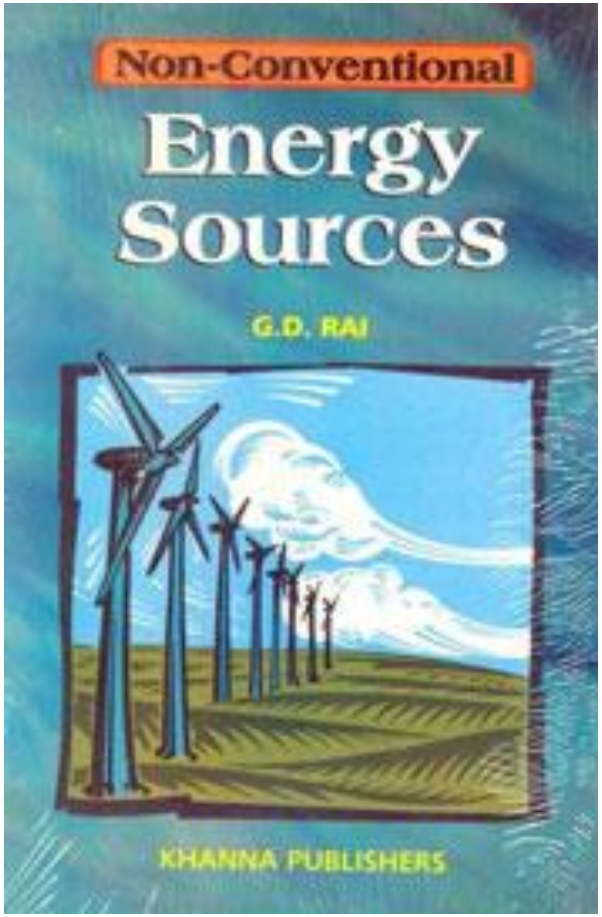
NON-CONVENTIONAL ENERGY SOURCES

SURESH VC
Associate Professor
Department of Physics
MES Keveeyam College, Valanchery

Textbooks for study

- **Non-conventional energy sources**
- **author : G.D.Rai**
- **Khanna publishers**



Conventional & Non-Conventional

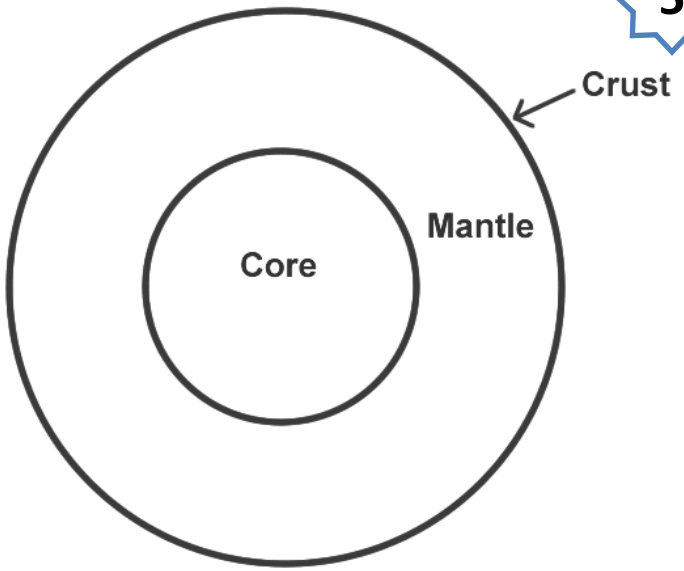
Conventional Energy	No-Conventional Energy
•Coal •Petroleum •Natural gas	•Solar •Wind •Biomass •Tidal energy •Geo-thermal energy

Importance of non-conventional energy source

- increasing demand for energy
- fast depleting conventional sources of energy

Types of non-conventional energy sources

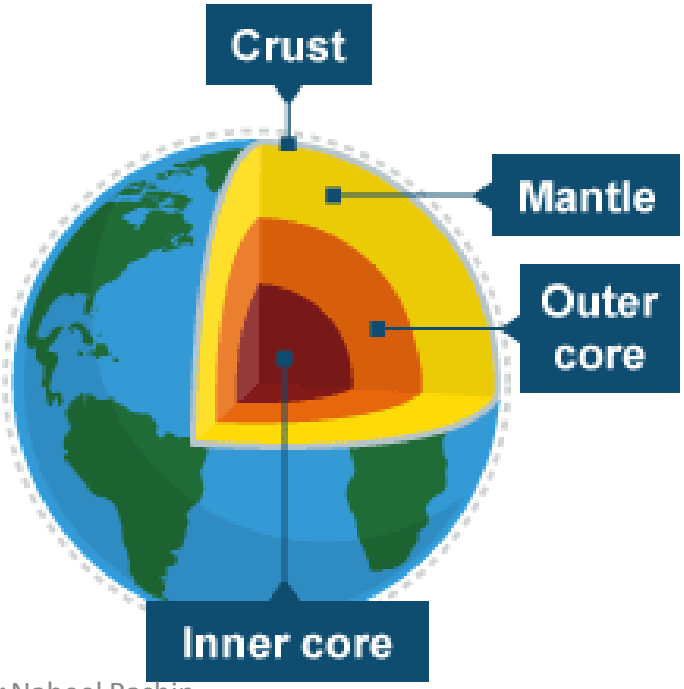
GEOTHERMAL ENERGY



Basic Information of earth

THREE GENERAL LAYERS OF EARTH

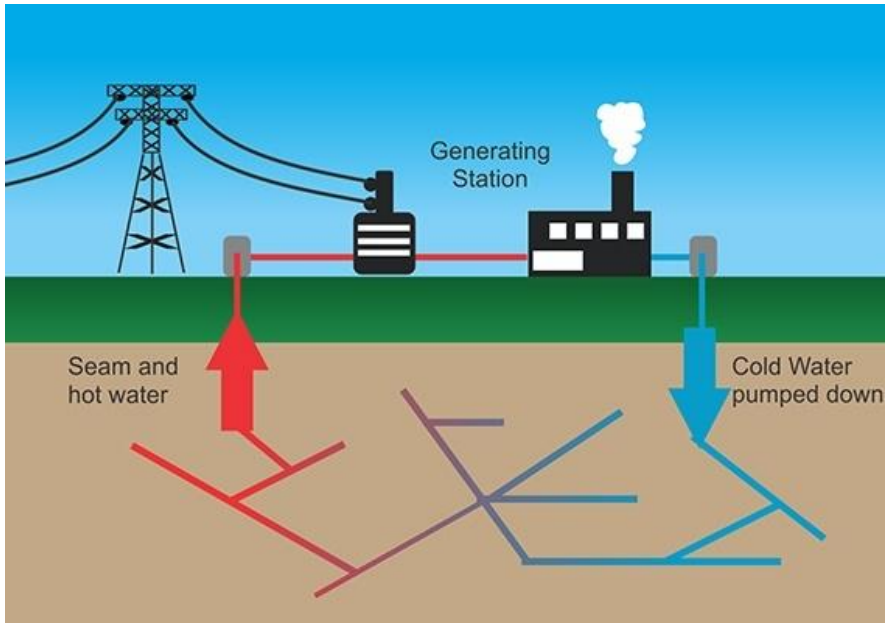
- Core
- Mantle
- Crust



Geothermal energy

- **THERMAL ENERGY**
  - Heat energy
  - Determines the temperature of matter
- **GEOTHERMAL ENERGY**
  - thermal energy present in earth's crust
  - Readily accessible form for of heat

Nesjavellir Geothermal Power Station (Iceland)



Geothermal Sources

- Hydrothermal convective systems
- Geopressured resources
- Petro-thermal or Hot Dry Rocks
- Magma Resources
- Volcanoes

Hydrothermal systems

- Hydrothermal systems
  - Vapor dominated systems
  - Liquid dominated system
  - Hot water fields

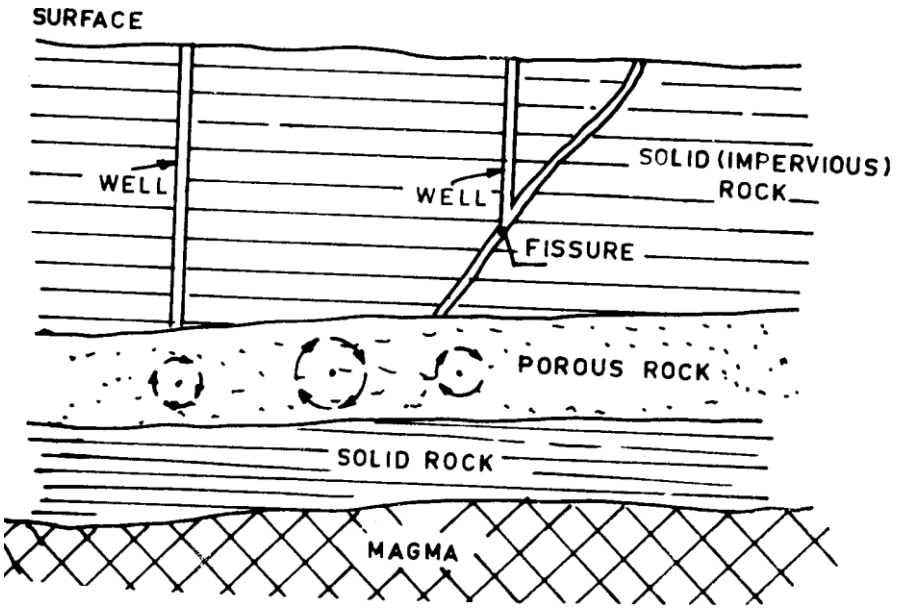
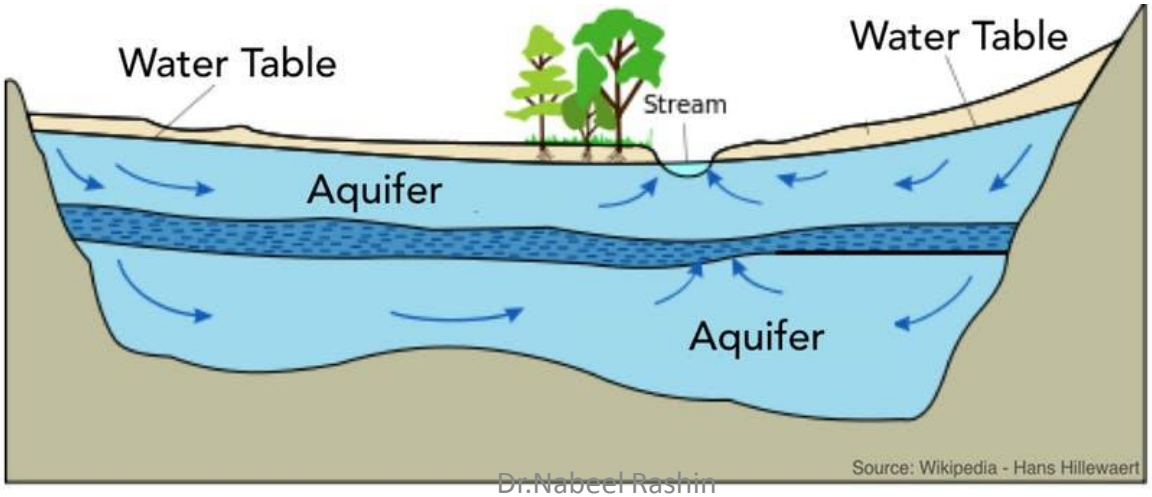


Fig. 8.5.1. Hydrothermal convenctive region.

Geo pressured Systems

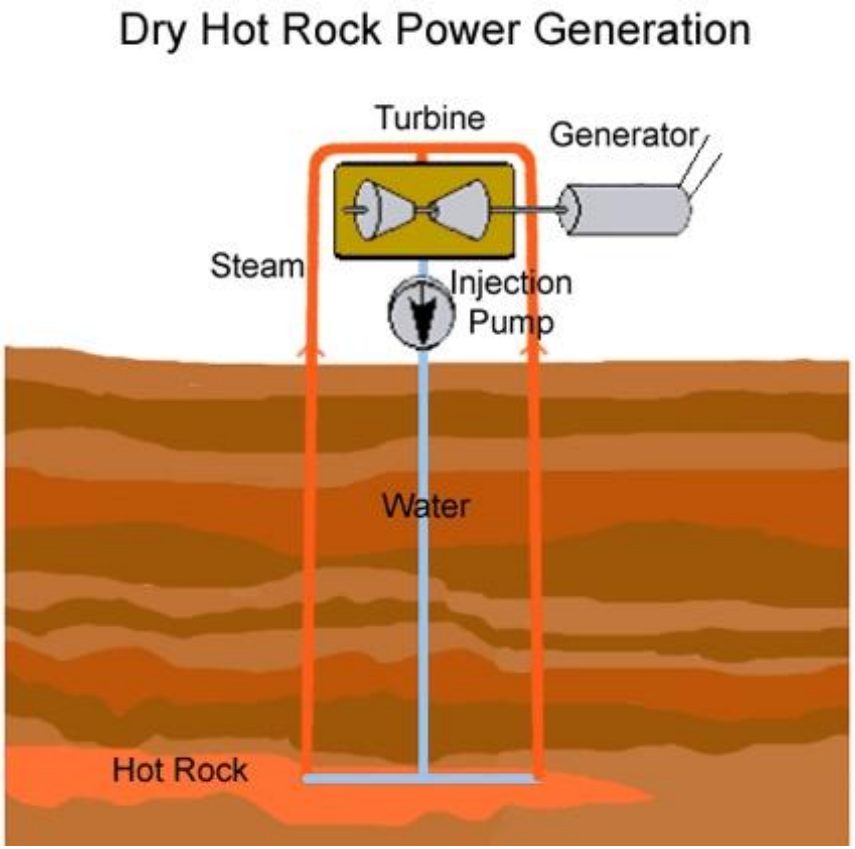
- Reservoir contains moderately high temperature water (160 ^{o}C)
- Substantial amount of **methane** (Natural Gas) dissolved in the pressurized water →released when pressure is reduced

- ***aquifers*** *: a body of permeable rock which can contain or transmit groundwater*



Hot Dry Rocks (or Petrothermal systems)

- Very hot solid rocks (150 to 290 ^{o}C)
- Moderate depths
- Water does not have access because of absence of ground water or the low permeability of the rock
- **To utilize this→**
- breakup impermeable rock
  - Fracturing by high pressure water
  - Nuclear explosives
- Introduce cold water and recover the resulting hot water or steam

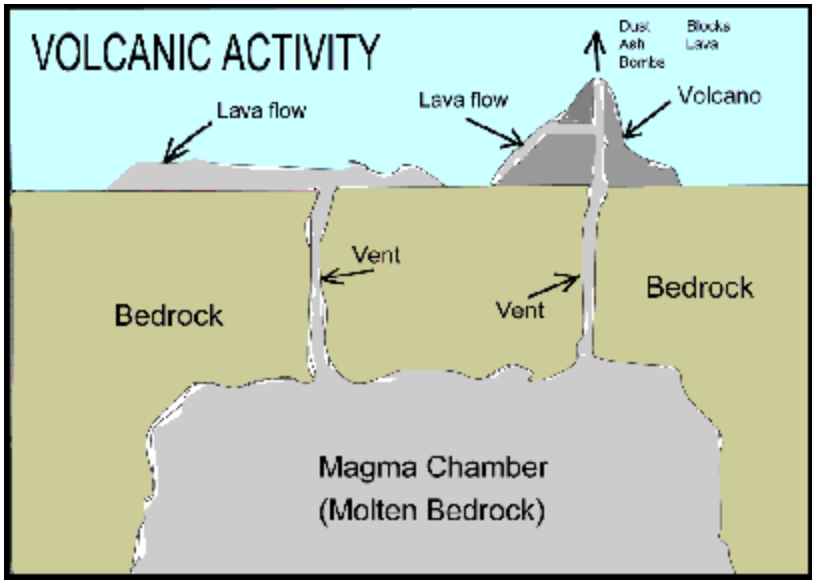


Magma Resources

- Consists of partially (or completely) molten rock
- Available at moderate depths at recently active volcanic regions

Drawbacks

- Available only at few locations
- Difficult t extract the energy due to high temperature



ADVANTAGES OF GEOTHERMAL ENERGY

- Versatile
- Cheaper
- Least polluting
- Multiple uses
- Renewable

DISADVANTAGES OF GEOTHERMAL ENERGY

- **Low efficiency**
- **Surface subsidence**
- **Pollution**
- **Drilling** operation is **noisy**
- **Large areas** needed

APPLICATIONS OF GEOTHERMAL ENERGY

THREE MAIN APPLICATIONS

1. Generation of Electric Power
2. Industrial process heat
3. Space heating for various buildings