

Mineral Resources

The earth is made of rocks, which are in turn made of minerals.

In order for something to be classified as a *mineral*, it must meet five (5) criterion:

Minerals are:

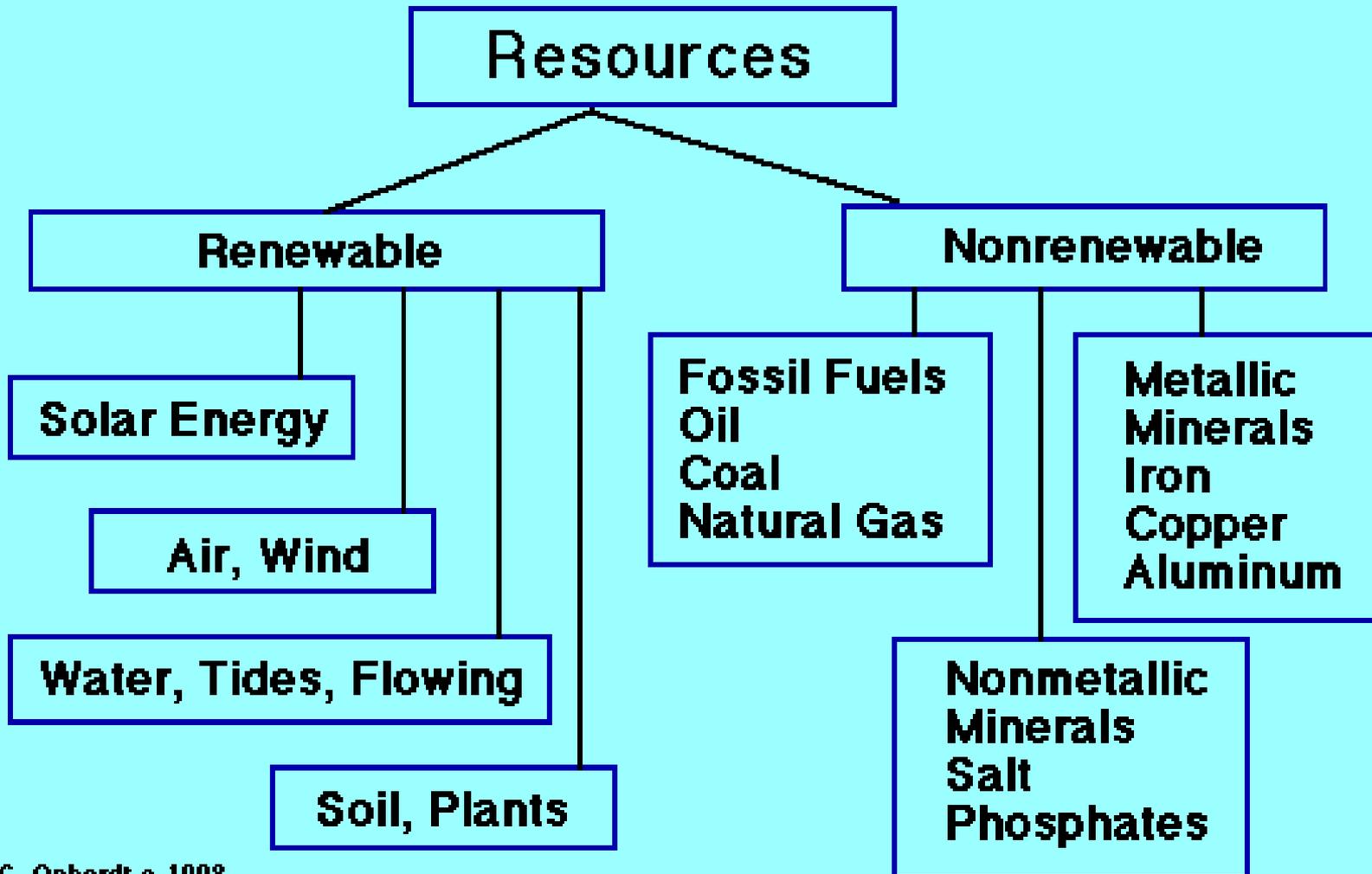
- 1. Naturally occurring,
- 2. Inorganic,
- 3. Have known chemical compositions
- 4. Have definite physical properties.
- 5. Are solid
-

They are usually (although not always) crystalline.

What are Mineral Resources?

- Concentration of naturally occurring material in or on the earth's crust that can be extracted and processed into useful materials
- Classified as *nonrenewable resources* because they take so long to produce
- We know how to find and extract 100+ nonrenewable minerals from the earth's crust
- **Mineral resources** that are potentially valuable, and for which reasonable prospects exist for eventual economic extraction.
- A 'Mineral Resource' is a concentration or occurrence of material of intrinsic economic interest in or on the earth's crust in such form, quality and quantity that there are reasonable prospects for eventual economic extraction.

Types of Mineral Resources



Fuels

- Fuel refers to various types of solid material that are used as fuel to produce energy and provide heating, usually released through combustion.
- Fuels are combustible or energy-generating molecules that can be harnessed to create mechanical energy, usually producing kinetic energy; they also must take the shape of their container.
- Fuel gas is any one of a number of fuels that under ordinary conditions are gaseous. Many fuel gases are composed of hydrocarbons (such as methane or propane), hydrogen, carbon monoxide, or mixtures thereof
- COAL ANTHRACITE:
- Coal is an important Fuel.



Coal

- Coal mining in India started in 1774 through East India Company in the Raniganj Coalfield along the Western bank of Damodar River in the Indian State of West Bengal.
- Growth of the Indian coal mining started when steam locomotives were introduced in 1853.
- Production increased to Million tonnes. Production reached 30 million tonnes in 1946.
- After Independence, National Coal Development Corporation was setup and collieries were owned by Railways.
- India consumes coal mainly for Power sector. Other industries like cement, fertilizer, chemical and paper rely coal for energy requirements.
- The Coal reserves of country are approximately 70 billion tonnes but today the rate of minning is about 400 to 450 tones anually , if these rates of minning remain continue than within 180 to 200 years these resource became absorbed.
- According to different carbon contain it can be cathogorised as
- ***Lignite***



bituminous



anthracite



Oil

- Most of India's crude oil reserves are located in the western coast (Mumbai High) and in the northeastern parts of the country, although considerable undeveloped reserves are also located in the offshore Bay of Bengal and in the state of Rajasthan.
- The combination of rising oil consumption and fairly unwavering production levels leaves India highly dependent on imports to meet the consumption needs.
- The formation of crude oil takes million of years .
- The petroleum after distillation and further processing provides numerous products and by-products.
- 1 million tones of crude oil on Fractional Distillation provides 0.8 million tones of petroleum product through the fractional distillation.



Natural gas

- A mixture of hydrocarbon **gases** that occurs **naturally** beneath the Earth's surface, often with or near petroleum deposits. **Natural gas** contains mostly of **methane** but also has varying amounts of **ethane, propane, butane, and nitrogen**. It is used as a fuel and in making organic compounds
- A huge mass of India's natural gas production comes from the western offshore regions, particularly the Mumbai High complex.
- The onshore fields in Assam, Andhra Pradesh, and Gujarat states are also major producers of natural gas.
- Half of the total Natural gas was remained utilized but in recent years people understood the value of this natural resources.
- Today we are using approximately 80
- to 90% of Natural gas.



Mining

- Mining : It is the process of extracting minerals from the earth's crust, the minerals can be extracted by surface or sub-surface mining.
- Out of these two sub-surface mining is more destructive, dangerous and expensive also
- Surface mining: equipment strips outer layer of soil and rock; used to extract 90% nonfuel resources and 60% coal
- Requires mining companies to restore surface-mined land so that it is usable again
- Although surface-mined land can be restored, it is expensive and not done in many countries.
- Open-pit mining: machines dig holes and remove ores



- **Dredging**: chains scrape underwater mineral deposits.



- **Area strip mining**: parallel strips made in flat land; power shovels used.



- **Contour strip mining**: terraces cut into side of hill; power shovels used.



- **Mountaintop removal**: explosives used to remove top of mountain and expose coal underneath.



Subsurface mining

- Used to remove coal and other metal ores that are too deep to be extracted by surface mining
- Blast tunnels to get to deposit, use machinery to transport ore to the surface
- Disturbs 1/10 as much land as surface mining, produces less waste
- More dangerous and expensive.



Impact of Mining

- [erosion](#)
- formation of [sinkholes](#)
- loss of [biodiversity](#)
- contamination of soil, [groundwater](#), [surface water](#) by chemicals from [mining](#) processes
- Health hazard
- Dissolution and transport of metals and [heavy metals](#) by run-off and ground water is another example of environmental problems with mining

What you can do to reduce Mining's Environmental Impacts

- **Reducing the consumption of minerals**
- People can reduce the consumer goods they use or the content of minerals in manufactured processes can be reduced. For example, instead of building more cars, we could rely more on public transit.
- **The efficiency of manufacturing processes can be increased to reduce the amount of new minerals required**
- For example, structural beams might be designed to be equally strong while using less steel.
- **Substitution of other materials and processes with more environmentally friendly materials and processes**
- For example, plastics might be used instead of metal to build appliances. Or biomass can be used instead of uranium to produce energy.
- **Using recycled materials instead of mined materials**
- For example, if tin cans are efficiently recycled, less material needs to be mined to make cans.

- **Improving environmental performance at mines**
- Mines can be designed so that they produce less waste or use less toxic chemicals.
- **Legislation and regulations to reduce environmental impacts can be enacted and enforced**
- Governments can require mines to adopt increasingly effective environmental procedures and invoke penalties for failure to comply.
- **Cleaning up abandoned mine sites**
- Companies and governments can be held accountable for abandoned sites and be required to carry out an environmental cleanup.
- **Economic measures**
- like tax shifting, can be introduced to provide incentives for practices like product substitution and disincentives for poor environmental performance.