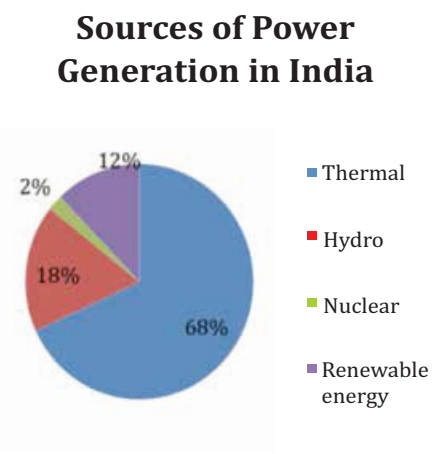
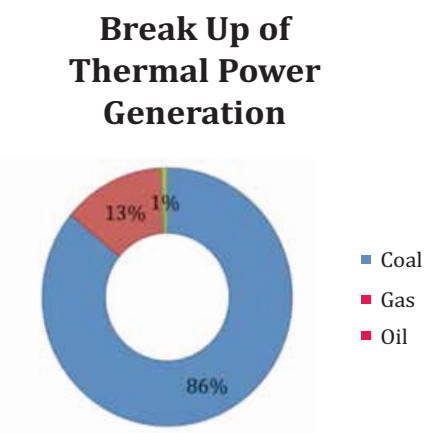
AN INTRODUCTION

Electricity is generated using different sources of energy like coal, oil, hydro, nuclear, solar, biomass, etc. Coal, gas, diesel and naphtha are called thermal resources and the plants that operate on them are known as Thermal Power Plants (TPPs). It is understood that even as Renewable Energy (RE) will gain ground in the coming years and dependence on thermal sources - especially coal – must be reduced, they will play an important role in meeting the energy needs in the near future. How TPPs are set up and operated will have great environmental consequences.



As of 2013, the net power generation capacity in India is 2,25,793.10 MW. A major share in power generation is from thermal sources, with an installed capacity of 153847.99 MW (68%). The installed capacity of hydropower is 39,623.40 MW (18%) and installed nuclear power capacity is 4,780.00 MW (2%). The installed contribution from RE is around 27,541.71 MW. [1]

India's reliance on coal for power is a serious environmental concern because both the mining and usage of coal have serious environmental impacts. Coal-fired power plants are the biggest source of manmade-CO_2, Sulphur and Mercury emissions. If adequate corrective measures are not taken, coal plants will pollute the water, air and soil, affect biodiversity and livelihoods. An assessment of the death and disease caused by coal-fired power plants in India by Conservation Action Trust, Greenpeace India and Urban Emissions has found that particulate emissions from these plants in 2011-12 resulted in an estimated 80,000 to 115,000 premature deaths and more than 20 million asthma



1 http://powermin.nic.in/indian_electricity_scenario/introduction.html

cases, which cost the public and the government an estimated Rs 16,000 – Rs 23,000 crores ($3500- $3833 million).

While the Environmental Impact Assessment (EIA) Process is common to power plants fired by all fuels, the impact mitigation measures recommended and inputs for better public participation, in this handbook, will focus on power plants fired by coal, which is considered the dirtiest fuel.

Coal & its Qualities

Coal is categorized into three main types, namely anthracite, bituminous and lignite based on the state or condition of the coal. Anthracite is the most aged state of coal. Bituminous is a soft coal, higher in quality than lignite and inferior in quality than anthracite. Lignite is the least aged coal. While anthracite is a hard coal and has carbon with little volatile content and no moisture, lignite is a soft coal with low carbon high in volatile matter and in moisture content.

Various Constituents in Coal and their implications

a) Fixed Carbon

Fixed carbon is the solid combustible residue that remains after a coal particle is heated and the volatile matter is expelled. The fixed carbon content of a coal is determined by subtracting the percentages of moisture, volatile matter and ash from a sample. Fixed carbon is a guesstimate of calorific value of coal after volatile matter is burnt.

b) Volatile Matter

Volatile Matter in the coal is the combustible gases like methane, hydrocarbons, hydrogen and carbon monoxide, and some incombustible gases like carbon dioxide and nitrogen. More of volatile matter means easier combustion of coal as it increases the flames.

c) Ash

Ash cannot be burnt and ash reduces the burning capacity and affects the combustion and boiler efficiency. It results in clinker formation in the boiler and also increases the handling cost of coal. Therefore, high ash content in coal is undesirable.

d) Moisture Content

Moisture present in coal reduces the per kg heat content (Kcal/kg) of coal as it reduces combustible components. Therefore, moisture content should be in an optimum range.

e) Sulphur

Sulphur in coal causes corrosion of the chimney, air heaters and economisers. This will reduce the life of the equipment and is also undesirable.

Coal Quality and Availability in India

Based on its calorific value, coal is classified as Coking Coal & Non-coking Coal. Coking coal is mainly used in metallurgy, steel, cement and sponge iron industries. The largest part of the coal resources of the country is non-coking coal. Coal is classified into seven grades from A to G. A, B and C categories are high quality coal and are used in cement, fertilizer and sponge iron industries. Most of the coalfields in India have D, E, F and G grade coal that are inferior in quality and used often in TPPs.

Lignite and bituminous coal are largely used in Indian TPPs due to their availability.[2] Lignite is considered suitable for power generation due to its low ash content. Coal India Ltd., a public sector company, provides coal for TPPs from national mines on a contractual basis.

Grades of coal used in India based on calorific value

Grade	Calorific Value Range (in Kcal/kg)	Ash content
A	Exceeding 6200	
B	5600 – 6200	19.50% to 24%
C	4940 – 5600	24% to 28.70%
D	4200 – 4940	28.70% to 34%
E	3360 – 4200	34% to 40%.
F	2400 – 3360	40% to 47%
G	1300 – 2400	

Usually grade D, E and F coal are available to the Indian power plants through Coal India ltd.

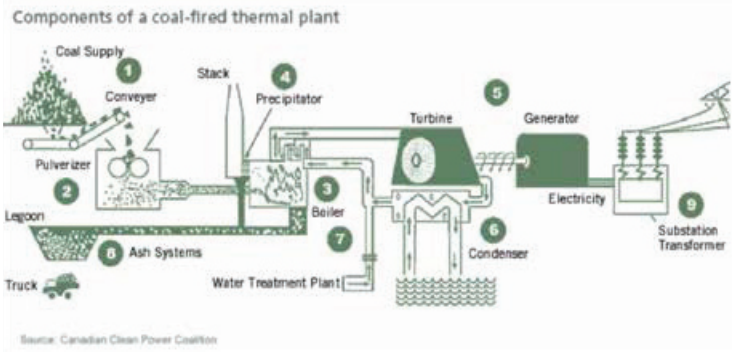
Indian coal is a low quality coal with low calorific value and high content of ash.

- The ash content ranges from 40 – 50%
- The moisture content ranges from 4 – 20%
- The sulphur content ranges from 0.2 – 0.7%
- The gross calorific value is between 2500 – 5000 kcal/kg
- The volatile matter content between 18 – 25%

2 http://www.productivity.in/knowledgebase/Energy%20Management/c.%20Thermal%20Energy%20systems/4.1%20Fuels%20and%20Combustion/4.1.3%20Properties%20of%20Coals.pdf

The above factors indicate that Indian coal is of inferior quality. The inefficiency of coal is the reason Indian power plants consume more coal than Australia and US for the same output.[3]

Power Generation in Coal-Based Plants



Conversion of coal to electricity takes place in three stages:
Boiler Furnace -> Coal is burnt in a furnace to produce heat. Due to the presence of carbon in the coal and oxygen in the air, carbon dioxide (CO_2) is produced
Boiler -> Water present in the boiler is turned to steam due to the production of heat. This happens at high pressure and temperature. Converting water to steam in a closed vessel will increase the pressure

Turbine and Generator -> Steam is sent to the turbine and rotates the blades in it, producing a mechanical force. The steam is then condensed and sent back to the boiler to start the cycle. Rotation of the turbine rotates the generator rotor to produce electricity.

Brief Description of Process

Coal is burnt in a boiler in a coal power plant to generate heat that is used to boil the water present to produce steam. The steam rotates the motor of the turbines that in turn rotates the generation rotor to produce electricity.

This process requires the preparation of coal, ensuring adequate air supply for combustion of coal, steam generation, reusing the cooled steam and the removal of residues (ash and flue gases).

Preparation of Coal

Coal yard → coal silo (storage) →coal pulveriser

In the coal pulveriser, coal is ground to a very fine powder for efficient and easy burning.

3 IL & FS manual on TPPs

To dry the moisture present in the coal, hot air is generated by fans in the pulveriser. The generated air also carries the dry coal powder to the boiler furnace, where it is burnt.

Inside the Boiler

The boiler is one of the main equipment in a coal power plant. It burns coal to generate heat that is used to boil the water present to produce steam.

Process 1 – Combustion:

In a boiler, combustion of coal takes place with the help of air that comes through an air system. A forced draft fan sucks the air from the atmosphere and blows it into the furnace. Heaters heat the air before it enters the furnace to increase the efficiency of combustion.

Heat, Ash and Flue Gas are generated in the combustion process. The heat converts the water to steam to turn the turbines. The flue gas is a residue and is drawn by an induced draft fan from the furnace and is sent to the electrostatic precipitator that captures the fly ash. The flue gas, without fly ash, is then released into the atmosphere through a stack/ chimney. Stacks are of great height so that the emission does not affect the ground level concentrations. Stack heights for large TPPs are around 250 to 280 meters. Another residue from the combustion is ash that is from inert matter present in the coal. In the furnace, 15 % of ash is collected at the bottom and the rest is captured in the electrostatic precipitator. The former is called Bottom Ash and the latter, Fly Ash.

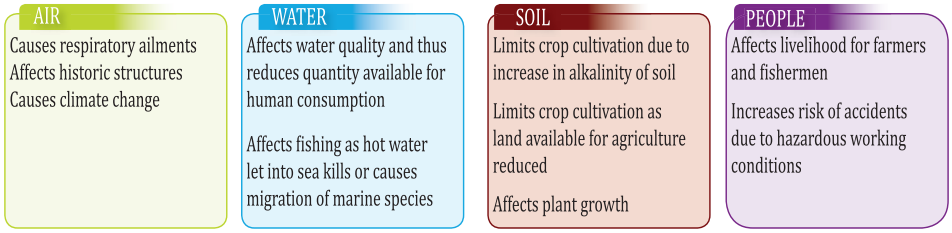
Process 2 – Steam Generation:

Water at high pressure is constantly supplied to the boiler through a feed water pump through the use of recirculated and pre-heated feed water. This increases the efficiency of conversion of water to steam and also reduces the requirement of heat through combustion of coal. An economiser is a device to pre-heat the feed water. Therefore, the recovered hot gases, exhausted from the boiler, are taken by the economiser to heat the water. This hot water is sent to the water walls surrounding the furnace where the water is circulated and converted into steam.

The steam is collected in a drum. From here, it is passed through super heater coils. The temperature and pressure of the steam are increased here. This super-heated steam is what finally goes to the turbine.

Environmental & Health Impacts of Coal based Plants

IMPACT ON



Water used for washing coal, if directly let into water bodies, will contaminate them. Fly ash from these plants will pollute the soil when it sets down on land. Air emission from these plants that contain pollutants such as sulphur dioxide, nitrogen oxides, particulate matter, carbon monoxide, volatile organic compounds and other metals like mercury, affects health and wellbeing.[4]

There are four types of environment impacts based on the nature and features of the impacts:

- Direct impact- e.g. Impact of untreated wastewater from the power plant discharged into a river or stream impacting marine life.
- Indirect impact –e.g. SO_2 from power plant deposited as SO_4 on the soil affects farming.
- Cumulative impact –e.g. Combined impact of all emissions of existing and upcoming projects in a region
- Induced impact –e.g. Impact of change in land use patterns and population in the area because of the plant on the existing natural resources like water, air.

Environmental Impacts

1. Air Pollution

   There are several pollutants emitted into the air from a coal power plant. These include Sulphur Dioxide (SO_2), Carbon Monoxide (CO), Oxides of Nitrogen (NOx) and Ozone (O_3). Suspended Particulate Matter (SPM), Lead and Non-Methane Hydrocarbons are also released.

   Any combustion process is a source for production of NOx. They are formed during combustion of the nitrogen present in the fuel and the oxygen present in the air. The formation of NOx is greater with increase in the combustion temperature.

   Further formations of major greenhouse gases Carbon Dioxide (CO_2) - formed by CO mixing with atmospheric oxygen - and Nitrous Oxide (N_2O) - formed by NOx combing with atmospheric oxygen – also take place.

4 Performance Review of Thermal Power Stations 2004-05 Section 14 Page no. 14.1 , section-14, Environmental aspects in power sector

Similarly, SOx (Oxides of Sulphur) are the combination of sulphur in the fuel and the oxygen from the air. Sulphur Dioxide (SO_2) is a common pollutant from coal power plants. Sometimes, due to excess oxygen, SO_3 is also formed, which mixes with the water in the atmosphere, causing acid rain.

SPM from coal power plants are mainly soot, smoke and fine dust particles and these cause asthma and respiratory illness.

2. Water Pollution

   In a coal power plant, water is used for washing coal, circulating in the boiler furnace to produce steam and cooling of equipment. The dust from coal-cleaned water contaminates groundwater. The hot water, if let out into water bodies without cooling, causes a rise in temperature and affects aquatic flora and fauna.

3. Land Degradation

   Untreated air and water pollutants from coal power plants affect the water and the flora and fauna of adjoining areas making them unfit for living or livelihood activities.

Health Impacts [5]

Chemical Pollutant	Health Impact
Sulphur Dioxide	▪ Affects respiratory system and lung functions ▪ Causes asthma and chronic bronchitis ▪ Causes eye irritation ▪ Causes cardiac disease
Nitrous Oxides	▪ Causes asthma ▪ Causes Chronic Obstructive Pulmonary Disease ▪ Stunts lung growth ▪ Causes cardiac disease
Particulate Matter (PM): Coarse Particulates (PM10), Fine Particulates (PM2.5)	▪ Causes asthma ▪ Causes Chronic Obstructive Pulmonary Disease ▪ Stunts lung growth ▪ Causes lung cancer ▪ Causes cardiac disease ▪ Causes congestive heart failure
Ammonia	▪ Causes respiratory problems ▪ Causes skin and eye burns
Hydrogen Chloride and Fluoride	▪ Causes irritation to skin, eyes, nose, throat, breathing passages

5 http://www.env-health.org/IMG/pdf/heal_report_the_unpaid_health_bill_how_coal_power_plants_make_us_sick_final.pdf

Chemical Pollutant	Health Impact
Dioxins and Furan	▪ Probable cause of stomach cancer ▪ Affects reproductive, endocrine and immune systems
Polycyclic Aromatic Hydrocarbons	▪ Adversely affects the liver, kidney and testes ▪ May damage sperm cells and impair reproduction ▪ May attach to small particulate matter and be deposited in the lungs
Mercury	▪ Damages brain, nervous system, kidneys, liver ▪ Causes neurological and birth defects
Lead	▪ Damages nervous system of children ▪ Adversely affects learning, memory and behaviour of children ▪ Damages kidneys ▪ Causes cardiovascular disease ▪ Causes anaemia
Antimony, Arsenic, Beryllium, Cadmium, Chromium, Nickel, Selenium, Manganese	▪ Probable effects of carcinogens (lungs, bladder, kidney, skin cancers) ▪ Adversely affects nervous, cardiovascular, skin, respiratory and immune systems
Radium	▪ Probable carcinogens (lung and bone cancers) ▪ Causes anaemia ▪ Causes brain swelling
Uranium	▪ Probable carcinogens (lungs and lymphatic system) ▪ Causes kidney disease

Noise Pollution

Regular exposure to such high noise levels emanating from power plants from the usage of equipment like boilers, turbines and crushers, affects people working in the plants.

Introduction to the EIA Notification, 2006

The Ministry of Environment & Forests (MoEF) is the nodal agency in the Central Government for planning, promotion, coordination and overseeing the implementation of India's environmental and forestry policies and programmes.

The Environmental Protection Act 1986 (EPA), gives powers to the MoEF to restrict areas in which any industry, operation or process cannot be carried out, or can be permitted subject to certain safeguards. [Clause V, Sub-sec (2), Section 3 of the EPA]

The Environmental Impact Assessment Notification 2006 (EIA Notification) has been issued under the EPA.

Environmental Impact Assessment (EIA) is now mandatory under the EPA for 39 categories of developmental activities involving investments of Rs.50 crores and above.

The EIA Notification makes prior Environmental Clearance compulsory for

- All new projects and activities listed in the Schedule to this Notification
- Expansion/modernisation of existing projects listed in the Schedule to this Notification

TPPs are listed as item 1(d) under the Schedule to the Notification.

- ***When should EC be obtained by a TPP?***

1) Before setting up of a new plant
2) Before expansion or modernisation of an existing plant
3) For changes in the product mix of an existing plant

- ***Which Authorities can issue EC?***

1) Ministry of Environment & Forests [MoEF]
2) State Environment Impact Assessment Authority [SEIAA]

The EIA Notification calls these two authorities as **Regulatory Authorities**. For bigger projects, which fall under Category A in the Schedule, the MoEF issues the EC. For smaller projects- Category B, the SEIAA- a Central Government authority operating in each state, issues the clearance.

SEIAA

The SEIAA is a Central Government Authority that is constituted by the State Government but acts on behalf and reports to the MoEF.

COMPOSITION & WORKING

SEIAA has 3 members:

(i) Member-Secretary – a serving officer of the respective State Government/ Union territory, who is familiar with environmental laws

(ii) Chairperson – an expert in EIA process with a term of 3 years

(iii) Non-officio Member - an expert in EIA process with a term of 3 years

If an SEIAA has not been constituted in a state, then all projects requiring an EC will be considered by the MoEF.

All decisions of the SEIAA should be taken in a meeting and must, as far as possible, be unanimous. If a majority decision is taken, then the details of the opinions for and against it should be clearly recorded and copy of the minutes sent to the MoEF.

EC issuing Authority / Activity	Ministry of Environment & Forests (MoEF) CATEGORY A	State Environment Impact Assessment Authority (SEIAA) CATEGORY B
Coal/lignite/naphtha/gas based power generation	≥500 MW	<500 MW
Power generation using Pet coke diesel and all other fuels including refinery residual oil waste, except biomass	≥50 MW	5 MW- 49 MW
Power generation using Biomass or non-hazardous municipal solid waste as fuel	≥20 MW	16 MW – 19 MW

- ***Who recommends issue of EC for a project to the Authorities?***

1) Expert Appraisal Committee (EAC)

2) State Expert Appraisal Committee (SEAC)

The MoEF will issue EC for projects being evaluated by it based on the recommendations of the EAC. Likewise, the SEIAA will issue EC based on the recommendations of the SEAC.

SEAC

The SEAC is constituted by the Central Government in consultation with the State Government. If the SEAC has not been constituted in a state, then all Category B projects requiring an EC will be considered by the MoEF.

COMPOSITION OF EAC & SEAC:

The EAC & SEAC can have up to 15 members, who should be experts or experienced professionals in the following fields:

- Environmental Quality
- Different Sectors in Project Management
- Environmental Impact Assessment Process
- Risk Assessment
- Floral and faunal management (Life Science expert)
- Forestry and Wildlife
- Environmental Economics (The expert should have experience in project appraisal)

The Chairperson should be an outstanding and experienced environmental policy expert or expert in management or public administration with wide experience in the relevant development sector.

Qualifications for Experienced Professionals:

The person should have at least

- 5 years of formal University training in the concerned discipline leading to a MA/MSc Degree, or
- 4 years formal training in a professional training course together with prescribed practical training in the field leading to a B.Tech/B.E./B.Arch. Degree, in case of Engineering/Technology/Architecture disciplines, or
- 5 years of formal University training and prescribed practical training put together, in the case of any other professional degree (e.g. Law), or
- Prescribed apprenticeship/articleship and pass examinations conducted by the concerned professional association (e.g. Chartered Accountancy),or

- A University degree, followed by 2 years of formal training in a University or Service Academy (e.g. MBA/IAS/IFS).
- In selecting Experts / Experienced Professionals, experience gained by them in their respective fields will be taken note of.

Qualifications for Experts:

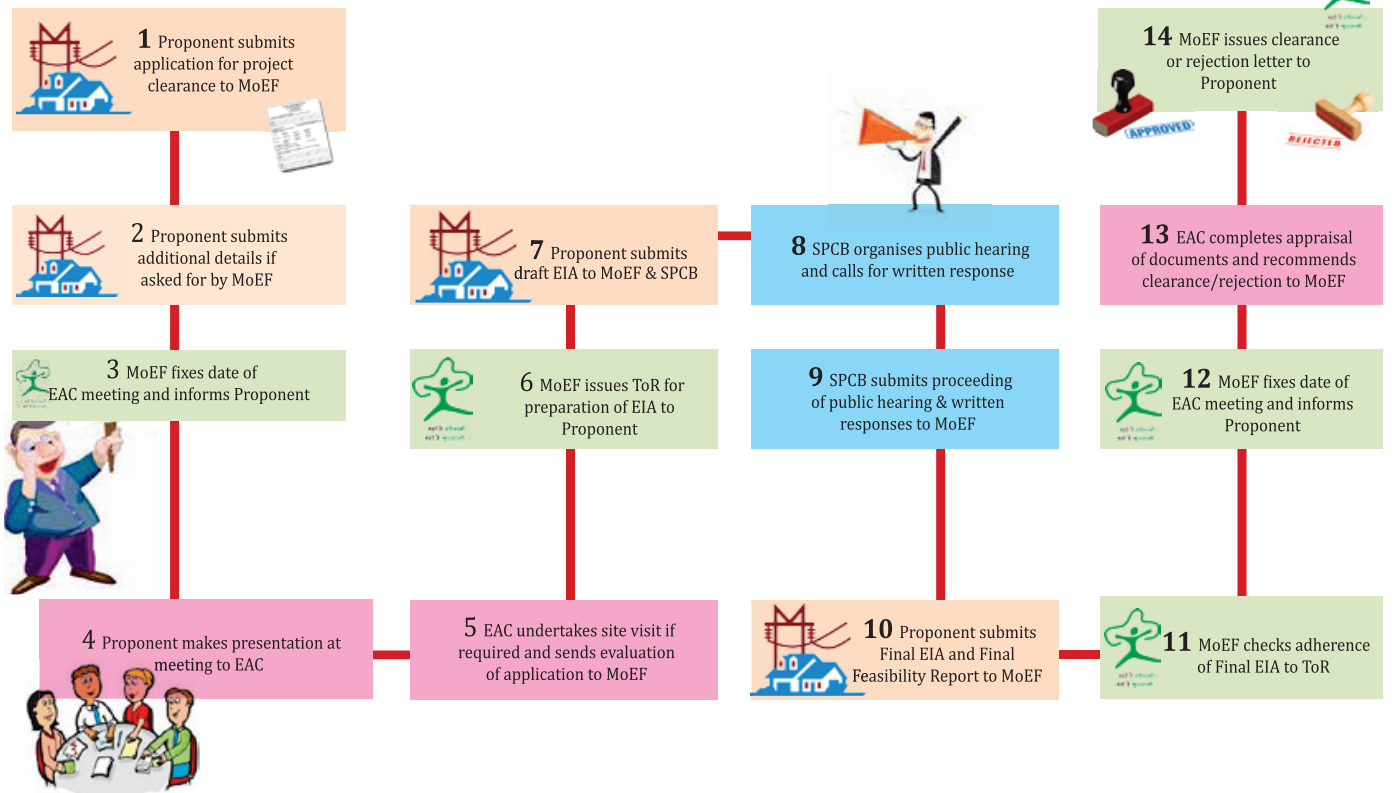
A professional fulfilling the above eligibility criteria with:

- At least 15 years of relevant experience in the field, or
- An advanced degree (e.g. PhD) in a concerned field and at least 10 years of relevant experience
- The Expert has to be less than 70 years of age. However, in the event of the non-availability of experts in a given field, the maximum age of a member of the Expert Appraisal Committee can be 75 years.

Working of SEAC & EAC:

- Each member, including the Chairperson, has a maximum tenure of 2 terms of 3 years each.
- Monthly Meetings should be held.
- Agenda and minutes to be noted.
- Minutes of the Meetings are to be finalised in 5 working days and uploaded on the MoEF website.

ENVIRONMENT IMPACT ASSESSMENT PROCESS FOR A THERMAL POWER PLANT WITH CAPACITY ≥ 500 MW



** For TPPs of lower capacity, the MoEF will be replaced by the SEIAA and the EAC by the SEAC*

Obtaining EC for New TPPs

The EC Process:

i) Application submission by Project Proponent/Applicant to MoEF/SEIAA

ii) Issuance of Terms of Reference by MoEF/ SEIAA

iii) Submission of EIA by Project Proponent/Applicant & Conduct of Public Consultation by State Pollution Control Board (SPCB)

iv) Issuance of EC / Rejection of Application by MoEF/SEIAA

I Application submission by Project Proponent to MoEF/SEIAA

1. Project Proponent/Applicant is to make an application for EC only after the prospective site is identified. This application is to be made in **Form 1***(See Annexure for Form 1 format)*and a copy of the project's **Pre-Feasibility Report,** is to be submitted, based on the proposed plant's capacity, to the MoEF or SEIAA. Form 1 includes the **ToR** proposed by the Project Proponent

2. Prior to obtaining an EC, the Project Proponent, also known as the Applicant, is not allowed to commence any activity at the site, except cleaning and fencing or making temporary shelters with basic amenities for labour.

3. At this stage, the Application made to the SEIAA will further be categorised as Category B1 & B2 by the Authority*. This process is called **Screening**.

4. B2 projects do not require an EIA.

*The MoEF issues a notification from time to time on the classification of projects as B1 and B2. Currently, all coal, lignite, naphtha & gas-based thermal power plants with a capacity over 5 MW are classified as B1 and require an EIA.

II. Issuance of Terms of Reference by MoEF/ SEIAA Mandated Time Frame - 60 days

1. Upon receipt of the application, the SEIAA/MoEF will check if all the required documents have been submitted.

2. If **Additional Details** are required, the Project Proponent/Applicant will be required to submit them.

3. On acceptance of the Application, the MoEF/SEIAA will invite the Project Proponent/Applicant for a meeting with the EAC/ SEAC where this project will be evaluated.

4. At the meeting, the **ToR** addressing all environmental concerns for conducting EIA studies will be issued by the MoEF/ SEIAA. This process is called **Scoping**.

Note:

If the EAC/ SEAC is of the opinion, during evaluation of the Application, that a visit to the site by its members is necessary to draw up the ToR*(See Annexure for contents of a ToR)*, the site-visit will be undertaken and ToR issued subsequently. For this, the MoEF/ SEIAA should provide a notice of 7 days to the Project Proponent/Applicant, who should provide requisite facilities to carry out the inspection.

The ToR is determined based on the

- Form 1
- ToR proposed by the Project Proponent/Applicant
- Site visit by a sub-group of EAC or SEAC (if conducted)
- Other information that may be available with the EAC/SEAC

The ToR should be conveyed to the Project Proponent/Applicant by the EAC/SEAC within 60 days of receipt of Form 1. If not, the ToR as proposed by the Project Proponent/ Applicant will be considered as the approved ToR for EIA purposes.

The approved ToR should be displayed on the website of the MoEF and the concerned SEIAA. The ToR for plants situated along the coast will contain details of additional studies required.

The Application can be rejected at this stage itself by the MoEF/ SEIAA based on the recommendation of the EAC/SEAC. If so, this decision, along with reasons for the rejection, should be communicated to the Project Proponent/Applicant in writing within 60 days of receipt of application.

The ToR and Form 1 should be displayed in the website of the MoEF/SEIAA before issual of ToR to the Project Proponent

III. After obtaining the ToR, an accredited consultant is engaged by the Project Proponent/Applicant to conduct the EIA studies and prepare a Draft EIA Report

1. After obtaining the ToR, an accredited consultant is engaged by the Project Proponent/ Applicant to conduct the EIA studies and prepare a **Draft EIA Report**. (This draft is likely to take a minimum of 3 months as it is based on the number of seasons specified, in the ToR, for conducting the studies.)

2. Simultaneously a request to the SPCB is to be submitted by the Project Proponent/ Applicant to conduct the Public Consultation.

3. The Public Consultation consists of two parts:

a. A **Public Hearing** at the site or in its close proximity to ascertain concerns of locally affected persons

b. Written Responses obtained from concerned persons having a plausible stake in the socio-environmental aspects of the project or the activity. The MoEF/SEIAA and the State Pollution Control Boards should invite responses in writing about the project.

Draft EIA Report includes:

- Project description
- Description of environment- baseline data, demographic, geological details and ecologically sensitive attributes in the study area
- Anticipated environment and social impacts of project
- Analysis of alternative resources

The Public Consultation has to be conducted and the **Public Hearing Report-** consisting of the summary of the hearing proceedings, statement of issues raised by the public and the comments of the applicant, video recording of the meeting and the received Written Responses- is to be submitted by the SPCB to the MoEF/SEIAA, within 45 days of receiving a request from the Project Proponent/ Applicant.

For more details, refer to the chapter on Effective Participation In The Public Consultation Process

The Public Hearing Report should be conspicuously displayed in the offices of the Panchayat, Zila Parishad and the District Magistrate, apart from the SPCB. The State Pollution Control board should also upload it on its (SPCB) website and all the responses received as part of the Public Consultation process should be shared with the Project Proponent by the MoEF/SEIAA

IV. Issuance of EC/Rejection of Application by MoEF/SEIAA: Mandated Time Frame - 135 days

1. The Project Proponent/Applicant should address the socio - environmental concerns expressed during the public consultation process and make appropriate changes in the **Draft EIA Report**. The revised document is called the **Final EIA Report**.

2. The Final EIA Report is to be submitted to the MoEF/SEIAA for appraisal. (Alternatively, the Project Proponent/Applicant can submit a **Supplementary Report** addressing all

the concerns expressed during the public consultation. This and the Draft EIA make up the Final EIA.)

The Project Proponent will submit the following to the MoEF/SEIAA:

- Final EIA Report [20 hard copies, 1 soft copy]
- Copies of Final Layout Plan [20 copies]
- **Project Feasibility Report** (1 copy)

The proponent can also submit a copy of the Videotape or CD of Public Hearing Proceedings (1 copy)

3. Within **30 days** of receiving these documents, the MoEF should scrutinise them for adherence to the conditions mentioned in the ToR, and send, electronically or otherwise, an observation report to the EAC/SEAC, including any inadequacies noted. Along with it, a copy of the Final EIA Report, Public Consultation Report & Form I should be attached. The scheduled date of the EAC/SEAC meeting for considering the proposal is to be mentioned.

4. A letter to the Project Proponent to attend the meeting and to furnish clarifications, if necessary, about the project, either in person or through an authorized representative is to be sent by the MoEF/SEIAA. The Project Proponent should be informed at least **15 days** in advance about the EAC/SEAC meeting.

5. The EAC/SEAC is to complete the appraisal of the Application within **60 days** of receiving the requisite documents. If the EAC/SEAC recommends issue of EC, then the minutes should clearly list out the specific environmental safeguards and conditions. If a rejection of the application has been recommended, reasons for the same should be stated.

6. The minutes of the EAC/SEAC meeting should be finalized in **5 working days** and displayed in the MoEF/SEIAA website

7. The MoEF/SEIAA should inform the Project Proponent of the EC issue or rejection of application - within 45 days of receiving the information from the EAC/SEAC.

   After this time, the recommendations of the EAC/SEAC on granting or refusing EC for the project become public documents. Thus, if the decision of the MoEF/SEIAA has not been communicated to the Project Proponent within the timeframe mentioned in Point 7, the Proponent can proceed as if the EC has been granted or denied based on the final recommendations of the EAC/SEAC.

The Environment Clearance should be published in an English and regional daily, apart from being uploaded in the MoEF/SEIAA website in seven days. The EC should also be displayed in a notice board in the MoEF & the premises of its Regional Offices for 30 days. The Project Proponent's website should display the EC permanently.

Reconsideration of EC decision: 135 days

The MoEF/SEIAA will normally accept the recommendations of the EAC/SEAC. In case of disagreement with the recommendations, the MoEF/SEIAA, stating its reasons for non-acceptance, may request a reconsideration of EAC/SEAC decision. The request is to be sent within **45 days** of receiving the recommendations.

Simultaneously, an intimation of this decision should be conveyed to the Project Proponent.

The EAC/SEAC has to consider the observations of the MoEF/SEIAA and furnish its views within **60 days**.

The MoEF/SEIAA should consider the views of the EAC/SEAC and decide on EC issuance. This decision of the MoEF/SEIAA is final, and should be conveyed to the Project Proponent within the next **30 days**.

Validity of EC

The validity of an EC for a TPP is for 5 years from the date the EC is granted till the start of production operations.

For renewing the EC, an application is to be made to the MoEF/SEIAA within the validity period, together with an updated Form I. The MoEF/SEIAA can consult the EAC/SEAC as required.

Cancellation of EC

If the Project Proponent has been found to deliberately conceal information or has submitted false or misleading information to obtain the EC and the project will have adverse or negative environmental or socio-economic impacts, the EC may be cancelled. The decision will be made by the MoEF/SEIAA after giving a personal hearing to the Project Proponent and following the principles of natural justice.

Process of obtaining an EC for Existing Plants (Expansion/ Modernization/Change of Product Mix)

1. A fresh Form 1 has to be submitted for all applications seeking prior EC for
   - Expansion of plant

- Modernisation of an existing plant with increase in production capacity beyond the threshold mentioned in the Schedule to the EIA Notification.*
- Change in product mix for existing plant

The applications should be submitted to the SEIAA/MoEF based on the extent of expansion.

2. Applications to be considered by the EAC/SEAC in **60 days**.
3. EAC/SEAC to decide on due diligence necessary, including preparation of EIA and Public Consultation. Application will be appraised accordingly for grant of EC.

*The threshold for TPPs, for which the EC is to be issued by the SEIAA, is 500 MW. So, if the capacity of a 300 MW plant after modernisation will be over 500 MW, it will require a prior environmental clearance involving all stages of the EIA process from the MoEF.

Post Environmental Clearance Monitoring

The Project Proponent has to submit half-yearly Compliance Reports to the terms and conditions stipulated in the EC, in hard and soft copies to the MoEF/SEIAA on 1st June and 1st December every year. Each of these documents is a public document and can be obtained by applying for it from the MoEF/SEIAA.

The latest Compliance Report should be displayed on the websites of the MoEF/SEIAA and the Project Proponent.

Transferability of EC

The EC given for a project to a Project Proponent can be transferred during its validity to another person entitled to undertake the project. In that case, an application to this effect should be submitted by the Transferor or by the Transferee with a written "no objection" by the Transferor.

The terms and conditions and validity period will remain in effect as stipulated in the EC. There is no requirement for further confirmation regarding these by the EAC/SEAC.

ANNEXURE A: FORM I FORMAT

1. Basic Information

- Name of project:
- Nature:
- Proposed capacity:
- Nearest town/city/railway station/airport along with distance in kms:
- Village Panchayat/Zilla Parishad/Municipal Corporation/Local Body with postal address and contact nos:
- Details if the project involves approval/clearance under:
    a The Forest (Conservation) Act 1980
    b The Wildlife (Protection) Act 1972 and
    c The CRZ Notification 1991
- Details of alternative sites examined, if any, along with topo sheet:
- Interlinked projects and details of application for interlinked projects submitted:
- Name, address and designation of the Applicant:
- Information on Government Order/Policy relating to the site:
    a Forest Land
    b Particulars on any litigation pending against the project/land

2. Activity Details

- Construction
- Operation or Decommissioning of the project involving actions which will cause physical changes in the locality- Topography, Land Use, Charges in water bodies and Others
- Permanent or Temporary Change in land use
- Cover or Topography including increase in intensity of land use (with respect to local land use plan)
- Clearance of existing land

- Vegetation and Buildings
- Creation of new land uses
- Pre-construction investigations -Bore wells, Soil testing and Others
- Construction works
- Demolition works
- Temporary sites used for construction works or housing of construction workers Above ground buildings structures or earthworks including linear structures
- Cut and fill or excavations
- Underground works including mining, tunnelling
- Reclamation works
- Dredging
- Offshore structures
- Production and Manufacturing Processes
- Facilities for storage of goods or materials
- Facilities for treatment or disposal of solid waste or liquid effluents
- Facilities for long term housing of operational workers
- New road
- Rail or Sea traffic during construction or operation
- New road, rail, air, waterborne or other transport infrastructure including new or altered routes and stations, Ports Airports etc;
- Closure or Diversion of existing transport routes or infrastructure leading to changes in traffic movements
- New or diverted transmission lines or pipelines
- Impoundment/damming/culverting
- Realignment or other changes to the hydrology of watercourses or aquifers
- Stream crossings
- Abstraction or transfers of water form ground or surface waters

- Changes in water bodies or the land surface affecting drainage or run-off
- Transport of personnel or materials for construction; operation or decommissioning Long-term dismantling or decommissioning or restoration works
- Ongoing activity during decommissioning which could have an impact on the environment
- Influx of people to an area either temporarily or permanently
- Introduction of alien species
- Loss of native species or genetic diversity
- Any other activities

3. Use of Natural Resources including Source Information & Data

- Land -especially undeveloped or agricultural land - in Hectares
- Water - expected source & competing users - in units Kilo Litres/Day
- Minerals in Metric Tonnes
- Construction material – stone, aggregates, sand / soil -expected source – in Metric Tonnes
- Forests and Timber -source – in Metric Tonnes
- Energy - electricity and fuels including source, competing users – Unit for fuel in Metric Tonnes and for electricity in MegaWatts
- Any other natural resource (use appropriate standard units)

4. Storage, Transport, Handling or Production of Substances harmful to human health or environment

- Changes in occurrence of disease
- Affect disease vectors (e.g. insect or water borne diseases)
- Affect the welfare of people (e.g. by changing living conditions)
- Vulnerable groups of people who could be affected by the project (e.g. hospital patients, children, the elderly etc)
- Any other causes

5. **Production of Solid Waste during Construction/ Operation / Decommissioning**

- Spoil
- Overburden or Mine Waste
- Municipal Waste (domestic and or commercial waste)
- Hazardous Wastes (as per Hazardous Waste Management Rules)
- Other Industrial Process Waste
- Surplus Produce
- Sewage Sludge or Other Sludge from effluent treatment
- Construction or Demolition Waste
- Redundant Machinery or Equipment
- Contaminated Soils or other materials
- Agricultural Waste
- Other Solid Waste

6. **Release of pollutants or any hazardous; toxic or noxious substances to air**

- Emissions from combustion of fossil fuels from stationary or mobile sources
- Emissions from production processes
- Emissions from materials handling including storage or transport
- Emissions from construction activities including plant and equipment
- Dust or odour from handling of materials including construction material, sewage and waste
- Emissions from incineration of waste
- Emissions from burning of waste in open air (e.g.slash materials; construction debris);
- Emissions from any Other Source

7. **Generation of Noise and Vibration and Emissions of Light and Heat**

- From operation of equipment (e.g. engines, ventilation plant, crushers)
- From industrial or similar processes

- From construction or demolition
- From blasting or piling
- From construction or operational traffic
- From lighting or cooling systems
- From any other sources

8. Risk of Contamination of Land or Water

- Release of pollutant into the ground / sewers / surface waters / groundwater / coastal waters / sea
- From handling, storage, use or spillage of hazardous materials
- From discharge of sewage or other effluents to water or the land (expected mode and place of discharge)
- By deposition of pollutants emitted to air into the land or into water
- From long-term build up of pollutants from these sources, in the environment
- From other sources

9. Risk of Accidents during Construction or Operation which could affect human health or environment

- From explosions, spillages, fires etc
- From storage handling use or production of hazardous substances
- From any other causes, including natural disasters causing environmental damage like earthquakes, floods etc

10. Factors that could lead to Environmental Effects or the potential for Cumulative Impacts in the locality

- Lead to development of supporting ancillary development or development stimulated by the project which could have impact on the environment (e.g.; supporting infrastructure, roads power supply, waste or waste water treatment, etc.)
- Housing Development
- Extractive industries

- Supply industries;
- Others
- Lead to after-use of the site; which could have an impact on the environment
- Set a precedent for later developments
- Have cumulative effects due to proximity to other existing or planned projects with similar effects

11. Environmental Sensitivity

- Areas protected under international conventions; national or local legislation for their ecological landscape, cultural or other related value
- Areas which are important or sensitive for ecological reasons – wetlands, watercourses or other water bodies, coastal zone, biospheres, mountains and forests
- Areas used by protected important or sensitive species of flora or fauna for breeding, nesting, foraging, resting, over wintering, migration
- Inland, coastal, marine or underground waters
- State, national boundaries
- Routes or facilities used by the public for access to recreation or other tourist pilgrim areas
- Defence installations
- Densely populated or built-up area
- Areas occupied by sensitive man-made land uses (e.g.hospitals; schools; places of worship; community facilities)
- Areas containing important, high quality or scarce resources (e.g. ground water resources, surface resources, forestry, agriculture, fisheries, tourism, minerals)
- Areas already subjected to pollution or environmental damage and where existing legal environmental standards are exceeded
- Areas susceptible to natural hazard which could cause the project to present environmental problems (e.g. earthquakes, subsidence, landslides, erosion, flooding or extreme or adverse climatic conditions)

12. Proposed Terms of Reference (ToR)

Following this; an affidavit stating;

"I hereby give undertaking that the data and information given in the Application and enclosures are true to the best of my knowledge and belief and I am aware that if any part of data and information submitted is found to be false or misleading at any stage; the project will be rejected and clearance given; if any; to the project; will be revoked at our risk and cost"

Date: Signature of the Applicant

Place: With name and full address to be submitted.

Note:

With regard to projects involving clearance under CRZ Notification 1991, the following are to be submitted along with the Application-

1. A CRZ map duly demarcated by an authorized agency showing Project Activities with reference to CRZ (at the stage of ToR)
2. Recommendations of the State Coastal Zone Management Authority (before issue of EC)

With regard to projects located within 10 kms of National Parks, Sanctuaries, Biosphere Reserves and Migratory Corridors of Wild Animals the following are to be submitted along with the Application-

1. A Map duly authenticated by the Chief Wildlife Warden showing these features and project location
2. Comments of the Chief Wildlife Warden

ANNEXURE B: TERMS OF REFERENCE

1(d): STANDARD TERMS OF REFERENCE FOR CONDUCTING ENVIRONMENT IMPACT ASSESSMENT STUDY FOR THERMAL POWER PLANTS PROJECTS AND INFORMATION TO BE INCLUDED IN EIA/EMP REPORT

1) The proposed project shall be given a unique name in consonance with the name submitted to other Government Departments etc. for its better identification and reference.

2) Vision document specifying prospective long term plan of the project shall be formulated and submitted.

3) Latest compliance report duly certified by the Regional Office of MoEF&CC for the conditions stipulated in the environmental and CRZ clearances of the previous phase(s) for the expansion projects shall be submitted.

4) The project proponent needs to identify minimum three potential sites based on environmental, ecological and economic considerations, and choose one appropriate site having minimum impacts on ecology and environment. A detailed comparison of the sites in this regard shall be submitted.

5) Executive summary of the project indicating relevant details along with recent photographs of the proposed site (s) shall be provided. Response to the issues raised during Public Hearing and the written representations (if any), along with a time bound Action Plan and budgetary allocations to address the same, shall be provided in a tabular form, against each action proposed.

6) Harnessing solar power within the premises of the plant particularly at available roof tops and other available areas shall be formulated and for expansion projects, status of implementation shall also be submitted.

7) The geographical coordinates (WGS 84) of the proposed site (plant boundary), including location of ash pond along with topo sheet (1:50,000 scale) and IRS satellite map of the area, shall be submitted. Elevation of plant site and ash pond with respect to HFL of water body/nallah/River and high tide level from the sea shall be specified, if the site is located in proximity to them.

8) Layout plan indicating break-up of plant area, ash pond, green belt, infrastructure, roads etc. shall be provided.

9) Land requirement for the project shall be optimized and in any case not more than what has been specified by CEA from time to time. Item wise break up of land requirement shall be provided.

10) Present land use (including land class/kism) as per the revenue records and State Govt. records of the proposed site shall be furnished. Information on land to be acquired including coal transportation system, laying of pipeline, ROW, transmission lines etc. shall be specifically submitted. Status of land acquisition and litigation, if any, should be provided.

11) If the project involves forest land, details of application, including date of application, area applied for, and application registration number, for diversion under FCA and its status should be provided along with copies of relevant documents.

12) The land acquisition and R&R scheme with a time bound Action Plan should be formulated and addressed in the EIA report.

13) Satellite imagery and authenticated topo sheet indicating drainage, cropping pattern, water bodies (wetland, river system, stream, nallahs, ponds etc.), location of nearest habitations (villages), creeks, mangroves, rivers, reservoirs etc. in the study area shall be provided.

14) Location of any National Park, Sanctuary, Elephant/Tiger Reserve (existing as well as proposed), migratory routes / wildlife corridor, if any, within 10 km of the project site shall be specified and marked on the map duly authenticated by the Chief Wildlife Warden of the State or an officer authorized by him.

15) Topography of the study area supported by toposheet on 1:50,000 scale of Survey of India, along with a large scale map preferably of 1:25,000 scale and the specific information whether the site requires any filling shall be provided. In that case, details of filling, quantity of required fill material; its source, transportation etc. shall be submitted.

16) A detailed study on land use pattern in the study area shall be carried out including identification of common property resources (such as grazing and community land, water resources etc.) available and Action Plan for its protection and management shall be formulated. If acquisition of grazing land is involved, it shall be ensured that an equal area of grazing land be acquired and developed and detailed plan submitted.

17) A mineralogical map of the proposed site (including soil type) and information (if available) that the site is not located on potentially mineable mineral deposit shall be submitted.

18) Details of fly ash utilization plan as per the latest fly ash Utilization Notification of GOI along with firm agreements / MoU with contracting parties including other usages etc. shall be submitted. The plan shall also include disposal method / mechanism of bottom ash.

19) The water requirement shall be optimized (by adopting measures such as dry fly ash and dry bottom ash disposal system, air cooled condenser, concept of zero discharge) and in any case not more than that stipulated by CEA from time to time, to be submitted along with details of source of water and water balance diagram. Details of water balance calculated shall take into account reuse and recirculation of effluents.

20) Water body/Nallah (if any) passing across the site should not be disturbed as far as possible. In case any Nallah / drain is proposed to be diverted, it shall be ensured that the diversion does not disturb the natural drainage pattern of the area. Details of proposed diversion shall be furnished duly approved by the concerned Department of the State.

21) It shall also be ensured that a minimum of 500 m distance of plant boundary is kept from the HFL of river system / streams etc. and the boundary of site should also be located 500 m away from railway track and National Highways.

22) Hydro-geological study of the area shall be carried out through an institute/ organization of repute to assess the impact on ground and surface water regimes. Specific mitigation measures shall be spelt out and time bound Action Plan for its implementation shall be submitted.

23) Detailed Studies on the impacts of the ecology including fisheries of the River/Estuary/Sea due to the proposed withdrawal of water / discharge of treated wastewater into the River/Sea etc shall be carried out and submitted along with the EIA Report. In case of requirement of marine impact assessment study, the location of intake and outfall shall be clearly specified along with depth of water drawl and discharge into open sea.

24) Source of water and its sustainability even in lean season shall be provided along with details of ecological impacts arising out of withdrawal of water and taking into account inter-state shares (if any). Information on other competing sources downstream of the proposed project and commitment regarding availability of requisite quantity of water from the Competent Authority shall be provided along with letter / document stating firm allocation of water.

25) Detailed plan for rainwater harvesting and its proposed utilization in the plant shall be furnished.

26) Feasibility of near zero discharge concept shall be critically examined and its details submitted.

27) Optimization of Cycles of Concentration (COC) along with other water conservation measures in the project shall be specified.

28) Plan for recirculation of ash pond water and its implementation shall be submitted.

29) Detailed plan for conducting monitoring of water quality regularly with proper maintenance of records shall be formulated. Detail of methodology and identification of monitoring points (between the plant and drainage in the direction of flow of surface / ground water) shall be submitted. It shall be ensured that parameter to be monitored also include heavy metals. A provision for long-term monitoring of ground water table using Piezometer shall be incorporated in EIA, particularly from the study area.

30) Socio-economic study of the study area comprising of 10 km from the plant site shall be carried out through a reputed institute / agency which shall consist of detail assessment of the impact on livelihood of the local communities.

31) Action Plan for identification of local employable youth for training in skills, relevant to the project, for eventual employment in the project itself shall be formulated and numbers specified during construction & operation phases of the Project.

32) If the area has tribal population it shall be ensured that the rights of tribals are well protected. The project proponent shall accordingly identify tribal issues under various provisions of the law of the land.

33) A detailed CSR plan along with activities wise break up of financial commitment shall be prepared. CSR component shall be identified considering need based assessment study and Public Hearing issues. Sustainable income generating measures which can help in upliftment of affected section of society, which is consistent with the traditional skills of the people shall be identified. Separate budget for community development activities and income generating programmes shall be specified.

34) While formulating CSR schemes it shall be ensured that an in-built monitoring mechanism for the schemes identified are in place and mechanism for conducting annual social audit from the nearest government institute of repute in the region shall be prepared. The project proponent shall also provide Action Plan for the status of implementation of the scheme from time to time and dovetail the same with any Govt. scheme(s). CSR details done in the past should be clearly spelt out in case of expansion projects.

35) R&R plan, as applicable, shall be formulated wherein mechanism for protecting the rights and livelihood of the people in the region who are likely to be impacted, is taken into consideration. R&R plan shall be formulated after a detailed census of population based on socio economic surveys who were dependant on land falling in the project, as well as, population who were dependant on land not owned by them.

36) Assessment of occupational health and endemic diseases of environmental origin in the study area shall be carried out and Action Plan to mitigate the same shall be prepared.

37) Occupational health and safety measures for the workers including identification of work related health hazards shall be formulated. The company shall engage full time qualified doctors who are trained in occupational health. Health monitoring of the workers shall be conducted at periodic intervals and health records maintained. Awareness programme for workers due to likely adverse impact on their health due to working in non-conducive environment shall be carried out and precautionary measures like use of personal equipments etc. shall be provided. Review of impact of various health measures undertaken at intervals of two to three years shall be conducted with an excellent follow up plan of action wherever required.

38) One complete season site specific meteorological and AAQ data (except monsoon season) as per latest MoEF&CC Notification shall be collected and the dates of monitoring shall be recorded. The parameters to be covered for AAQ shall include PM10, PM2.5, SO2, NOx, CO and Hg. The location of the monitoring stations should be so decided so as to take into consideration the upwind direction, pre-dominant downwind direction, other dominant directions, habitation and sensitive receptors. There should be at least one monitoring station each in the upwind and in the pre - dominant downwind direction at a location where maximum ground level concentration is likely to occur.

39) In case of expansion project, air quality monitoring data of 104 observations a year for relevant parameters at air quality monitoring stations as identified/stipulated shall be submitted to assess for compliance of AAQ Standards (annual average as well as 24 hrs).

40) A list of industries existing and proposed in the study area shall be furnished.

41) Cumulative impacts of all sources of emissions including handling and transportation of existing and proposed projects on the environment of the area shall be assessed in detail. Details of the Model used and the input data used for modeling shall also be provided. The air quality contours should be plotted on a location map showing the location of project site, habitation nearby, sensitive receptors, if any. The windrose and isopleths should also be shown on the location map. The cumulative study should also include impacts on water, soil and socio-economics.

42) Radio activity and heavy metal contents of coal to be sourced shall be examined and submitted along with laboratory reports.

43) Fuel analysis shall be provided. Details of auxiliary fuel, if any, including its quantity, quality, storage etc should also be furnished.

44) Quantity of fuel required, its source and characteristics and documentary evidence to substantiate confirmed fuel linkage shall be furnished. The Ministry's Notification dated 02.01.2014 regarding ash content in coal shall be complied. For the expansion projects, the compliance of the existing units to the said Notification shall also be submitted

45) Details of transportation of fuel from the source (including port handling) to the proposed plant and its impact on ambient AAQ shall be suitably assessed and submitted. If transportation entails a long distance it shall be ensured that rail transportation to the site shall be first assessed. Wagon loading at source shall preferably be through silo/conveyor belt.

46) For proposals based on imported coal, inland transportation and port handling and rail movement shall be examined and details furnished. The approval of the Port and Rail Authorities shall be submitted.

47) Details regarding infrastructure facilities such as sanitation, fuel, restrooms, medical facilities, safety during construction phase etc. to be provided to the labour force during construction as well as to the casual workers including truck drivers during operation phase should be adequately catered for and details furnished.

48) EMP to mitigate the adverse impacts due to the project along with item - wise cost of its implementation in a time bound manner shall be specified.

49) A Disaster Management Plan (DMP) along with risk assessment study including fire and explosion issues due to storage and use of fuel should be carried out. It should take into account the maximum inventory of storage at site at any point of time. The risk contours should be plotted on the plant layout map clearly showing

which of the proposed activities would be affected in case of an accident taking place. Based on the same, proposed safeguard measures should be provided. Measures to guard against fire hazards should also be invariably provided. Mock drills shall be suitably carried out from time to time to check the efficiency of the plans drawn.

50) The DMP so formulated shall include measures against likely Fires/Tsunami/Cyclones/Storm Surges/ Earthquakes etc, as applicable. It shall be ensured that DMP consists of both On-site and Off-site plans, complete with details of containing likely disaster and shall specifically mention personnel identified for the task. Smaller version of the plan for different possible disasters shall be prepared both in English and local languages and circulated widely.

51) Detailed scheme for raising green belt of native species of appropriate width (50 to 100 m) and consisting of at least 3 tiers around plant boundary with tree density of 2000 to 2500 trees per ha with a good survival rate of around 80% shall be submitted. Photographic evidence must be created and submitted periodically including NRSA reports in case of expansion projects. A shrub layer beneath tree layer would serve as an effective sieve for dust and sink for CO2 and other gaseous pollutants and hence a stratified green belt should be developed.

52) Over and above the green belt, as carbon sink, plan for additional plantation shall be drawn by identifying blocks of degraded forests, in close consultation with the District Forests Department. In pursuance to this the project proponent shall formulate time bound Action Plans along with financial allocation and shall submit status of implementation to the Ministry every six months.

53) Corporate Environment Policy

a. Does the company has a well laid down Environment Policy approved by its Board of Directors? If so, it may be detailed in the EIA report.

b. Does the Environment Policy prescribe for standard operating process / procedures to bring into focus any infringement / deviation / violation of the environmental or forest norms / conditions? If so, it may be detailed in the EIA.

c. What is the hierarchical system or Administrative order of the company to deal with the environmental issues and for ensuring compliance with the environmental clearance conditions.

Details of this system may be given.

d. Does the company has compliance management system in place wherein compliance status along with compliances / violations of environmental norms are reported to the CMD and the Board of Directors of the company and / or shareholders or stakeholders at large? This reporting mechanism should be detailed in the EIA report.

All the above details should be adequately brought out in the EIA report and in the presentation to the Committee.

54) Details of litigation pending or otherwise with respect to project in any Court, Tribunal etc. shall invariably be furnished.

Additional TOR for Coastal Based Thermal Power Plants Projects (TPPs):

Over and above the TOR mentioned in Thermal Power Plants Projects, the following shall be strictly followed (as applicable):

a) Low lying areas fulfilling the definition wetland as per Ramsar Convention shall be identified and clearly demarcated w.r.t the proposed site.

b) If the site includes or is located close to marshy areas and backwaters, these areas must be excluded from the site and the project boundary should be away from the CRZ line. Authenticated CRZ map from any of the authorized agencies shall be submitted.

c) The soil leveling should be minimum with no or minimal disturbance to the natural drainage of the area. If the minor canals (if any) have to be diverted, the design for diversion should be such that the diverted canals not only drains the plant area but also collect the volume of flood water from the surrounding areas and discharge into marshy areas/major canals that enter into creek. Major canals should not be altered but their embankments should be strengthened and desilted.

d) Additional soil required for leveling of the sites should as far as possible be generated within thesite itself in such a manner that the natural drainage system of the area is protected and improved.

e) Marshy areas which hold large quantities of flood water to be identified and shall not be disturbed.

f) No waste should be discharged into Creek, Canal systems, Backwaters, Marshy areas and seaswithout appropriate treatment. Wherever feasible, the outfall should be first treated in a Guard Pond and then only discharged into deep sea (10 to 15 m depth). Similarly, the Intake should be from deep sea to avoid aggregation of fish and in no case shall be from the estuarine zone. The brine that comes out from Desalinization Plants (if any) should not be discharged into sea without adequate dilution.

g) Mangrove conservation and regeneration plan shall be formulated and Action Plan with details of time bound implementation shall be specified, if mangroves are present in Study Area.

h) A common Green Endowment Fund should be created by the project proponents out of EMP budgets. The interest earned out of it should be used for the development and management of green cover of the area.

i) Impact on fisheries at various socio economic level shall be assessed.

j) An endowment Fishermen Welfare Fund should be created out of CSR grants not only to enhance their quality of life by creation of facilities for Fish Landing Platforms / Fishing Harbour / cold storage, but also to provide relief in case of emergency situations such as missing of fishermen on duty due to rough seas, tropical cyclones and storms etc.

k) Tsunami Emergency Management Plan shall be prepared wherever applicable and Plan submitted prior to the commencement of construction work.

l) There should not be any contamination of soil, ground and surface waters (canals & village pond) with sea water in and around the project sites. In other words necessary preventive measures for spillage from pipelines, such as lining of Guard Pond used for the treatment of outfall before discharging into the sea and surface RCC channels along the pipelines of outfall and intake shouldbe adopted. This is just because the areas around the projects boundaries could be fertile agricultural land used for paddy cultivation.

Annexure C: Contents of EIA Document & Executive Summary of EIA

EIA Structure	Contents
Introduction	1. Purpose of the Report 2. Identification of Project & Project Proponent 3. Brief Description of the Project -nature, size, location, its importance to the country or region 4. Scope of the Study (As per ToR)
Project Description	1. Description of those aspects of the Project that are likely to cause environmental effects. 2. Details should give clear picture of the following: • Type • Need • Location (maps showing location. project boundary; site layout) • Size of Operation • Proposed Schedule for Approval and Implementation • Technology and Process 3. Project Description (including drawings showing project layout, etc.) 4. Schematic Representations (including feasibility drawings which give information important for purpose of EIA) 5. Mitigation measures (to meet environmental standards and other EIA requirements) 6. Assessment of New & Untested technology (for the risk of technological failure)
Description of the Environment	1. Study Area 2. Period 3. Components & Methodology 4. Establishment of Baseline (for valued environmental components as identified in the scope) 5. Base Maps of all environmental components
Anticipated Environmental Impacts & Mitigation Measures	1. Details of Investigated Environmental Impacts due to various aspects like: • Location • Design • Construction • Regular Operations • Final Decommissioning or Rehabilitation (of a completed project) 2. Measures for Minimizing / Offsetting Identified Adverse Impacts 3. Irreversible Commitments of environmental components 4. Assessment of Significance of Impacts 5. Mitigation Measures

EIA Structure	Contents
Analysis of Alternatives (Technology & Site)	Details for each Alternative (if Scoping indicates need for alternatives) 1. Description 2. Summary of Adverse Impacts 3. Proposed Mitigation Measures 4. Selection of Alternative
Environmental Monitoring Program	Technical aspects of monitoring effectiveness of mitigation measures include: • Measurement Methodologies • Frequency • Location • Data Analysis • Reporting Schedules • Emergency Procedures; • Detailed Budget • Procurement Schedules
Additional Studies	• Public Consultation • Risk Assessment • Social Impact Assessment
Project Benefits	Improvements in Physical and Social Infrastructure Employment Potential (skilled/ semi-skilled / unskilled) Other Tangible Benefits
Environmental Cost Benefit Analysis	If recommended during Scoping
EMP	Description of the Administrative Aspects after approval of the EIA to ensure implementation of mitigation measures and monitoring their effectiveness
Summary & Conclusion (This will constitute the Summary of the EIA Report)	• Overall Justification for implementation of the project • Explanation of mitigation of adverse effects
Disclosure of Consultants engaged	Details of the consultants engaged including: Name Brief Resume Nature of Consultancy

Contents of Executive Summary of EIA Report

The Executive Summary of EIA Report shall be a summary of the full EIA report condensed to 10 A4 size pages maximum. It should necessarily cover in brief the following chapters of the full EIA Report:

1. Project Description
2. Description of the Environment
3. Anticipated Environmental Impacts and Mitigation Measures
4. Environmental Monitoring Programme
5. Additional Studies
6. Project Benefits
7. Environment Management Plan