PARMAR SSC

Topic:- Minerals



Minerals

- A mineral is a natural substance of organic or inorganic origin with definite chemical and physical properties.
- It is a homogenous naturally occurring substance with a definable internal structure.
- Minerals are of three types: Metallic, Non-Metallic, and Energy Minerals.

Metallic Minerals

1.Ferrous (containing iron)

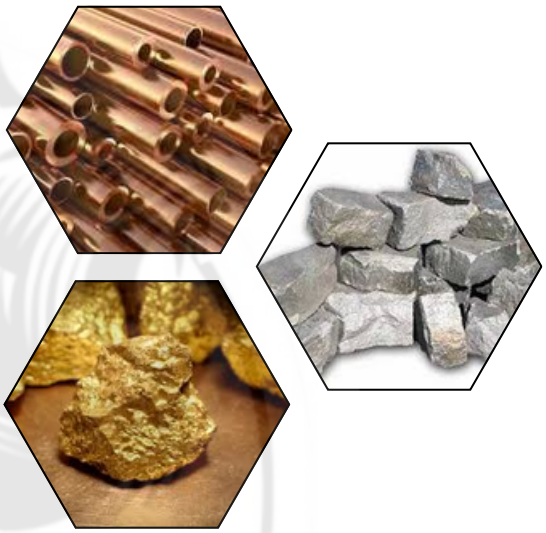
- Iron ore, manganese, nickel, cobalt, etc.

2. Non-Ferrous

- Copper, lead, tin, bauxite, etc.

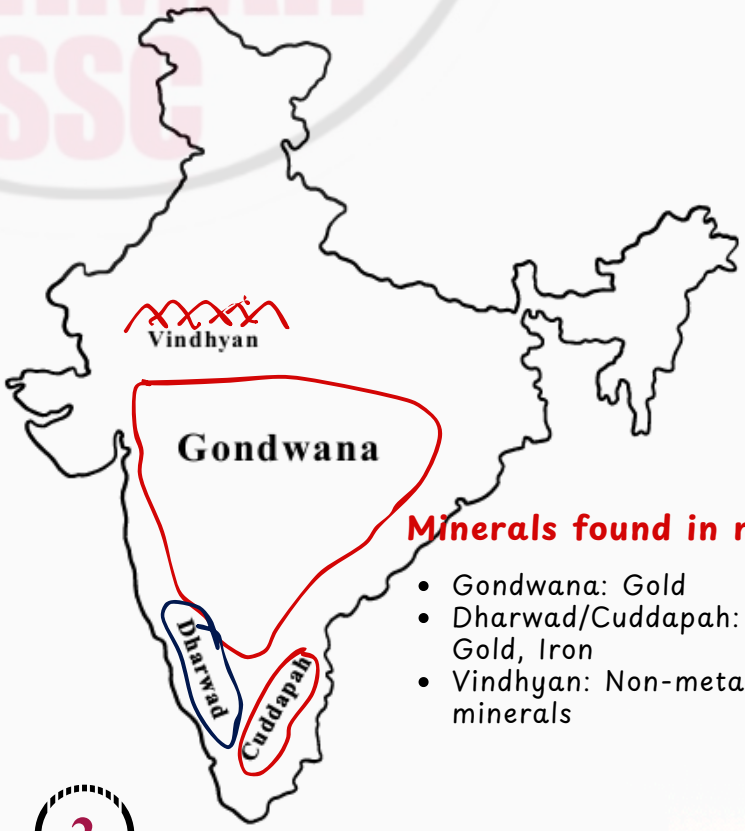
3. Precious

- Gold, silver, platinum, etc



Distribution of Minerals in India

- Most of the metallic minerals in India are found in the Peninsular Plateau.
- Over 97% of coal reserves are found in the valleys of Damodar, Son, Mahanadi and Godavari.
- Petroleum reserves are located in the sedimentary basins of Assam, Gujarat and Mumbai High i.e., off shore region in the Arabian Sea.
- Most of the major mineral resources occur to the east of a line linking Mangaluru and Kanpur



Minerals found in region.

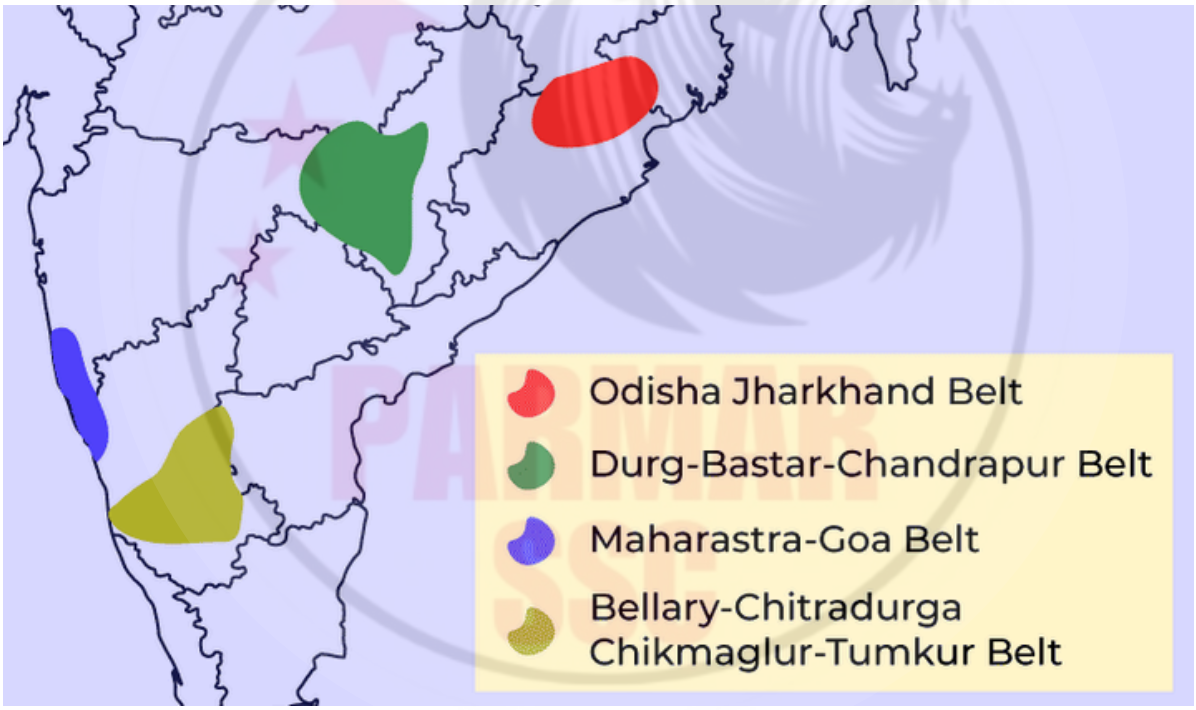
- Gondwana: Gold
- Dharwad/Cuddapah: Gold, Iron
- Vindhyan: Non-metallic minerals

Iron Ore



- Magnetite is the finest iron ore with a very high content of iron up to 70%.
- Hematite ore is the most important industrial iron ore in terms of the quantity used, but it has a slightly lower iron content than magnetite (50-60%)
- In 2018-19, almost entire production of iron ore (Approx. 97%) came from the states of Odisha, Chhattisgarh, Karnataka and Jharkhand.
- Reserve (topmost) : Odisha.
- Production: Odisha > Chhattisgarh > Karnataka.
- More than 72% of Magnetite deposits in India are found in Karnataka

Four Major Iron Ore Belt in India



1. Odisha-Jharkhand Belt

- Jharkhand: Singhbhum (Region: Noamudi and Gua).
- Odisha region: Sundargarh, Mayurbhanj, Jhar.
- Odisha: Badampahar mines.

2. Durg-Bastar-Chandrapur Belt (Chhattisgarh and Maharashtra)

- Dalli rajhara, Bailadila (Chhattisgarh).

3. Maharashtra-Goa Belt

- Goa: Mormugao.

4. Bellary-Chitradurga-Chikmanglur-Tumkur Belt (Karnataka)

- Mangalore, Kudremukh, Baba Budan Hills.
- Karnataka: Shivamogga.

Ferrous Minerals

Manganese



- Manganese is mainly used in the manufacturing of steel and ferro-manganese alloy.
- It is also used in manufacturing bleaching powder, insecticides, and paints.
- Topmost producer (India): Madhya Pradesh.
- Odisha: Sundargarh deposits.



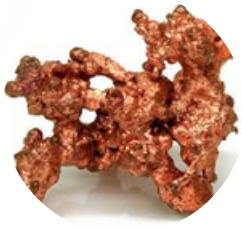
Non-Ferrous Minerals

Copper

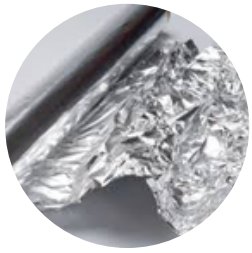


- First metal to be discovered by humans.
- The Balaghat mines in Madhya Pradesh, Khetri mines in Jhunjhunu and Alwar region in Rajasthan.
- Singhbhum district of Jharkhand

Aluminium



- Primary ore: Bauxite.
- It is used in aircraft because of its lightweight.
- India's bauxite deposits are mainly found in the Amarkantak plateau, Maikal hills, and the plateau region of Bilaspur-Katni.
- Odisha is the largest producer of Bauxite.
- Panchpatmali deposits in Koraput district are the most important bauxite deposits in Odisha.
- Largest producer of bauxite in the world: Australia.



Gold



- Topmost producer (World): China > Australia.
- Topmost producer (India): Karnataka (Kolar Gold Field), Hutti Gold field.
- Andhra Pradesh: Ramagiri.
- Largest reserves (India): Bihar.

Note : Hornblende is a inosilicate amphibole mineral used in highway construction.



Non-Metallic Minerals

1. Mica :

- It is used in electric and electronic industries due to its excellent di-electric strength, low power loss factor, insulating properties and resistance to high voltage (forms 4% of Earth's crust).
- Mica deposits are found in northern edge of the Chota Nagpur Plateau.
- Koderma Gaya-Hazaribagh belt of Jharkhand is the leading producer of Mica.
- In Rajasthan, the major Mica producing area is around Ajmer.
- Nellore mica belt of Andhra Pradesh is also an important producer in the country.



2. Limestone

- It is a sedimentary rock that is found in association with rocks, composed of calcium carbonates, or a mixture of calcium and magnesium carbonates.
- It is a basic raw material for the cement industry and essential for melting iron ore in blast furnace.



3. Diamond

- Madhya Pradesh (Panna), is the only state that produces diamond.



- A diamond reflects light due to total internal reflection and a high refractive index, which are enhanced by its precise cut

Source of Energy

Conventional Sources

Commerical

- Coal
- Petroleum
- Electricity

Non-Commerical

- Fire-Wood
- Straw
- Dried-Dung

Non-Conventional Sources

- Bio-Energy
- Solar-Energy
- Tidal Energy
- Wind Energy
- Energy from Urban Waste

Conventional Sources of Energy

- These are traditionally used energy sources, often non-renewable and derived from fossil fuels. E.g. Fossil fuels (coal, oil, natural gas) and nuclear fuel (Uranium used in power plants).

Coal



- Coal is also known as buried sunshine/black diamond/black gold.
- In India, coal is the most abundantly available fossil fuel.
- In India coal occurs in rock series of two main geological ages, namely Gondwana, a little over 200 million years in age and in tertiary deposits which are only about 55 million years old.
- The major resources of Gondwana coal (metallurgical coal) are located in Damodar valley. Jharia, Raniganj, Bokaro are important coalfields.
- The Godavari, Mahanadi, Son and Wardha valleys also contain coal deposits.
- Tertiary coals occur in the north eastern states of Meghalaya, Assam, Arunachal Pradesh and Nagaland.
- Reserve (topmost): Odisha > Jharkhand >Chhattisgarh.
- Production(topmost): Chhattisgarh> Odisha



Types of Coal



Anthracite



Bituminous



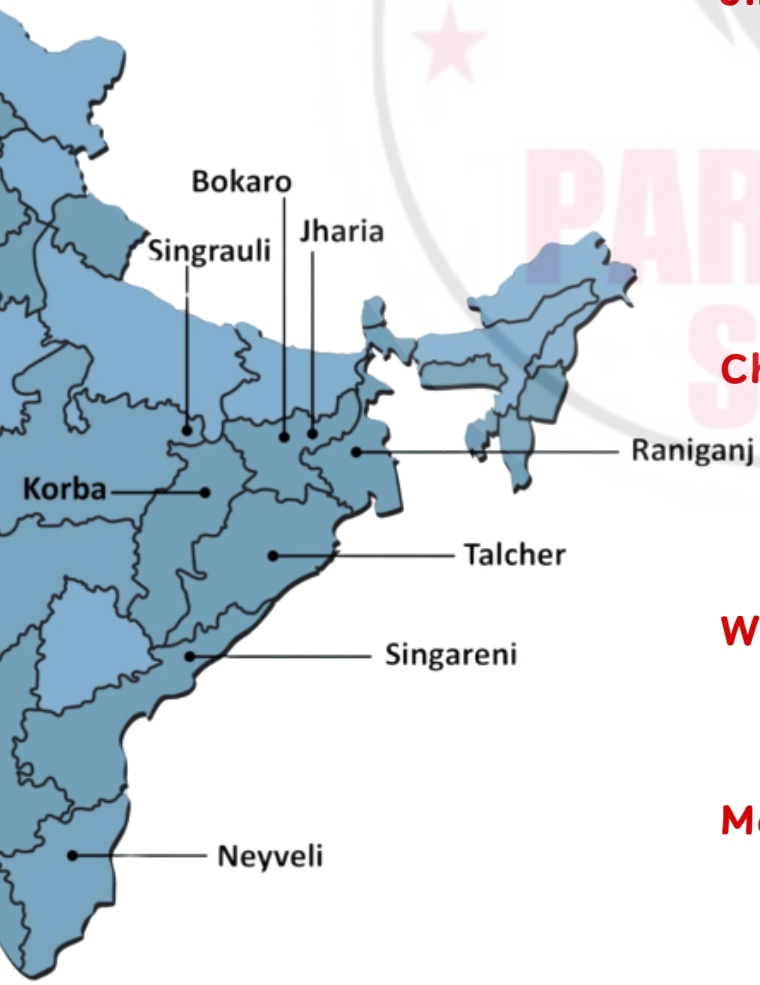
Lignite



Peat

- A good coal has: High calorific value, Low moisture content, High carbon content.
- **Anthracite**: 80-90% carbon, Highest quality, Hard coal.
- **Bituminous**: 70-80% carbon; coal that has been buried deep and subjected to high temperatures (also known metallurgical coal/coking coal).
- **Lignite**: 50-70% carbon; a great brown coal which is soft with high moisture content. Neyveli in Tamil Nadu is an important source of Lignite.
- **Peat**: Less than 50% carbon; decaying plants in swamps produce peat. It has a low carbon and high moisture content and low heating capacity.

Major Coal Mines of India



Jharkhand

- Jharia, Dhanbad
- Bokaro
- Jayanti
- Godda
- Giridih (Karbhari Coal Field)
- Ramgarh
- Karanpura
- Daltonganj

Chhattisgarh

- Korba
- Bishrampur
- Sonhat
- Jhilmil
- Hasdo-Arand

Odisha

- Jharsuguda Coalfield
- Rampia Coalfield
- Talcher Coalfield
- Ib Valley Coalfield

West Bengal

- Raniganj Coalfield,
- Dalingkot (Darjeeling), Birbhum,
- Chinakuri

Madhya Pradesh

- Singrauli Coalfield
- Sohagpur Coalfield
- Johila Coalfield
- Umaria Coalfield
- Satpura Coalfield

Maharashtra

- Kamptee (Nagpur)
- Wun Field
- Wardha
- Walarpur
- Ghughus
- Warora

Petroleum





- Ankleshwar is the most important oil field of Gujarat.
- Assam is the oldest oil producing state of India.
- Digboi (commissioned in: 1901 and is the 1st refinery of India), Naharkatiya and Moran-Hugrijan are the important oil fields in the state.

Natural Gas

- Methane (CH_4) is a primary component of natural gas (70-90%).
- Natural Gas is found with petroleum deposits and is released when crude oil is brought to the surface.
- It is used as fuel in power sector to generate electricity.
- The majority of India's natural gas reserves are located in the Mumbai High and associated fields along the west coast, with additional reserves being found in the Cambay Basin.

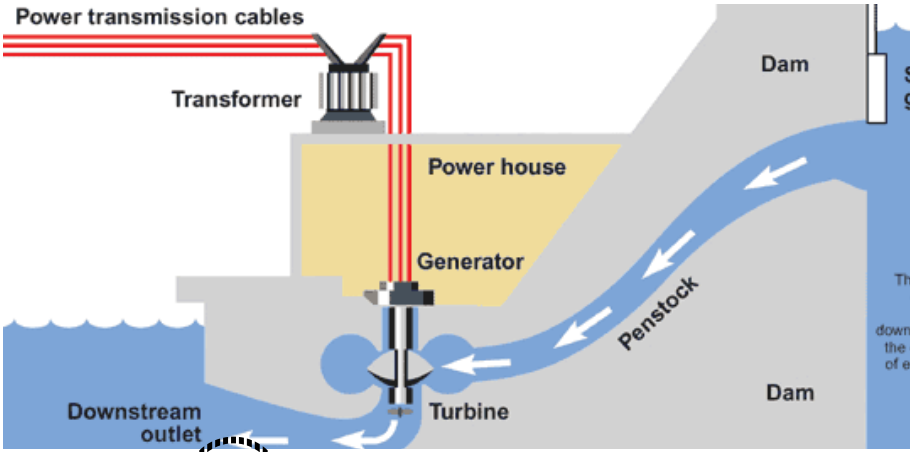


Ethyl mercaptan

- Its primary use is as an odorant in otherwise odorless gases like natural gas and propane to act as a warning agent for leaks

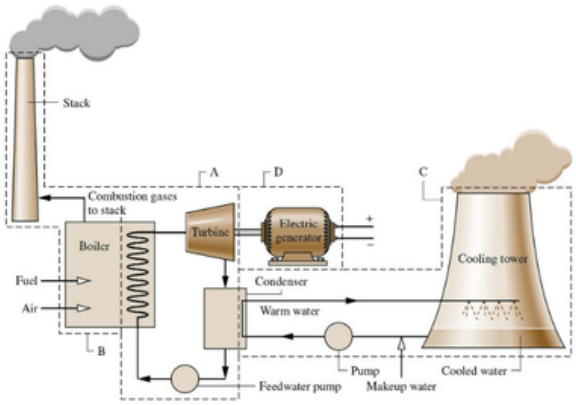
Electricity

- Hydro-energy/Hydroelectricity: Hydroelectricity is a renewable energy source that uses the power of moving water to generate electricity.
- Thermal: It uses the power of Coal, Petroleum and Natural Gas to generate electricity.



Thermal Energy Power Plant

- Thermal energy power plants, also known as thermal power stations are facilities that convert heat energy, often from burning fossil fuels or nuclear fission, into electrical energy, typically by using steam to drive turbines.



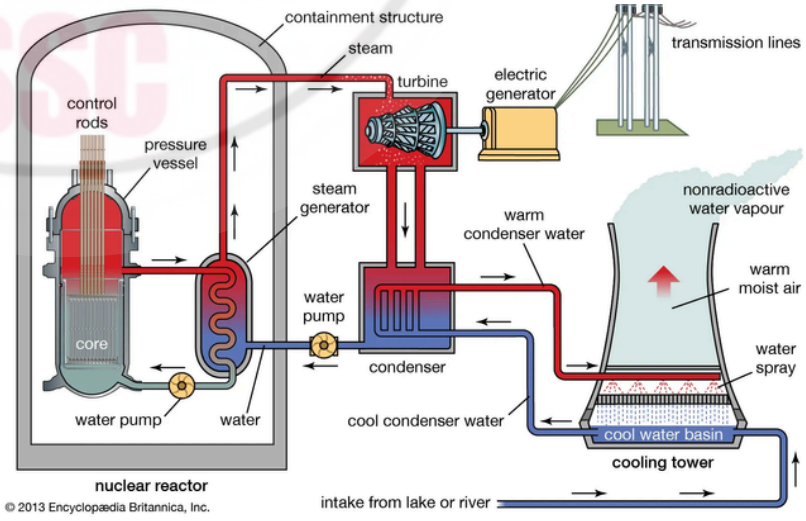
Non-Conventional Sources of Energy



- These are energy sources that are replenished naturally and can be used continuously without depletion, often referred to as renewable energy sources. E.g. Solar energy, wind energy, geothermal energy, Biogas etc.

Nuclear/Atomic Energy

- Nuclear fission is a reaction in which the nucleus of an atom splits into two or more smaller nuclei.
- The fission process often produces gamma photons, and releases a very large amount of energy which is used to generate electric power. E.g. Uranium and Thorium mines, which are available in Jharkhand and the Aravalli ranges of Rajasthan
- Monazite sand of Kerala is also rich in Thorium.



Function of Moderator, Control Rods, and Coolant in Nuclear Reactors

1. Moderator

- Moderator slows down the fast-moving neutrons produced during fission, making them more likely to cause further fission events.
- E.g. Common moderators include, heavy water (deuterium oxide), and graphite.
- **Chernobyl disaster** took place on 26th April 1986 in Ukraine, Soviet Union.

2. Control Rods

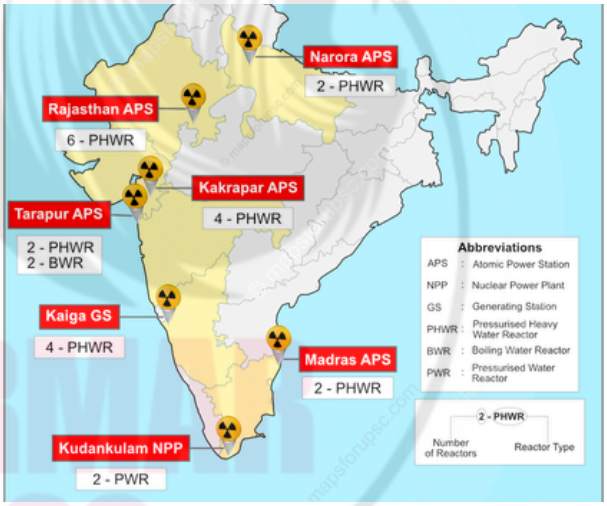
- Control rods absorb neutrons, thus regulating the rate of fission and preventing the chain reaction from becoming uncontrolled. E.g. Control rods are typically made of boron, cadmium, silver, etc.

3. Coolant

- Coolants remove the heat generated by fission, preventing the reactor core from overheating and allowing the heat to be used to produce steam for electricity generation. E.g. Heavy water, gas like helium or CO2.

Nuclear Power Plants of India

- Tarapur: Maharashtra (1st nuclear power plant) commissioned in 1969.
- Kudankulam and Kalpakkam: Tamil Nadu.
- Kaiga: Karanataka.
- Narora: Uttar Pradesh.
- Rawatbhata: Rajasthan.
- Kakrapar: Gujarat.



Solar Energy

- It is a renewable source of energy.
- Solar energy is the radiant heat and light from the sun that can be harnessed to generate electricity, heat, and other forms of energy.
- Photovoltaic technology is a technology which converts sunlight directly into electricity.
- HQ of **International Solar Alliance**: Gurugram.
- Bhadla Solar Park in Rajasthan is the largest.



PM-Suryaghar Bijli Yojna

PM Surya Ghar is a government scheme that provides subsidies for households to install rooftop solar panels, with the goal of offering up to 300 units of free electricity per month to one crore households

Wind Energy



- It is a renewable source of energy.
- India has a great potential of wind power.
- The largest wind farm cluster is located in Tamil Nadu from Nagercoil to Madurai.

Tidal Energy



- Ocean tides can be used to generate electricity.
- In India, the Gulf of Khambhat, the Gulf of Kutch in Gujarat on the western coast and Gangetic delta in Sunderban regions of West Bengal provide ideal conditions for utilising tidal energy.

Renewable Vs Non-Renewable Resources

Renewable Resources

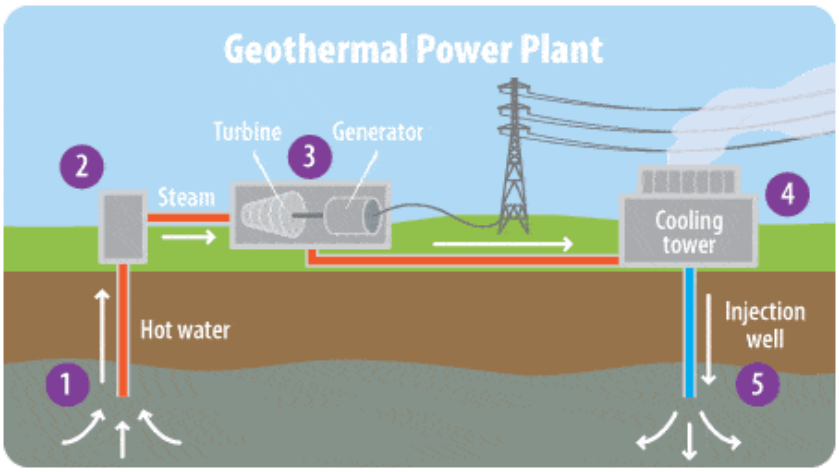
- They can be easily recycled
- They are also called as inexhaustible resources
- They are environment friendly and do not release any particles to the atmosphere.
- They are found abundantly in nature.

Non-Renewable Resources

- They cannot be easily recycled as they take millions of years to form once exhausted
- They are also called as exhaustible resources
- They are not environment friendly, they release carbon dioxide, methane, and other toxic gases.
- They are scarce in nature

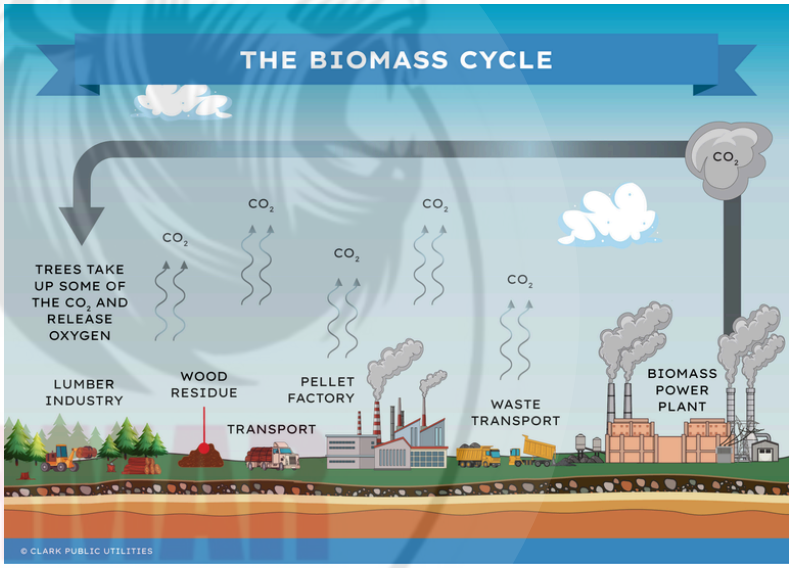
Geothermal Energy

- Geothermal energy refers to the heat and electricity produced by using the heat from the interior of the Earth.
- Two experimental projects have been set up in India to harness geothermal energy → Parvati valley near Manikarn (Himachal Pradesh) and Puga Valley (Ladakh).



Biomass

- Shrubs, farm waste, animal and human waste are used to produce biogas for domestic consumption in rural areas.
- Decomposition of organic matter yields gas, which has higher thermal efficiency in comparison to kerosene, dung cake, and charcoal.
- The plants that utilise cattle dung are known as 'Gobar gas plants' in rural India.

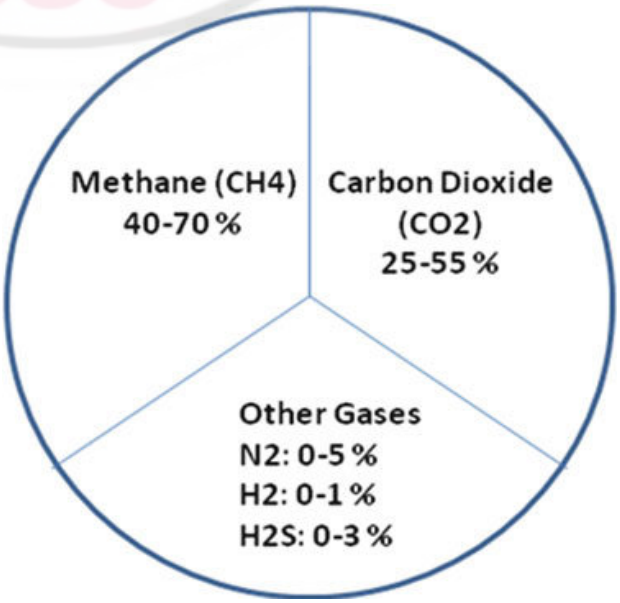


Anaerobic Digestion/Respiration

- In anaerobic digestion/respiration, microorganism breaks down biodegradable material in absence of oxygen.
- Biogas is generated through anaerobic respiration.

Biogas Composition:

- CO_2: 30-40%
- CH_4: 55-70%



Major Industrial Regions of India

- Mumbai-Pune Industrial Region.
- Hugli Industrial Region.
- Bangalore-Tamil Nadu Industrial Region.
- Gujarat Industrial Region.
- Chotanagpur Industrial Region.
- Vishakhapatnam-Guntur Industrial Region.
- Gurgaon-Delhi-Meerut Industrial Region.
- Kolfam-Thiruvananthapuram Industrial Region

