ENERGY GENERATION: GEOTHERMAL AND THERMAL ENERGY

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GEOTHERMAL ENERGY

Geothermal energy is a form of renewable energy that comes from the heat stored beneath the Earth's surface. The word "geothermal" comes from the Greek words **geo** (earth) and **thermal** (heat), meaning "earth heat."

OR

"The use of heat from the Earth's interior to generate energy, either directly or indirectly, through various technologies, including power plants, heat pumps, and thermal energy conversion systems."



GEOTHERMAL ENERGY GENERATION PROCESS

- Locating a geothermal reservoir
- Extracting hot water or steam
- Power plant conversion
- Turning turbines to generate electricity
- Condensing and reinjecting
- Electricity distribution



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TYPES OF GEOTHERMAL ENERGY

Conventional Geothermal Energy

Generated from hot water or steam reservoirs.

Used for power generation and direct use applications.

Enhanced Geothermal Systems (EGS)

Artificially created geothermal reservoirs.

Used for power generation in areas with limited natural resources.



Binary Cycle Geothermal Energy

Uses secondary fluids to extract heat from geothermal resources. Suitable for lower-temperature resources.

Direct Use Geothermal Energy

Uses geothermal energy directly for heating, cooling, and industrial processes.

Examples include district heating, greenhouse heating, and aquaculture.

Closed Loop Geothermal Energy

Uses sealed loops to extract heat from underground rocks.

Suitable for areas with limited natural resources.





ADVANTAGES & DISADVANTAGES OF GEOTHERMAL ENERGY

Advantages

Geothermal energy is environmental friendly.

Heigh efficiency of geothermal system as it use 25-50% less electricity.

Disadvantages

High cost of installation.

Risk of triggering earthquakes due to sudden ejaculation of water.



THERMAL ENERGY

Thermal energy is the energy generated from the heat of various sources, including fossil fuels, biomass, nuclear reactions, and solar radiation. It is a form of kinetic energy associated with the motion of particles in a substance due to their temperature.

THERMAL ENERGY GENERATION PROCESS

- Energy source selection
- Heat generation
- Heat transfer
- Electricity generation
- Usage of thermal energy
- U Waste heat management



TYPES OF THERMAL ENERGY

Given Service Service

Generated from combustion of coal, natural gas, and oil. Used in power plants, industrial processes, and heating systems.

Biomass-Based Thermal Energy

Generated from organic matter (wood, agricultural waste, etc.). Used in power plants, industrial processes, and heating systems.

Solar Thermal Energy

Generated from concentrated solar radiation. Used for heating, cooling, and power generation.

Nuclear Thermal Energy

Generated from nuclear reactions.

Used in nuclear power plants for electricity generation.

□ Waste Heat Recovery Thermal Energy

Generated from waste heat from industrial processes.

Used to increase efficiency and reduce energy waste.

ADVANTAGES & DISADVANTAGES OF THERMAL ENERGY

Advantages

Thermal power plant can be established anywhere. Generation costs are extremely low as coal is very cheap.

Disadvantages

They are not environmental friendly and cause pollution. Cost of maintenance is high.

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THANKS