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Perspective

Thermal Power Plant Components, Together with their Benefits and Drawbacks

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Description

A thermal power station is a type of power plant where heat energy is transformed into electric power. It depends on the ranking cycle. When water is heated, steam is created, which drives the steam turbine that powers the electrical generator. The heat added to a boiler at a power plant in order to generate electricity is most frequently referred to as thermal power. Systems for producing solar thermal power (electricity) gather and focus sunlight to create the high temperatures required producing energy. The steam is used in a typical steam turbine to produce energy.

Currently, parabolic troughs, power towers, and dish/engine systems are the three solar-thermal power technologies being developed. These technologies can easily be combined with fossil fuels and, in some situations, modified to make use of thermal storage because they use a thermal intermediate. Steam power plants can be erected for industrial uses such as paper mills, textile mills, sugar mills and refineries, chemical works, plastic manufacturing, food manufacturing, etc. to either create electrical energy alone or electrical energy coupled with the generation of steam.

Advantages and Disadvantages of a Thermal Power Plant

Advantages of Thermal Power Plant

Financial benefits: When compared to other types of power plants, the initial investment cost to establish a thermal power plant is also lower. These plants are typically positioned close to the load center, which lowers the cost of electricity distribution.

Location advantage: Locations for thermal plants can be chosen taking into account places where relocating people is not necessary. The development of thermal power plants typically occurs in plain areas and does not require much larger acreage, emphasizing the potential for expansion.

Environmental impact: Fuels with almost no harmful emissions are used in the thermal power generation process. Thermal power station building also takes very little time, greatly lowering the likelihood of air and soil contamination.

Reliable source of energy: Power plants are adaptable enough to deal with a range of power needs and shifting demand patterns. The mainstay of grid supply, thermal power offers a consistent output. Thermal power generation is a more dependable source of energy because the technology is well-established and widely available.

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Disadvantages of Thermal Power Plant

Volume of water requirement: Water sources in rivers, lakes, and groundwater are severely impacted by the enormous demand for water.

Use of fossil fuels: Coal and natural oil must be mined for thermal power generation, which causes the depletion of these fossil resources. The quality of the coal or natural oil used in thermal power plants might occasionally affect the power production at its maximum.

Air and soil pollution: The occasional emission of toxic gases like Carbon dioxide, Sulphur dioxide, and other gases has a negative effect on the ecosystem. There is a potential that pollution will be produced from non-point sources as a result of coal transportation, fuel loading and unloading, coal and oil storage, etc.

High maintenance cost: Thermal facilities have intricate machinery and equipment that must be handled carefully by qualified staff. The ability of the facility to expand its capacity and resources is constrained by a lack of current equipment and qualified employees to handle operations and maintenance.

Low efficiency and life span: Many thermal power facilities that use coal have outdated technology that cannot be upgraded. Considering the climate changes brought on by pollution and the greenhouse effect, environmental scientists have recommended restricting the operation of coal-based power plants.

Major Components of a Thermal Power Plant

- Coal handling plant
- Pulverizing plant
- Draft or draught fan
- Boiler
- Ash handling plant
- Turbine and generator
- Condenser
- Cooling tower and ponds
- Feed water heater
- Economizer
- Super heater and reheated
- Air pre heater
- Alternator with exciter
- Protection and control equipment
- Instrumentation

Conclusion

However, compared to other power generation techniques, thermal power plants that use fossil fuels emit more CO_2. It is crucial that the temperature of the steam or gas be used to rotate in thermal power plants to increase efficiency.