



GOVERNMENT OF KHYBER PAKHTUNKHWA
CLIMATE CHANGE, FORESTRY, ENVIRONMENT
AND WILDLIFE DEPARTMENT
(SECTION ENVIRONMENT)

NOTIFICATION

Peshawar Dated the 25/07/2025

No. SO(ENVT)/CCFE&WD/1-8/EPC-2025: In exercise of powers conferred under Clause xxii of Section 7 of the Khyber Pakhtunkhwa Environmental Protection Act, 2014, (Khyber Pakhtunkhwa Act No. XXX of 2022), the Khyber Pakhtunkhwa Environmental Protection Council (EPC) in its 3rd Meeting held on 13.05.2025 has been pleased to approve the following guidelines for General Environmental Approval (GEA);

GUIDELINES FOR THERMAL POWER PLANTS (CAPACITY LESS THAN 01 MW)

1. INTRODUCTION:

1. Fuel: fuel means diesel oil, fuel oil, gas, LPG etc.
2. Thermal Power plant: in thermal power plant steam Turbine or Engine driven system are used to generate electricity.
 - A. Engine-driven power plants: The engine operates on the air-standard diesel thermodynamic cycle. Air is drawn or forced into a cylinder and is compressed by a piston. Fuel is injected into the cylinder and is ignited by the heat of the compression of the air. The burning mixture of fuel and air expands, pushing the piston. Finally the products of combustion are removed from the cylinder, completing the cycle. The energy released from the combustion of fuel is used to drive an engine, which rotates the shaft of an alternator to generate electricity.
 - B. Steam Turbine power plants: The fuel is burnt, hot gases and heat energy produced converts water (in tubes lining the boiler) into steam. The high pressure steam is passed into a turbine containing thousands of blades. The steam pushes the blades, causing the turbine shaft to rotate at high speed. A generator is mounted at one end of the turbine shaft and consists of carefully wound wire coils. Electricity is generated when these are rapidly rotated in a strong magnetic field. After passing through the turbine, the steam is condensed and returned to the boiler to be heated once again.

1. ENVIRONMENTAL IMPACT OF A THERMAL POWER PLANT:

- i. When fuel is burned it releases pollutants. Such as, sulfur dioxide, nitrogen oxides, particulates, and various other heavy metals.
- ii. The burning of fuel also produces sulfur and nitrogen oxides that react with atmospheric moisture to produce sulfuric and nitric acids—so-called acid rain.
- iii. The burning of all fossil fuels (oil and natural gas included), releases large quantities of carbon dioxide (CO₂) into the atmosphere and is a major driver of global warming.



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2. MITIGATION MEASURES TO REDUCE OR ELIMINATE THE POLLUTANTS;

i. SITE SELECTION CRITERIA:

Site selection play very important role to manage the environment issues of a thermal power plant, the following points shall be considered during the site selection process.

- The site should be located in industrial areas or at a suitable site, at least 300 m away from residential area, medical care facilities, schools, child care facilities, parks, wildlife areas.
- ☐ The existing development context of the site should be compatible with the activity.
- At the design stage of new power plants, consideration should be given to the site lay-out, with a view to avoiding disturbances to the surrounding environment. In particular, attention should be paid to the location of entrances, exits, car parks, access roads and amenities.
- The site should not be located within any Environmentally Sensitive Area (ESA) and other sites such as wetland, steep slope and in areas that are likely to be affected by hazards such as inland flooding and landslide etc.
- On-site wastewater disposal facility such as septic tanks and pits shall be located not less than 30 m from any water course/water body.
- Existing natural drains and watercourses on or in the vicinity of the site shall not be tampered with.

ii. CLEANER FUELS SELECTION:

- Low sulfur, fuel oil
- LPG

iii. PARTICULATE REMOVAL:

Any advance and appropriate Technology should be adopted to remove the Particulate, which is emitted from the combustion process. Some technologies are given below

- Fabric filters (Bag Houses)
- Electrostatic precipitators (ESPs).
- Wet scrubber
- Cyclones

iv. DESULFURIZATION TECHNOLOGIES:

The use of Desulfurized technologies depends upon the content of sulfur in the fuel.

- Low sulfur fuel(specific control not required)
- High sulfur fuel Desulfurization technologies are required to be applied



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❖ **FGD(Flue Gas Desulfurization) System wet scrubbers:**

- A solution containing calcium, nitrogen or ammonia based sorbents absorb Sox to produce wet by-product. (sludge is dumped in landfill sites)
- Sea water based sorbents. (sludge is dumped in landfill sites)
- Limestone based sorbents (Gypsum can be dumped or used in buildings)

❖ **FGD System in furnace sorbent injection**

- Pulverized lime or limestone sorbent is injected into the furnace to react with the combustion gases.
- This process removes Sox after combustion.

❖ **Re-generable FGD (Flue Gas Desulfurization) Systems;**

- Wet sorbent sodium sulphite or magnesium oxide is used to remove Sox
- The reaction product is separated and the sorbent is regenerated, and reused.

v. DE NITRIFICATION TECHNOLOGIES:

Nox emission can be reduced through the following techniques

- Low Nox Combustion Modification
- Selective catalytic Reduction
- Selective non catalytic Reduction

a. Low Nox Combustion Modification:

- ✓ The Nox formation can be controlled through reducing combustion temperature or oxygen concentration.
- ✓ This can be achieved in a number of ways including the following.
- ❖ Combustion with low excess air in the furnace; this can reduce Nox formation
- ❖ Flue gas recirculation increases the flow rate through the boiler.
- ❖ Low Nox burner; it converts fuel nitrogen to elemental nitrogen instead of Nox

b. Selective catalytic Reduction:

Nitrogen oxides in the flue gases react with ammonia in the presence of catalyst (Titanium oxide) to produce water and elemental nitrogen (N₂)

c. Selective non catalytic Reduction;

Ammonia is used to react with Nox at high temperature without a catalyst to produce elemental nitrogen.

vi. CO₂ REDUCTION:

CO₂ can be controlled/reduced through the following techniques

- A. **Pre-combustion;** CO₂ capture typically involves gasification processes, such as integrated gasification combined cycle (IGCC) technology, where fuel is converted into gaseous components by applying heat under pressure in the presence of steam. IGCC plants may be designed so that concentrated CO₂ at a high pressure can be captured from the synthesis gas that emerges from the gasification reactor



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before it is mixed with air in a combustion turbine..

- B. Post-combustion CO₂ capture** involves physical and chemical processes to separate CO₂ from the exhaust flue gas. The trace impurities in the flue gas tend to reduce the effectiveness of the CO₂ adsorbing processes, and compressing captured CO₂ from atmospheric pressure to pipeline pressure represents a large parasitic load. One technological option, oxygen combustion (oxy-combustion), combusts fuel in an enriched oxygen environment using pure oxygen diluted with recycled CO₂ or water. This process enables a relatively concentrated stream of CO₂ to be captured by condensing the water in the exhaust stream. Oxy-combustion offers several potential benefits for existing coal-fired plants

vii. WATER USAGE REDUCTION:

- It is possible to reduce the water for cooling systems by installing evaporative cooling systems. Careful management is required to minimize befouling. Waste water from the other process can be recycled after proper treatment.

viii. WATER TEMPERATURE REDUCTION:

- This can be achieved by lengthening the outlet channel

ix. SOLID WASTES

- Solid wastes, including FGD sludges, that do not leach toxic substances or other contaminants of concern to the environment may be disposed in landfills or other disposal sites provided that they do not impact nearby water bodies. Where toxics or other contaminants are expected to leach out, they should be treated by, for example, stabilization before disposal.

x. NOISE

- A buffer zone (greenbelt) should be developed around the battery limit of the industry
- PPEs should be arranged and ensure the use by the workers in the factory

xi. General Mitigation measures:

- First aid facility should be arranged for the workers/employees in the factory.
- Stack height of the plant is not less than 50 meters.
- Plants should Construction of sanitary latrine having facility of septic tank and soak pit system to avoid any sewage contamination to the natural water ways
- waste bins shall be installed, where appropriate and waste shall be minimized through recycle and reuse, Disposal of solid waste in designated municipal dumping place
- . Dust emissions due to vehicles, and construction works Water spray on a daily basis shall be carried out.
- Production of debris/waste during construction shall be disposed of in the designated area/landfilling site



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- Oil and grease spill & leakage. Ensure regular maintenance of equipment to prevent diesel and hydraulic oil spills -Tidiness shall be kept -Proper handling of lubricating oil and fuel shall be ensured -Collection of accidental spillage, proper treatment, and disposal shall be ensured
- Sound pollution-all vehicles shall use good silencer for reducing noise during their movements -Noise suppressors and mufflers shall be used in heavy equipment -Heavy construction equipment shall be used, avoiding school hours and also at night time
- soil erosion; the excavation material should be stockpiled in a place to avoid run-off -and watered during dry condition -Excavated material/soil will be confined within the Plant compound and not be released in the environment outside the Plant compound -
- Pollution of water resources; Sediment laden construction water will be discharged into settling ponds prior to final discharge. Direct discharge into surface watercourses outside the Plant compound will not be allowed.
- Earth, stones and solid waste will be properly stockpiled and disposed of so that these do not block water.

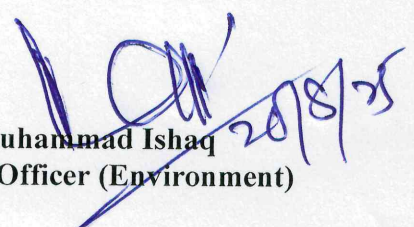
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**Secretary to Govt. of Khyber Pakhtunkhwa
Climate Change, Forestry, Environment & Wildlife
Department**

No. SO(ENVT)/CCFE&WD/1-8/EPC-2025:

Copy for information to;

1. All members of Environmental Protection Council (EPC) Khyber Pakhtunkhwa
2. PS to Secretary Climate Change, Forestry, Environment & Wildlife Department, Khyber Pakhtunkhwa


Muhammad Ishaq
Section Officer (Environment)