

POWER PLANTS

Power Plant:

A **power plant** (or **power station**) is an industrial facility that generates electricity by converting various forms of energy into electrical power.

It serves as the backbone of modern electricity supply systems. Power plants use different energy sources, such as fossil fuels, nuclear energy, or renewable resources, to produce electricity.

Classification of Power Plants:

Power plants can be classified based on various criteria, such as the type of energy source, method of power generation, and their application. Here's a detailed classification:

1. Based on Energy Source

A. Conventional (Non-Renewable) Power Plant

- Thermal Power Plants – Use fossil fuels (coal, oil, natural gas)
- Nuclear Power Plants – Use nuclear fission (uranium, plutonium)

B. Renewable Power Plants

- Hydroelectric Power Plants – Use water flow (dams, run-of-river)
- Solar Power Plants – Use photovoltaic (PV) cells or solar thermal energy
- Wind Power Plants – Use wind turbines

- Geothermal Power Plants – Use heat from the Earth's core
- Biomass Power Plants – Use organic matter (wood, agricultural waste, biogas)
- Tidal and Wave Power Plants – Use ocean tides and waves

2. Based on Power Generation Process

- Steam Power Plants – Use steam turbines (coal, nuclear, biomass)
- Gas Turbine Power Plants – Use combustion turbines (natural gas, diesel)
- Combined Cycle Power Plants (CCPP) – Use both gas and steam turbines
- Diesel Power Plants – Use diesel engines
- Hydroelectric Power Plants – Use water turbines
- Fuel Cell Power Plants – Use electrochemical reactions (hydrogen, methanol)

3. Based on Load Handling Capacity

- Base Load Power Plants – Operate continuously (coal, nuclear, large hydro)
- Peaking Power Plants – Operate during high demand periods (gas turbines, hydro)
- Standby/Backup Power Plants – Used in emergencies (diesel generators, battery storage)

4. Based on Location

- Onshore Power Plants – Located on land (coal, nuclear, solar)
- Offshore Power Plants – Located in oceans/lakes (offshore wind, tidal)
- Floating Power Plants – Installed on ships or floating platforms