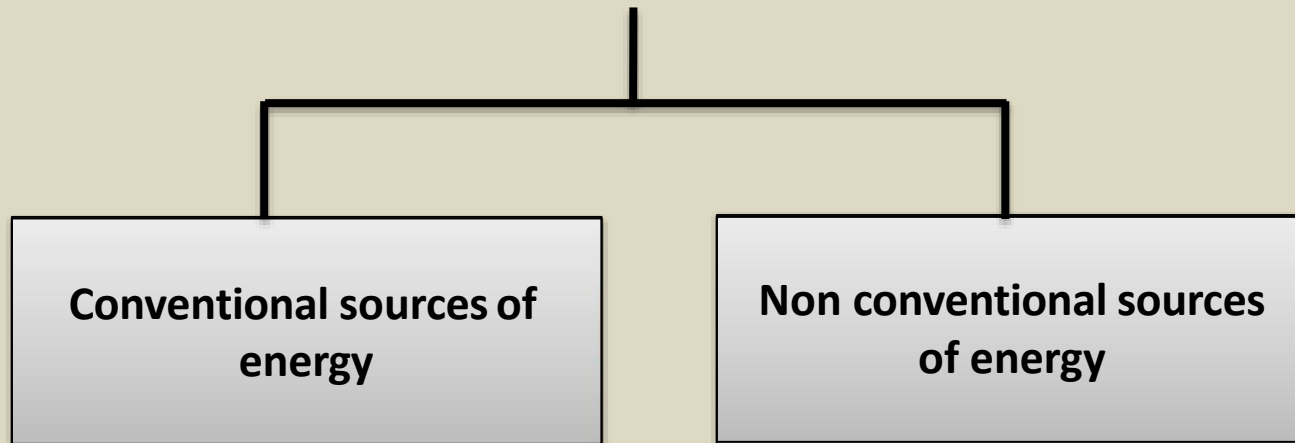
# Conventional & Non- Conventional Sources of Energy

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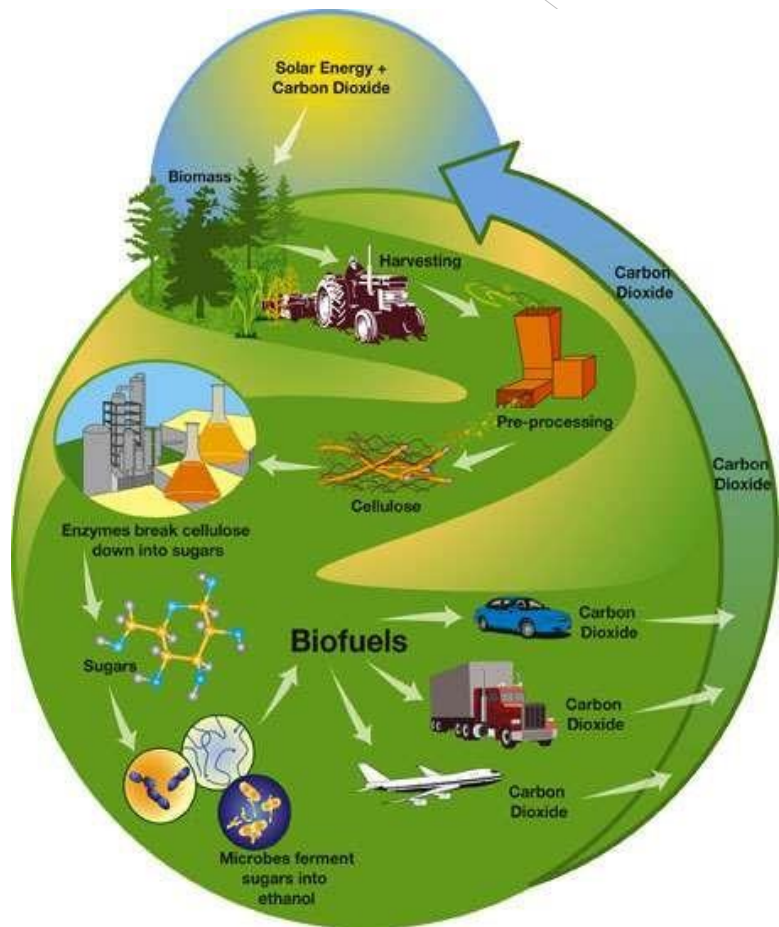
# Introduction to Energy

- ❖ Energy broadly means the capacity of something, a person, an animal or a physical system to do work and produce change.
- ❖ Used in science to describe how much potential a physical system has to change.

## Sources of Energy.



# WHAT ARE CONVENTIONAL RESOURCES




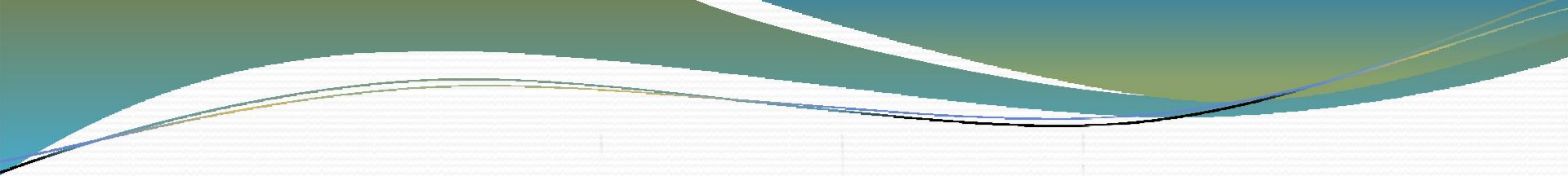
- Energy that has been used from ancient times is known as conventional energy. Coal, natural gas, oil, and firewood are examples of conventional energy sources.

# FEATURES OF CONVENTIONAL RESOURCES

- ❖ Traditional energy sources consist primarily of coal, natural gas and oil. They form from decaying plant and animal material over hundreds of thousands to millions of years. Most of these sources are burned to produce energy through power plants and automobiles.



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- **Being carbon** based, natural gas, oil and coal store carbon as potential energy and release it when burned. The Intergovernmental Panel on Climate Change states that carbon and other greenhouse gas emissions are a major culprit in climate change.

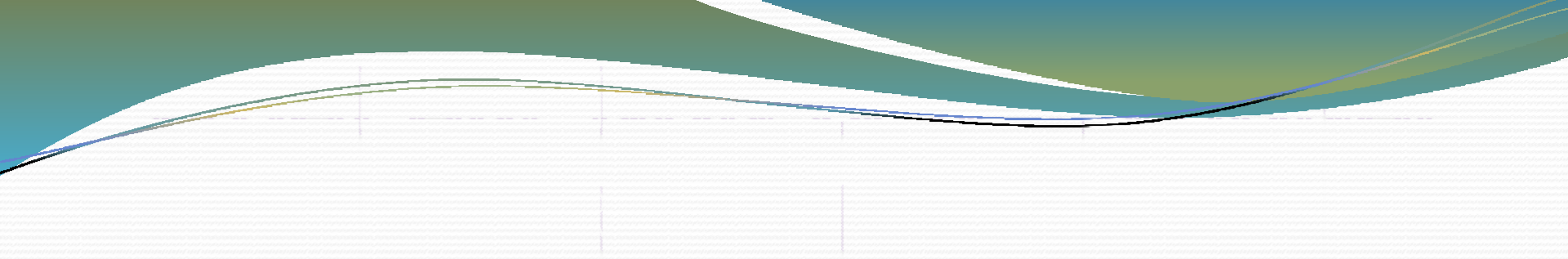


**According** to the Energy Information Administration, burning coal produces sulfur, nitrogen oxide and mercury emissions. All of these are known to have disastrous environmental and health consequences.



# NON CONVENTIONAL RESOURCES

- A conventional resource are the ones that are commonly used (like a pen or a pencil)
- A non conventional resources are ones that work but are not commonly used (like an ionic laser)



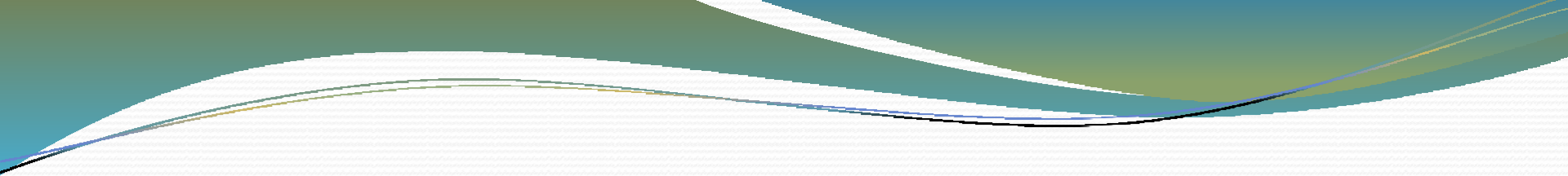
The **non** conventional sources of energy such as energy from sun, wind, biomass, tidal energy, geothermal energy and even energy from waste material are gaining importance. This energy is abundant, renewable, pollution free and Eco friendly. It can be more conveniently supplied to urban, rural and even remote areas.



**Those energy sources which are renewable and ecologically safe.**

- ❖ such as solar energy, wind energy, biomass energy, ocean energy (tidal energy, wave energy, ocean thermal energy), geothermal energy, nuclear energy etc.
- ❖ Some sources of energy are non renewable like coal, petroleum and natural gas.



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- **About 16% of global final energy consumption** comes from renewable, with 10% coming from traditional biomass, which is mainly used for heating, and 3.4% from hydroelectricity.
  - ❖ New renewable (small hydro, modern biomass, wind, solar, geothermal, and biofuels) accounted for another 3% and are growing very rapidly.
  - ❖ The share of renewable in electricity generation is around 19%, with 16% of global electricity coming from hydroelectricity and 3% from new renewable.

# WIND ENERGY

The image features a sunset sky with a bright sun low on the horizon, casting a warm orange and yellow glow. Several wind turbines are silhouetted against this sky, with the largest one on the right side of the frame. The turbines are positioned on a dark, flat horizon line. A yellow rectangular box with a blue border is overlaid on the left side of the image, containing the text 'WIND ENERGY' in a stylized, metallic font.

**Airflows can be used to run** wind turbines.

- Wind energy is used in wind mills which converts the kinetic energy of the wind into mechanical or electrical energy.
- The kinetic energy of wind can be used to do mechanical work like lifting water from wells or grinding grains in flour mills.
- A single wind mill produces only a small amount of electricity.
- large number of wind mills in a large area are coupled together to produce more electricity in wind energy farms.
- The minimum wind speed required is 15km/hr.
- At present Wind power potential of India is 1020 MW
- Largest wind farm is near Kanyakumari in Tamilnadu generate 380 MW electricity

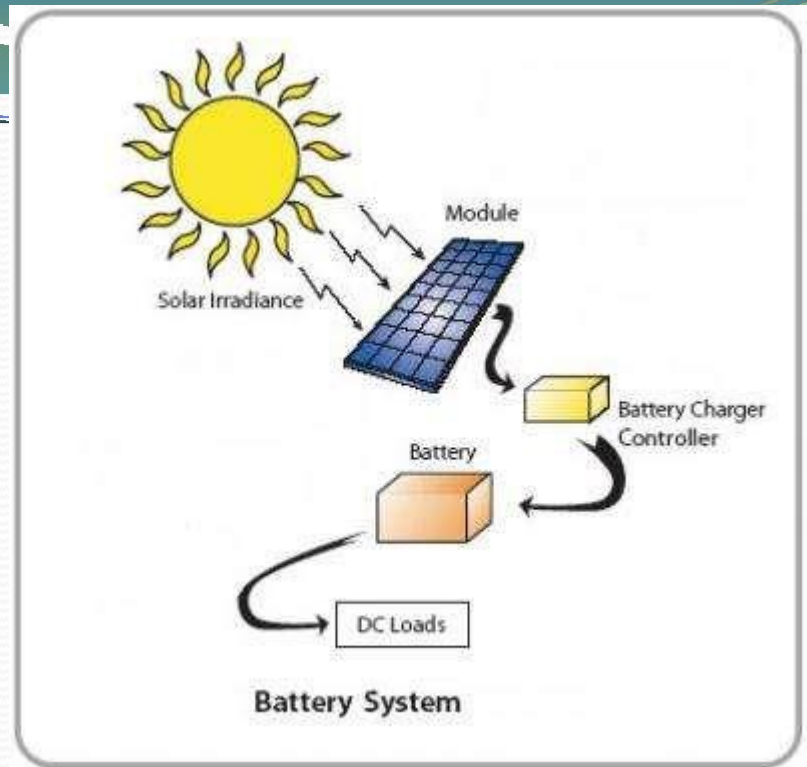




# SOLAR ENERGY

Energy obtained from the sun in the form of heat and light.

- Energy derived in the form of solar radiation.
- The solar energy received by the near earth space is approximately 1.4 kilojoules/second known as solar constant
- The heat energy is used in solar heating devices like solar cooker, solar water heater, solar furnaces etc. The light energy is used in solar cells.





A photograph of a large dam with multiple spillways. Water is cascading over the spillways, creating white foam. To the right of the spillways is a large, white, rectangular power house building. The sky is blue with some light clouds. The foreground shows the concrete structure of the dam and the turbulent water below.

# Hydro Power

Courtesy of The National Renewable Energy Laboratory (NREL)

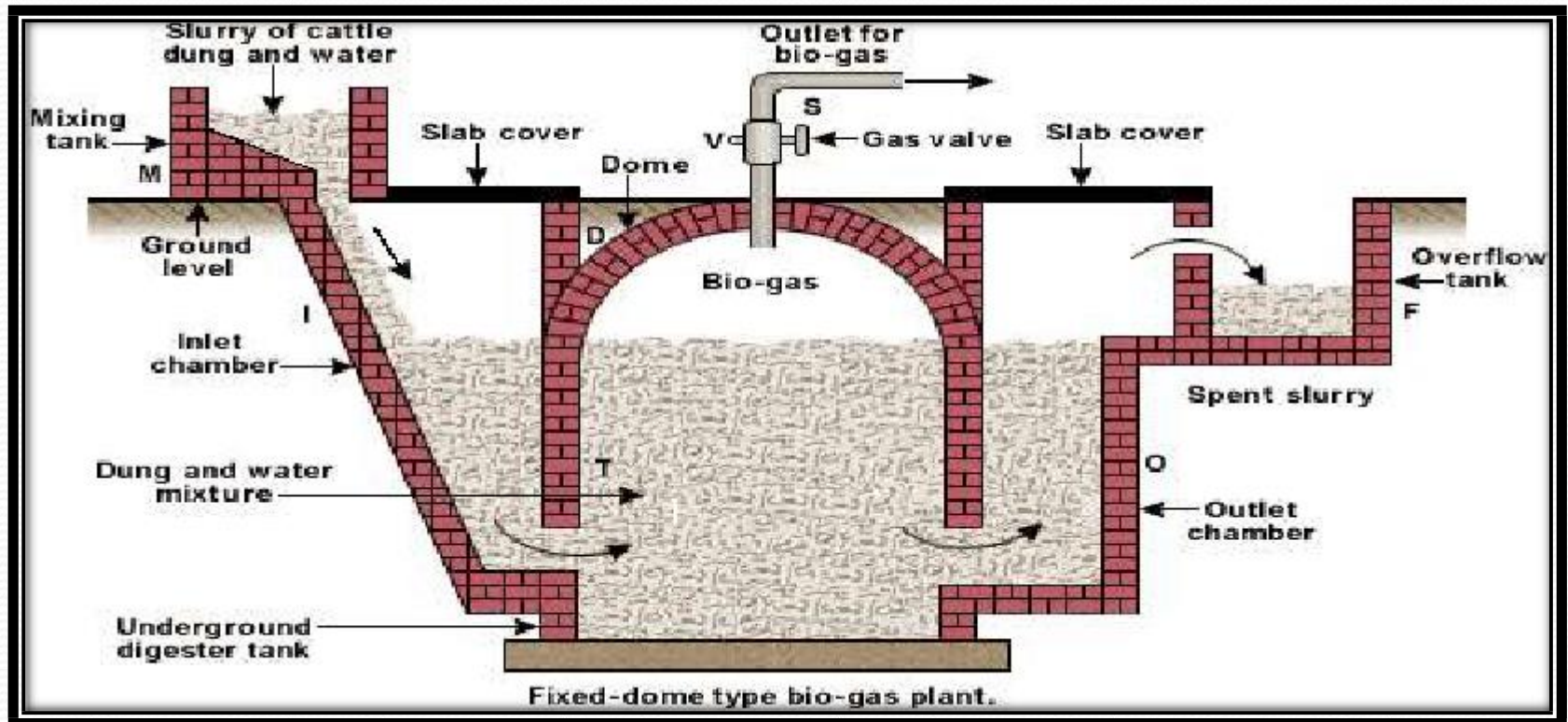


In hydro power plants water from rivers are stored by constructing dams.

- Micro hydro systems are hydroelectric power installations that typically produce up to 100 kW of power.
- They are often used in water rich areas as a remote-area power supply (RAPS).
- Run-of-the-river hydroelectricity systems derive kinetic energy from rivers and oceans without using a dam.
- E.g: Grand Coulee Dam in Washington State and the Akosombo Dam in Ghana.



# BIOGASS



## Biogas plant :-

- ◆ Mixture of gases containing methane, carbon dioxide, hydrogen and hydrogen sulphide.
- ◆ It is produced by anaerobic degradation of animal waste.
- ◆ Anaerobic degradation means break down of organic matter by bacteria in the absence of oxygen.
- ◆ The biogas plant has a large underground tank made of bricks and  
◆ cement.
- ◆ The lower part is the digester and the upper part has a dome with a gas outlet.

**Animal dung is mixed with water in the mixing tank and the slurry is sent into the digester.**

- ❖ The gas is taken out through the gas outlet and used for heating and lighting purposes.
- ❖ The slurry left behind is rich in nitrogen and phosphorus and is used as manure for crops.
- ❖ From cattle dung alone we can produce biogas of a magnitude of 22.500 MW annually.
- ❖ A sixty cubic feet gohar gas plant can serve the needs of one average family.
- ❖ This gas contains 55 – 70 percent methane, which is inflammable and it is generally used as cooking gas and for generation of electricity.





# TIDAL ENERGY

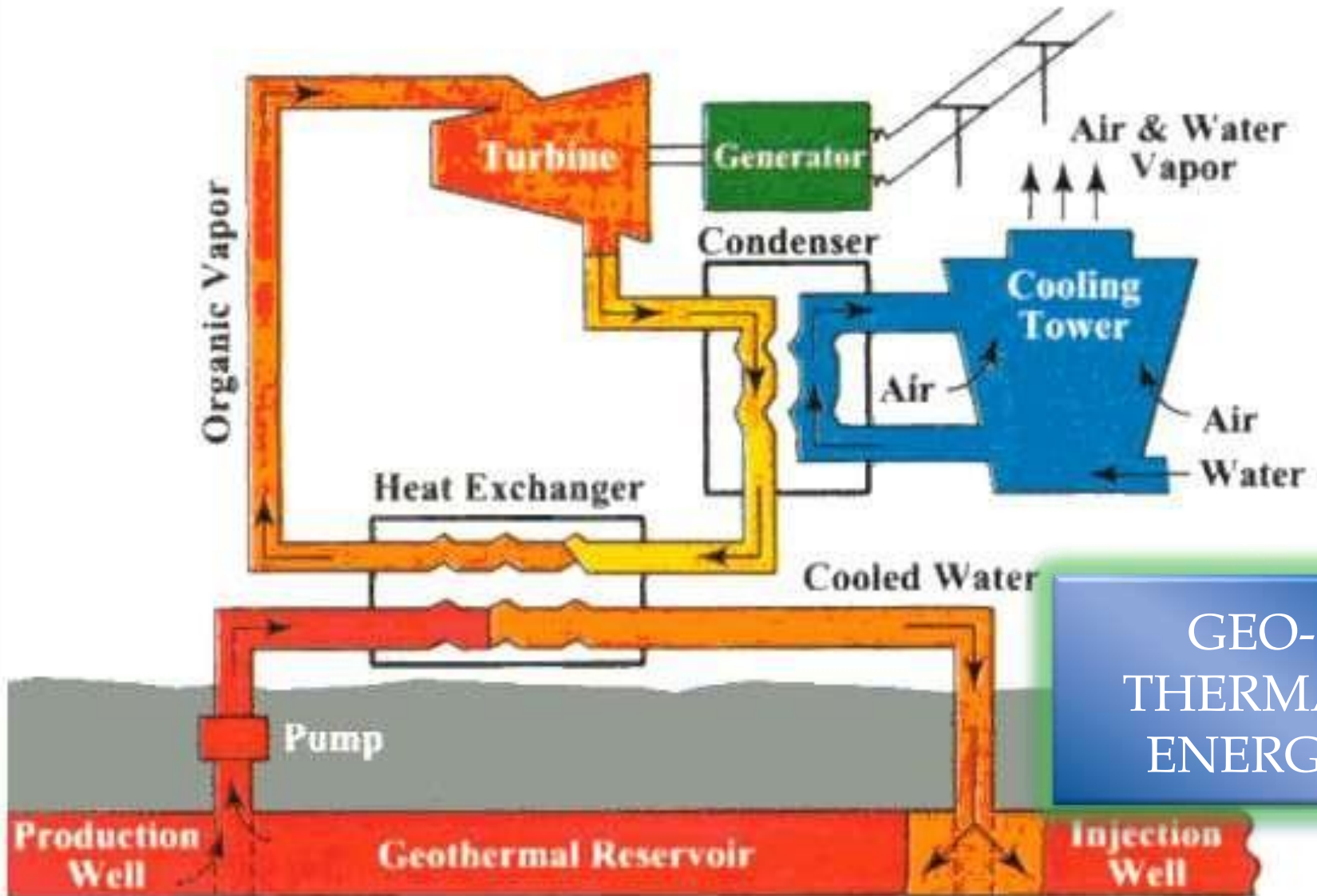
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# Tidal energy :-

- ❖ Produced by gravitational forces of sun and moon.
- ❖ Produced by making the use of water movement from a high tide to a low tide.
- ❖ The high tide to a low tide refers to the rise and fall of water in the ocean.
- ❖ A difference of several meters is required between the high and low tide.
- ❖ Ocean waves and tides can be made to turn a turbine and generate electricity.
- ❖ Areas where rivers flow into the sea experience waves and tides and electricity can be generated there. It has much potential.

## Schematic of binary cycle geothermal power plant



GEO-  
THERMAL  
ENERGY

## Geothermal energy :-

- It means the energy harnessed from the hot rocks present inside the earth .
- High temperature, high pressure steam fields exist below the earth's surface in many places.
- At the core, temperatures may reach over 9,000 degrees Fahrenheit.
- This heat comes from the fission of radioactive material naturally present in the rocks.
- The deeper regions of the earth's crust is very hot. This heat melts rocks and forms magma.
- The magma moves up and collects below at some places called Hot spots.
- The underground water in contact with hot spot gets heated into steam at high pressure.
- By drilling holes into hot spots the steam coming out can be used to rotate turbines of generators to produce electricity.



# BIOFUEL

# Biofuel:-

- ❖ **Biofuels include a wide range of fuels which are derived from biomass.**
- ❖ **The term covers solid biomass, liquid fuels and various biogases.**
- ❖ **Liquid biofuels include bio-alcohols, such as bioethanol, and oils, such as biodiesel.**
- ❖ **Gaseous biofuels include biogas, landfill gas and synthetic gas .**
- ❖ **Bioethanol is an alcohol made by fermenting the sugar components of plant materials and it is made mostly from sugar and starch crops.**
- ❖ **Trees and grasses, are also used as feedstock for ethanol production. Ethanol can be used as a fuel for vehicles in its pure form.**





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