

BEC POWER PVT. LTD.**Sapos Village, Dabhra Tehsil, Janjgir-Champa District, Chhattisgarh****1.0 INTRODUCTION**

BEC Power Pvt. Ltd have proposed to establish a 500 MW (Phase-I: 1 x 250 MW & Phase-II : 1 x 250 MW) Coal based power plant in Sapos Village, Dabhra Tehsil, Janjgir-Champa District, Chhattisgarh. The capital investment of the project is Rs. 2200 Crores.

The summary of the report is presented below

2.0 ENVIRONMENTAL SETTING OF SITE (10 Km. Radius)

Latitude	:	21° 45' 27" N to 21° 45' 44" N
Longitude	:	83° 09' 1.5" E to 83° 09' 55.9" E
Nearest habitation	:	Sapos – 0.5 kms.
Nearest railway station	:	Robertson – 25 Kms.
Nearest National Highway	:	12 Kms. (NH # 200)
Nearest river	:	Mahanadi (Aerial Distance - 2.0 Kms.)
Nearest reserve forest	:	Nil
National Parks/ Sanctuaries / tiger reserve/ elephant reserve/ migratory routes	:	Nil
Historical places	:	Nil
List of Industries	:	There are no industries present with in 10 Km. radius of the proposed project.
Defence Installations	:	Nil
Airports / Airstrips	:	Nil

SALIENT FEATURES OF THE PROJECT

S. No.	Parameters	Description														
1.	Plant capacity	500 MW Thermal Power plant														
2.	Configuration	Phase- I : 1 x 250 MW Phase- II : 1 x 250 MW														
3.	Capacity of STG	2x250 MW														
4.	Total area of the plant and land use	Total area : 445.21 Acres <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Description</th> <th>Area (in Acres)</th> </tr> </thead> <tbody> <tr> <td>Plant, Office & Open space</td> <td>152.00</td> </tr> <tr> <td>Coal Handling plant & storage</td> <td>75.00</td> </tr> <tr> <td>Ash Disposal Area</td> <td>62.00</td> </tr> <tr> <td>Green Belt Area</td> <td>136.00</td> </tr> <tr> <td>Road, drains etc</td> <td>20.21</td> </tr> <tr> <td>TOTAL</td> <td>445.21</td> </tr> </tbody> </table>	Description	Area (in Acres)	Plant, Office & Open space	152.00	Coal Handling plant & storage	75.00	Ash Disposal Area	62.00	Green Belt Area	136.00	Road, drains etc	20.21	TOTAL	445.21
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Ash Disposal Area	62.00															
Green Belt Area	136.00															
Road, drains etc	20.21															
TOTAL	445.21															
5.	Power Evacuation	Power generated will be evacuated through Central Transmission System of														

		PGCIL by LILO of the 400 KV - Double Circuit lines.
6.	Fuel	Primary fuel : Coal Secondary fuel : HFO/LDO
A.	Source of Fuels	SECL / MCL
B.	Total fuel requirement	Coal : 1.468 MTPA (Phase-I) : 1.468 MTPA (Phase-II)
C.	Calorific value	Coal : 3200 K. Cals/ Kg
D.	Ash content in coal (% by weight)	Coal : 45.0% (by mass, max.)
E.	Sulphur content in coal (% by weight)	0.5 % (by mass , max.)
7.	Water requirement	
A.	Total requirement	41,496 cum/day (17 Cusecs)
B.	Source of water	Mahanadi river (3.0 kms.).
C.	Water Transmission	Dedicated pipeline will be laid from river bed to the site.
D.	Raw water Treatment	Raw water will be treated in clarifiers
E.	Cooling water system	Recirculating type cooling water system with induced draft cooling towers with cooling tower blow down from the cold water side to ensure no thermal pollution.
F.	Raw water storage at the site	290472 cum (7 days storage)
8.	Total effluent generation	9846 cum/day
9.	Effluent treatment	<ul style="list-style-type: none"> • Neutralization of D.M. plant regeneration waste water and discharge to Central Monitoring Basin. • Recirculating type cooling water system with induced draft cooling towers with cooling tower blow down from the cold water side to ensure no thermal pollution. • Recirculation of effluent from coal dust suppression and dust extraction system and service water system. -Recirculation of ash dyke water. • Only effluent from fuel oil storage area will be treated in oil separator and will be reused in service water system. • Recirculation of filter backwash to clarifier. • Disposal of clarifier sludge in ash handling plant.
10.	Fire fighting system	Adequate fire protection systems as per TAC & OISD guidelines will be provided.
11.	Stack details	
A.	No. of stacks	1 (Each stack with twin flues)

B.	Stack height	275 m
C.	Dia. of each flue (at top)	5.0 m
D.	Particulate emission per flue	16.7 g/s
E.	SO ₂ emission per flue	567.2 g/s
F.	NO _x emission per flue	216.5 g/s
12.	Noise levels	All the equipments will be designed to meet the prescribed OSHA standards (< 90 dBA)

3.0 DESCRIPTION OF THE PROJECT

3.1 Power Generation & Evacuation

The whole process comprises of generating heat energy in the boiler and then converting heat energy generated in the Boiler into mechanical energy in the turbine and further converting this mechanical energy generated in the turbine into electrical energy in the alternator. Coal will be used as fuel in the boiler. The combustion of the fuel generates the heat energy in the boiler. This heat energy is transferred to heat transfer area provided in different areas like (bed coils, water wall, Steam Drawn/mud drum, bank tubes, economizer, super heater, air pre-heater). This heat will be transferred to the water which will pass through and steam is generated and this steam will be further super heated in the super heater so that dry super heated steam will be generated. The quantity of the steam generated in each of the boilers will be 900 TPH (MCR). This Steam will be fed into the turbine and this steam expands in the turbine and generates mechanical energy i.e., it starts rotating the Rotor at high speed and further this mechanical energy will be converted into electrical energy in the alternator. The power generated at each of the alternator terminal is 250 MW. Power generated will be evacuated through Central Transmission System of PGCIL by LILO of the 400 KV - Double Circuit lines.

Fuel requirement

Coal will be the fuel in the proposed power plant. The annual requirement of coal for 2 x 250 MW is estimated to be about 2.936 million tons.

Coal requirement for Phase-I : 1.468 MTPA

Coal requirement for Phase-II : 1.468 MTPA

Source & Transportation

Coal linkage from SECL/MCL (Korba, Raigarh & Ib-Valley). The annual requirement of coal for 2 x 250 MW is estimated to be about 2.936 million tons. Coal linkage from Ministry of coal for the project is under process.

Sulphur content in in the Coal will 0.5 %, the maximum ash content of 45% is considered in the proposed power plant.

3.4 Water Requirement

The water required for the entire project will be 41,496 cum/day (17 Cusecs). This includes make-up water for Cooling, Boiler make-up, Air Conditioning & Ventilation, Clarifier sludge, Filter backwash, DM plant regeneration water, service water & domestic water. The water required for the project will be met from Mahanadi River. A dedicated pipeline will be laid from the river bed to the plant site. Permission has been obtained from Water Resources Department, Govt. of Chhattisgarh for drawl of 17 Cusecs of water.

**WATER REQUIREMENT
(For Both Phases)**

S.No	ITEM	REQUIREMENT (CUM / DAY)
1.	Cooling Tower make-up	36,072
2.	De-mineralized water for boiler make-up	1368
3.	DM plant regeneration	150
4.	Clarifier Sludge	288
5.	Service Water	672
6.	AC & vent. Requirement	2400
7.	Auxillary Cooling	24
8.	Filterback wash	432
9.	Domestic requirement for Plant & Colony	90
	Total	41,496

3.5 Quantity & Quality Of Effluent from Power plant

The total effluent quantity expected from the proposed project will be 9,846 Cum/day. This includes Boilers blowdown, CT Blowdown & DM Plant regeneration from the power plant. The Sanitary waste water will be treated in septic tank followed by soak pit.

**WASTE WATER GENERATION
(For Both Phases)**

S.No	SOURCE	Quantity (cum/day)
1.	Cooling tower blowdown	7584
2.	Boiler blowdown	1200
3.	D.M. plant regeneration water	150
4.	Service water	120
5.	Clarifer Sludge	288
6.	Filter backwash	432
7.	Sanitary Waste water (Plant & Colony)	72
	Total	9846

The characteristics of sanitary waste water & Cooling Tower blowdown, Boiler blow down and DM Plant regeneration water are shown below:

Parameters	Sanitary waste water	Cooling tower bolwdown	Boiler blowdown	D.M.Plant regeneration water
pH	7.0 - 8.5	7.0 - 8.0	9.5 - 10.5	4.0 - 10.0
TDS (mg/l)	800 - 900	1000	800-1000	5000-6000
BOD (mg/l)	200 - 250	-	-	-
COD (mg/l)	300 - 400	-	-	-

Sewage Treatment Plant

The sewage generated from the plant and colony will be transported in CI pipes to the Sewage Treatment Plant (STP). The treated sewage after ensuring compliance with CECB norms will be used for greenbelt development within the premises.

4.0 DESCRIPTION OF ENVIRONMENT (Baseline Data)

To assess the impacts arising out of the proposed Power plant, the base line data has been collected for the Winter Season (December, 2008 - February, 2009). The incremental ground level concentrations of SPM, SO₂, & NO_x due to the implementation of the power plant were computed. These incremental ground level concentrations super imposed on the baseline data gives the post project scenario.

4.1 Micro- Meteorology of the Study Area:

To understand the meteorological phenomenon in the study area, various parameters such as Wind pattern, temperature variation, and relative humidity were recorded on hourly basis during Winter Season (December, 2008 - February, 2009).

4.2 Ambient Air Quality:

Eight ambient air-monitoring stations were selected within the 10 km radius of the study area, representing the downwind, cross wind and upwind directions with reference to the project site. Ambient air quality was monitored for RSPM, SPM, SO₂, NO_x & CO at 8 stations for one season as per MOEF guidelines. The following are the concentrations of various parameters at all the monitoring stations.

RSPM	-	27.0 to 31.2 µg/m ³
SPM	-	82.0 to 98.2 µg/m ³
SO ₂	-	5.0 to 6.7 µg/m ³
NO _x	-	5.8 to 7.9 µg/m ³
CO	-	216 to 510 µg/m ³

4.3 Noise Monitoring:

Noise levels were measured at 8 stations during daytime & night time. The noise levels at the monitoring stations are ranging from 43.04 dBA to 49.10 dBA.

4.4 Water Environment:

Eight ground water samples were collected from in and around the plant site within 10 km radius. The parameters thus analyzed were compared with BIS :10500 showed all parameters well within the drinking water standards. 2 nos. of surface water samples were collected and analyzed and are found to be complying with BIS: 2296 standards

4.5 Soil Quality:

Five samples, from plant site and surrounding villages were collected to assess the soil quality in the 10 km study area of plant site and none of the samples indicated contamination.

4.6 Socio Economic Environment:

Socio-economic details have been collected within 10 Km. radius of the site.

5.0 PREDICTION OF IMPACTS

5.1 Prediction of Impact on Air Quality

The fuel for Power generation in the Project will be Coal. ESP will be installed to bring down the particulate emission to less than 50 mg/Nm³. A Single Stack (with twin flues) of 275 m height will be provided for effective dispersion of sulphur dioxide into the atmosphere.

The emissions of concern from the power plant are SPM, SO₂ & NO_x. The predictions of Ground Level Concentrations have been carried out using ISC-3 model. Meteorological data such as wind direction, wind speed, temperature, etc. collected at the site have been used as input data to run the model. The emissions of SPM, SO₂ & NO_x per flue will be 16.7 g/s, 567.2 g/s & 216.5 g/s respectively.

It is observed from the computation of results that the maximum predicted 24 hourly Incremental rise in ground level concentrations of SPM, SO₂ & NO_x are 1.0 µg/m³, 20.4 µg/m³ & 8.0 µg/m³ & respectively at a distance of 1.9 Kms. from the origin stack in the down wind direction. The predicted results show that the net resultant concentrations (Baseline conc. + incremental rise in conc.) for SPM, SO₂ & NO_x during the operation of the 500 MW power plant will be within the National Ambient Air Quality Standards. Hence there will not be any adverse impact on air environment due to the proposed Power Project.

NET RESULTANT MAXIMUM CONCENTRATIONS DUE TO THE PROJECT
(During operation of the 500 MW project)

	SPM (µg/m ³)	SO ₂ (µg/m ³)	NO _x (µg/m ³)
Maximum baseline conc. in the study area	98.2	6.7	7.9
Maximum predicted incremental rise in concentration	1.0	20.4	8.0
Net resultant concentration	99.2	27.1	15.9
National Ambient Air Quality Standards	200	80	80

5.2 Prediction of Impact on Noise Quality

The major sources of noise generation in the proposed power project will be Steam turbines, boilers, boiler feed pumps, Compressors etc. The ambient noise levels will be within the standards prescribed by MOE&F vide notification dated 14-02-2000 under the noise pollution (Regulation & Control), rules 2000 i.e. the noise levels will be less than 75 dBA during day time and 70 dBA during night time. The extensive greenbelt proposed to be developed in the Plant premises will further attenuate the noise levels. Hence there will not be any adverse impact due to noise environment due to the proposed project on population in surrounding areas.

5.3 Prediction of impact on Water Environment

Water required for the power plant will be sourced from Mahanadi river. Water drawal Permission from Govt. of Chhattisgarh has been obtained. Closed circuit water recycling will be adopted to achieve zero discharge. About 9,846 m³/day of waste water will be generated from the plant and will be used for dust suppression, green belt development and in Ash handling plant. Thus zero discharge will be ensured during operation of the plant. Hence there will not be any adverse impact on water resources due to the proposed power project.

5.4 Prediction of impact on Land Environment

The fly ash generated will be utilized in accordance with MOEF Notification. Bottom ash will be stored in ash dyke. Suitable impervious lining will be provided to ash dyke. Hazardous wastes such as waste oils will be stored in HDPE drums and will be disposed off to CECB approved vendors. Hence there will not be any adverse impact on land

environment due to the proposed power project.

5.5 Prediction of Impact on flora & fauna

There are no National parks/Sanctuaries within the study area of 10 km. radius. High efficiency ESP's will be provided to bring down the particulate emission to less than 50 mg/Nm³. There are no rare & endangered species in the area. Hence there will not be any adverse impact on flora & fauna due to the proposed power project operations.

5.6 Prediction of impacts on Socio Economic Environment

Socio economic status of people in the area will improve due to this project. Unskilled / semi-skilled workers will be drawn from the local areas only. Infrastructural facilities will improve in the study area due to the proposed coal based power project.

6.0 ENVIRONMENTAL MANAGEMENT PLAN

6.1 Air Pollution

In the proposed project dust suppression/dust extraction system will be provided wherever essential. Plantation will be taken – up all along the roads in the power plant. All CREP recommendations stipulated for thermal power plants will be implemented.

The fuel for the proposed Power Project will be Coal. A single stack 275 m height with Twin Flues will be provided for effective dispersion of pollutants into the atmosphere. High efficiency Electrostatic Precipitators (ESP) will be provided for bringing down the particulate emission in the exhaust of the Boilers stacks to less than 50 mg / Nm³.

STACK DETAILS

1.	Number of stacks	—	1 (with twin flues)
2.	Height of the stack	m	275
3.	Internal stack dia of Flue	m	5.0
4.	Volumetric flow rate per flue	M ³ /sec	432
5.	Exit velocity of flue gas	m/sec	22.0
6.	Temperature of flue gas	0C	393
7.	SO ₂ emission quantity per flue	g/s	567.2
8.	NO _x emission quantity per flue	g/s	216.5
9.	SPM emission quantity per flue (with ESP online)	g/s	16.7

The air pollution control measures proposed are

- High efficiency ESPs to restrict the particulate emission to less than 50 mg/Nm³.
- Continuous sprinkling of water on coal stock piles to enforce the dust suppression.
- A blanket of water will be maintained on the top of the ash pond to prevent fugitive dust.
- Massive green belt development of the extent of 136 acres etc.
- Dust extraction system, Dust suppression system will be provided at Coal Handling plant, Crusher & at all other material transfer points.
- Total 2 nos. of High efficiency Electro Static Precipitators (ESP) each with 6 fields (Five fields working & one standby) will be provided to bring down the Particulate emission in

the exhaust gas to less than 50 mg/Nm³. Inter-locking system will be provided to ESP in such a way that whenever the ESP fails, the boiler will trip down and there will be no power generation.

- A flue gas velocity of 22 m/s will be maintained for effective dispersion of emissions.
- Low NOx burners will be provided to restrict the NOx emissions to less than 650 mg / Nm³.
- All the conveyors will be covered with GI sheets to prevent the fugitive dust emission into the atmosphere.
- Adequate dust suppression system like fog type and water spray system will be installed in the material unloading areas.
- Extensive greenbelt will be taken up all around the plant area to further reduce the emissions.
- All the internal roads will be asphalted to reduce the fugitive dust emission due to the vehicular movement.
- Water spraying will be done frequently at coal stock yard to control the fugitive dust.

6.2 Water Environment:

The total wastewater generated from the proposed Power Project will be 9,846 cum/day. The effluent generated will be cooling tower blowdown, Boiler blowdown, Clarifier blowdown, Plant service water, DM plant regeneration waste water. Service water, run-off from the coal pile area, DM plant regeneration waste and sanitary waste water.

Effluent Treatment Plant

The total quantity of effluent generated from various units in both the phases will be 9,846 cum/day. Out of this 72 cum/day will be the sanitary waste water, which will be treated in sewage treatment plant.

Boiler blow-down and D.M.Plant regeneration water will be treated in a neutralization tank. Service water will be treated in an oil separator and after treatment this effluent stream along with treated boiler blow-down & D.M.plant regeneration and Cooling Tower Blow-down will be taken to Central Monitoring Basin and will be partly utilized for greenbelt development within the plant premises and the remaining will be used for Dust Suppression & Ash Handling system. No effluent will be let out of the plant premises. The ash dyke supernatant will be treated in a settling tank and the clarified effluent will be completely recycled. This plant will work with zero discharge principle. The following will be the treated effluent characteristics.

The following will be treated combined effluent characteristics.

pH	6.5 to 8.5
Free available chlorine	< 1.0 mg/l
Copper	< 1.0 mg/l
Zinc	< 1.0 mg/l
Chromium	< 0.2 mg/l
Iron	< 1.0 mg/l
Phosphorus	< 5.0 mg/l

Effluent Management Scheme

The details of the effluent management system for the proposed coal based power plant will be as following:

- Neutralisation of D.M. plant regeneration waste water and discharge to Central Monitoring Basin.
- Recirculating type cooling water system with induced draft cooling towers with cooling tower blow down from the cold water side to ensure no thermal pollution.
- Recirculation of effluent from coal dust suppression and dust extraction system and service water system.
- Recirculation of ash water.
- Only effluent from fuel oil storage area will be treated in oil separator and will be reused in service water system.
- Recirculation of clarifier blowdown.
- Disposal of clarifier sludge in ash handling system.

6.3 Ash Management

The fly ash generated in the power plant will be stored in accordance with the Ministry of Environment & Forests, New Delhi notification on fly ash utilisation. Fly ash will be utilized in cement plants, asbestos plants, block making, brick manufacturing and in road construction.

Description	Quantity / Quality	Method of collection	Method of disposal
Ash	1.056 MTPA	Fly ash to be utilized will be stored in silo only. Bottom ash will be stored in ash dyke.	Fly ash will be used in cement plants, road construction Fly ash utilization will be in accordance with MOEF notification. Bottom ash will be stored in ash dyke with suitable impervious lining.

6.4 Land and Biological Environment

Green belt in about 136 acres will be developed in a total area of 445.21 acres. The massive afforestation helps in reducing the dust level, noise levels and also the ambient temperature. Cooling tower blowdown is partly utilized for green belt development. Upcoming project along with the green belt will have beneficial effects in changing the environmental quality of the surrounding area.

6.5.1 Socio-Economic Environment

The proposed project creates employment to 1500 people during construction and 350 people during operation of the proposed project. Skilled and semiskilled workers are to be drawn from the local areas. Local economy will certainly improve through increase in employment potential in the proposed activity. Proper precautionary measures would be taken for adopting occupational safety and health standards. The life style of the local

people will certainly improve with this proposed project.

6.6 Fire Protection Occupational Health & Safety Systems

Adequate fire protection systems & safety devices will be provided in the proposed plant as per norms. Regular health checkups will be conducted in the villages.

6.7 Rain water harvesting measures

Rain water harvesting pits will be constructed to harvest the roof top water in consultation with State Ground Water Board.

6.8 Post Project Environmental Monitoring

During operation of the plant, Environmental monitoring will be carried out as per norms and the reports will be submitted to MOEF & CECB regularly.

BEC POWER PVT. LTD.

**Sapos Village,
Dabhra Tehsil,
Janjgir-Champa District, Chhattisgarh.**

**EXECUTIVE SUMMARY OF
ENVIRONMENTAL IMPACT ASSESSMENT
&
ENVIRONMENTAL MANAGEMENT PLAN
(2 X 250 MW THERMAL POWER PROJECT)**

Submitted to

**CHHATTISGARH ENVIRONMENT CONSERVATION BOARD
RAIPUR, CHHATTISGARH.**