PRE-FEASIBILITY REPORT

Of

18 MW CAPTIVE POWER PLANT

AT

Mattapalli village, Mattampally Mandal, Suryapet District, Telangana State

By

Sagar Cements Limited (SCL)
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2. Introduction of the project/ Background information
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1.0 EXECUTIVE SUMMARY

Sagar Cements Limited (SCL) is operating Cement Plant with clinker production of 2.0 MTPA and cement of 2.35 MTPA capacity at Mattapalli village, Matampalli Mandal, Suryapet District, Telangana State.

Sagar Cements Limited (SCL) has obtained Environmental Clearance (vide EC letter J-11011/379/2006-IA II(l) dated 2-4-2007) for expansion of Cement Plant with clinker production capacity from 0.50 to 2.0 MTPA and cement production from 0.30 to 2.35 MTPA capacity along with **25 MW coal based captive power plant** at Mattapalli village, Matampalli Mandal, Suryapet District, Telangana State. **Public hearing for the proposal was conducted on 11-10-2006**

SCL has implemented the expansion of cement plant. Power plant could not be implemented due to financial constraints and availability of water.

SCL has obtained amendment vide J-11011/379/2006-IA II(l) dated 30-8-2013 in EC to implement 10 MW Waste Heat Recovery Based and 15 MW Coal based power plant in place of 25 MW coal based power plant along with extension of validity of EC for the power plant from 02.04.2012 for further period of five years. SCL has constructed the Waste Heat Recovery Power plant of 7 MW and is about to commission the same

Validity of EC issued for 15 MW Captive power plant based on AFBC Technology expired on 02.04.2017.

SCL now proposes to adopt a superior technology with CFBC (Circulating Fluidized Bed Combustion) Boiler, which is economically adapted for CPP capacities of 18 MW and would meet with the latest Regulatory requirements. Also the water cooled Condensor system will be replaced with air cooled Condensor system.

The proposed CFBC technology will comply with the latest Government Gazette Norms, dated 08.12.2015 which stipulates the following stack emission levels (ESP outlet dust concentration: 30 mg/Nm$^3$; SOx: 100 mg/Nm$^3$; NOx: 100 mg/Nm$^3$; Mercury : 0.03
ppm) for the boilers which will be installed / commissioned after 01.01.2017,

SCL proposes to set up a 18 MW Coal based Thermal Power Plant to meet the power requirement of the existing cement plant. Salient features of the power plant are given below

<table>
<thead>
<tr>
<th>Location of Power Plant</th>
<th>Within the existing Cement plant for which EC was earlier obtained</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plant Capacity</td>
<td>1 x 18 MW - Thermal Power Plant</td>
</tr>
<tr>
<td>Technology</td>
<td>Conventional steam cycle operating in Rankine cycle, consisting of 80 TPH CFBC boilers and 1 no. Turbine 540 deg. C at 110 Kg / cm2 pressure.</td>
</tr>
<tr>
<td>Main Fuel</td>
<td>Indian Coal / washery Reject</td>
</tr>
<tr>
<td>Type of Coal for design of boiler</td>
<td>Boiler will be designed for coal</td>
</tr>
<tr>
<td>Source of water</td>
<td>Mine Pit and Ground water</td>
</tr>
<tr>
<td><strong>Water Requirement</strong></td>
<td></td>
</tr>
<tr>
<td>Total raw water requirement</td>
<td>280 m³/day</td>
</tr>
<tr>
<td>Annual generation</td>
<td>123.0 mio kwh</td>
</tr>
<tr>
<td>Annual auxiliary consumption</td>
<td>12.3 mio kwh</td>
</tr>
<tr>
<td>Net output</td>
<td>110.7 mio kwh</td>
</tr>
<tr>
<td>Land Requirement</td>
<td>2.50 Ha</td>
</tr>
<tr>
<td>Manpower Requirement</td>
<td>43 persons &amp; 24 contract labour</td>
</tr>
<tr>
<td>Project Implementation Schedule</td>
<td>3 months for Power Plant Order Placement</td>
</tr>
<tr>
<td></td>
<td>18 months from main machinery order placement to commissioning</td>
</tr>
</tbody>
</table>

The proposed new unit will be located within the existing cement plant complex. No additional land or site is required. Keeping in view of utilizing some of the common existing infrastructure.

Fuel proposed for thermal power plant will be Indian coal / Imported Coal.
The power plant is based on air cooled condensate system. The water requirement for the proposed CPP plant works out to be approximately 280 m$^3$/ day. Water demand is proposed to be met from the present water source being received from Mine pit and ground water.

Waste water generated from the power plant will be treated and used in the cement plant, and the treated effluent will be used for development/maintenance of the green belt. An effluent disposal pump will be used for this purpose.

The wastewater generated from the power plant will be used for development/maintenance of the green belt.

Ash is generated from the power plant will be consumed in existing cement plant.

There is no wild life sanctuary, national park, eco-sensitive area within the 10 km radius of the project site.

Existing infrastructure include well developed roads, storm water drains with adequate storage space for fly ash and parking area.

All infrastructure facilities such as education, health facilities and other social facilities are adequate at nearest populated area.

Dust collected from air pollution control equipment is 100% recycled in process and Ash generated in power plant will be consumed in existing cement plant.

SCL has well-defined CSR policy to Carryout social development and welfare measures in the surrounding villages. Under CSR activity SCL had carried out community development projects, in the fields of health, education and environmental preservation, in and around the plant.

The capital cost, for the proposed Power Plant project, works out to Rs 90.0 crore.
2. INTRODUCTION OF THE PROJECT/ BACKGROUND INFORMATION

(I) IDENTIFICATION OF PROJECT AND PROJECT PROPONENT

Sagar Cements is a prominent player in the field of cement in Telangana and Andhra Pradesh for over 3 decades adopting progressive manufacturing practices, whether it relates to maintaining high standards of quality of its products or development of its highly valued human resources or the need to keep the pollution to the barest minimum. ISO 9001:2008, ISO 14001:2004 and OHSAS 18001:2007 certified Company.

The Company manufactures various varieties of cement like Ordinary Portland Cement (OPC) of 53 grade, 43 grade, Portland Pozzalona Cement (PPC) and Sulphate Resistant Cement (SRC) to suit different needs of customers and all these products are being sold under the Brand Name “Sagar” which has already become popular in Telangana and Andhra Pradesh, has now found its acceptance among the customers in the neighboring States as well.

The Company employs modern technology in each of its process of manufacture at its Plant and has adopted progressive manufacturing practices, whether it relates to maintaining high standards of quality of its products or development of its highly valued human resources or the need to keep the pollution to the barest minimum.

The Company has a strong committed marketing network comprising various layers like Distributors, Dealers, C&F Agents, all of whom are served by dedicated marketing personnel. The Company has a well-designed Organizational Structure and the roles and responsibilities of each of its personnel have been well defined. The Company believes in the importance of development of Human Resources as a valuable asset and is endeavoring to enhance its value by organizing various need based in-house training programmes and encouraging their participation in the external programmes sponsored by various institutions of repute.

Sagar Cements has a consistent Profit track record and, except for a few years when it was either executing its expansion plans or the industry as a whole was undergoing a difficult period, it has been declaring dividend at reasonable percentages.
The company’s Shares are listed on National Stock Exchange of India and Bombay Stock Exchange, where they are actively traded.

The Company which started its operation with a Cement capacity of 66000 TPA, has gradually increased it to the level of 2.35 MTPA, while its Clinker capacity has also witnessed a significant increase from 66000 TPA in 1982 to present level of 2.0 MTPA.

(ii) **BRIEF DESCRIPTION OF NATURE OF THE PROJECT.**

The proposal is for setting up of 18 MW coal based captive power plant within the existing cement plant complex. Power plant is based on Circulating Fluidised Bed Combustion (CFBC) with air cooled condensate system. Fuel proposed for thermal power plant is Indian coal / Imported Coal. One 80 TPH boiler will be installed to meet steam requirement of the power plant.

(iii) **NEED FOR THE PROJECT AND ITS IMPORTANCE TO THE COUNTRY AND OR REGION**

Currently the cement plant electrical energy requirement is being met from the TSGENCO. Maximum power requirement of the plant is 23 MW where as average power requirement is 21.5 MW. As on date the maximum contract demand from the grid is 27MVA.

In view of the very high power tariff from grid power, SCL intend to have own power generation comprising of WHR Power Plant & Captive thermal power plant for meeting major power and energy requirement of the cement plant.

In addition to above grid connection will be retained for meeting the peak load requirement/outage of any source consist of WHR power plant and coal fired captive power plant.

The objective of the study is to finalize Capacity of the Power Plant based on the best available option considering reliable and cost effective power generation.

(VI) **EXPORT POSSIBILITY**

No export is proposed
(VII) DOMESTIC/EXPORT MARKETS.

Power generated will be used for captive consumption

(VIII) EMPLOYMENT GENERATION (DIRECT AND INDIRECT) DUE TO THE PROJECT

Additional employments of about 43 persons & 24 contract persons required for proposed power plant.
3 PROJECT DESCRIPTION

(I) TYPES OF PROJECT INCLUDING INTERLINKED AND INTERDEPENDENT PROJECT, IF ANY

SCL proposes to set up a 18 MW Coal based Thermal Power Plant to meet the power requirement of the existing cement plant.

The proposed new unit will be located within the existing cement plant complex. No additional land or site is required. Keeping in view of utilizing some of the common existing infrastructure.

(II) LOCATION (MAP SHOWING GENERAL LOCATION, SPECIFIC LOCATION AND PROJECT BOUNDARY & PROJECT SITE LAYOUT WITH COORDINATES.

The Cement Plant is located at Mattampally village of Matampalli Mandal of Suryapet District, Andhra Pradesh. The plant site falls under the Survey of India Topo sheet No. 56 P/13 and is located between North latitude 16°46’15” and 16° 47’00” and East longitude 79°52’45” and 79°53’00”. Fig – 1 shows the Location Map of the cement plant. Sagar cement limestone mine is located adjacent to the plant area in southern direction.

Road connecting Huzur nagar – Mattampally passess at a distance of 0.5 km from the plant site in the SE direction. The plant site can be approached from Kodad (on NH 9) & Miryalaguda at 35 km and 56 km respectively. The nearest railway station Miryalaguda is at 56 km in WNW direction on Secunderabad – Nadikude section of South Central Railway.

The nearest village, Pedaveedu is situated at a distance of 3 km in the southern direction. Mattampally Mandal head quarters is located at a distance of 3 km in the Northern direction of the plant site. Huzur nagar at about 15 km is the nearest town. Hyderabad, state capital is located at a distance of about 200 km.

Krishna River is located at a distance of 6.0 km flowing across the study area from NW to SE direction. Fig – 2 shows the Key plan of the plant site.

Grey Gold cements and NCL cement plants along with their captive limestone mines are located within 10 km radius of the study area.

Fig – 3 shows the 10 km radius of the study area. Salient features of the plant site are given in Table – 1.1.
Note:- Not to Scale
TABLE – 1
SALIENT FEATURES OF THE PLANT SITE

<table>
<thead>
<tr>
<th>FEATURE</th>
<th>DETAILS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Altitude</td>
<td>100 m above msl (average)</td>
</tr>
<tr>
<td>Longitude</td>
<td>Between 79°52'45&quot; and 79°53' E</td>
</tr>
<tr>
<td>Latitude</td>
<td>Between 16°46'15&quot; and 16°47' N</td>
</tr>
<tr>
<td>Village, Tehsil, District, State</td>
<td>Mattampally and Pedaveedu villages, Mattampally Mandal, Suryapet District, Andhra Pradesh</td>
</tr>
<tr>
<td>Max. Temp.</td>
<td>48 °C</td>
</tr>
<tr>
<td>Min. Temp.</td>
<td>12 °C</td>
</tr>
<tr>
<td>Relative Humidity</td>
<td>48 - 84 %</td>
</tr>
<tr>
<td>Annual rainfall</td>
<td>600 mm</td>
</tr>
<tr>
<td>Land availability</td>
<td>Existing – 50.2 ha After expansion – 60.73 ha</td>
</tr>
<tr>
<td>Topography</td>
<td>Gently Undulating</td>
</tr>
<tr>
<td>Soil Type</td>
<td>Lateritic soils</td>
</tr>
<tr>
<td>Nearest River</td>
<td>Krishna – 6.0 km</td>
</tr>
<tr>
<td>Nearest Highway</td>
<td>National highway (connecting Hyderabad – Vijayawada at 35 km)</td>
</tr>
<tr>
<td>Nearest Railway station</td>
<td>Miryalaguda Railway station – 56 km</td>
</tr>
<tr>
<td>Nearest Village</td>
<td>Pedaveedu – 1.3 km</td>
</tr>
<tr>
<td>Nearest City</td>
<td>Kodad town – 35 km</td>
</tr>
<tr>
<td>Nearest Industries</td>
<td>☑ Grey Gold cements  ☑ NCL cements</td>
</tr>
<tr>
<td>Nearest Air port</td>
<td>Hyderabad – 200 km</td>
</tr>
<tr>
<td>Nearest Forest</td>
<td>Sultanapur RF – 1.8 km</td>
</tr>
<tr>
<td>Sensitive places</td>
<td>Nil</td>
</tr>
<tr>
<td>Historical places</td>
<td>Nil</td>
</tr>
</tbody>
</table>

* distances mentioned above are aerial distances

(III) DETAILS OF ALTERNATE SITES CONSIDERED AND THE BASIS OF SELECTING THE PROPOSED SITE, PARTICULARLY THE ENVIRONMENTAL CONSIDERATIONS GONE INTO SHOULD BE HIGHLIGHTED.

The proposed new unit Coal based 18 MW Power plant will be located within the existing cement plant complex, No additional land or site is required. Keeping in view of utilizing some of the common existing infrastructure.
(IV) **SIZE OR MAGNITUDE OF OPERATION.**

The Proposed new unit is Coal based 18 MW Power plant will be located within the existing cement plant complex.

Fuel proposed for the Power Plant is Coal hence conventional Rankine steam cycle plant has been considered for 1 x 18 MW CPP.

**POWER CYCLE CONFIGURATION**

In the conventional steam system operating on Rankine cycle, the main equipment is the steam generator, steam turbine & Air Cooled Condenser with their auxiliaries.

The utility system includes fuel storage system, fuel handling system, Water treatment plant, fire water system, cooling tower for auxiliaries, ash handling system and compressed air systems etc. The following factors have influenced the selection of major equipment’s:

- The efficiency of steam power cycle improves with the increase in the inlet steam temperature and pressure, as has been established by thermodynamics.

- The basic power cycle configuration chosen for the 1x18 MW would be with pressure of 110 kg at a and temperature of 540 °C at turbine inlet and following tap off for regeneration:
  - Two high pressure
  - One low pressure
  - One de-aeration

The following configurations will be adopted for the power plant:

<table>
<thead>
<tr>
<th></th>
<th><strong>Steam Turbine Generator</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Type of turbine</td>
</tr>
<tr>
<td>B</td>
<td>No. and ratings of turbine</td>
</tr>
<tr>
<td>c</td>
<td>Capacity</td>
</tr>
<tr>
<td>d</td>
<td>No. of Bleeds</td>
</tr>
</tbody>
</table>

The steam generator design parameters will be as follows
The selected configuration consist of 1 x 18 MW power plant with CFBC boiler with a continuous rating of 80 TPH connected to a single turbo-generator of 18 MW nominal capacity.

The type of turbine & boiler are discussed below:

**TURBINE**

The 18 MW size turbine is having an axial length of approx. 4.5 meters. Hence it will be possible to provide 4 nos. of steam tap off nozzles in the turbine for feed heating making the turbine a four extraction cum condensing type. With this configuration the power cycle efficiency can be improved.

Based on the above analysis, following configurations will be adopted for the each units:

<table>
<thead>
<tr>
<th>A Steam Generator</th>
<th>B Steam Turbine Generator</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. No. and ratings of Boiler</td>
<td>a. No. and ratings of turbine</td>
</tr>
<tr>
<td>1 no. with Maximum Continuous rating 80 TPH &amp; 540°C</td>
<td>1 no. for each unit of inlet parameters, 110 kg &amp; 540 °C</td>
</tr>
<tr>
<td>b. Type of Boiler</td>
<td>b. Capacity</td>
</tr>
<tr>
<td>CFBC</td>
<td>18 MW Maximum Continuous rating</td>
</tr>
<tr>
<td>c. No. of boiler fans</td>
<td>c. No. of controlled extractions</td>
</tr>
<tr>
<td>2 x 60% duty for ID &amp; SA &amp; SA Fan</td>
<td>4 nos.2 HP, 1MP and 1 LP</td>
</tr>
<tr>
<td>d. Type of Atmospheric pollution control system</td>
<td>d. Type of exhaust steam cooling</td>
</tr>
<tr>
<td>Electrostatic precipitators with outlet dust concentration less than 30 mg / Nm³</td>
<td>With Air cooled condenser</td>
</tr>
</tbody>
</table>

### Table

<table>
<thead>
<tr>
<th></th>
<th>Boiler type</th>
<th>CFBC</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Super-heater outlet pressure ata</td>
<td>110</td>
</tr>
<tr>
<td>2</td>
<td>Super-heater outlet temperature (°C)</td>
<td>540 ± 5</td>
</tr>
<tr>
<td>3</td>
<td>Feed water inlet temperature (°C)</td>
<td>230</td>
</tr>
<tr>
<td>4</td>
<td>Excess air (%)</td>
<td>Not more than 25</td>
</tr>
<tr>
<td>5</td>
<td>Boiler outlet flue gas temperature(°C)</td>
<td>150 (max.)</td>
</tr>
<tr>
<td>6</td>
<td>Dust concentration at chimney (mg/Nm³)</td>
<td>30 (max.)</td>
</tr>
</tbody>
</table>
(V) PROJECT DESCRIPTION WITH PROCESS DETAILS (A SCHEMATIC DIAGRAM/FLOW CHART SHOWING THE PROJECT LAYOUT, COMPONENTS OF THE PROJECT ETC. SHOULD BE GIVEN.

Power generation process is based on Rankine Steam cycle. The steam generated in the boiler when expanded through a turbine, turns the turbine shaft, which is tandem coupled to an electric power generator. The schematic diagram of the power generation process are shown in Fig- 4.

The Power plant is aimed at generation of 18.0 MW of electric power with one CFBC boiler of 80 tph capacity connected to Turbo Generator set of 18.0 MW.

The steam generator design parameters will be as follows:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum continuous rating (MCR) (T/hr)</td>
<td>80</td>
</tr>
<tr>
<td>Super-heater outlet pressure (kg/cm² (g))</td>
<td>110</td>
</tr>
<tr>
<td>Super-heater outlet temperature (°C)</td>
<td>540 + 5</td>
</tr>
<tr>
<td>Feed water inlet temperature (°C) at eco inlet</td>
<td>230</td>
</tr>
<tr>
<td>Excess air (%)</td>
<td>Not more than 25</td>
</tr>
<tr>
<td>Boiler outlet flue gas temperature (°C)</td>
<td>150 (max.)</td>
</tr>
<tr>
<td>Dust concentration at chimney (mg/Nm³)</td>
<td>30 (max.)</td>
</tr>
</tbody>
</table>

The steam generator will be with following auxiliaries:

The steam generator will be provided with a steam drum and the drum will be of fusion-welded type. The steam drum will be with necessary nozzle connections for the steam outlets, safety valves, feed water inlets, down-comers, continuous blow down, level indicators, chemical dosing, sampling connection, drains and vents to assure the required steam purity.

STEAM TURBINE AND AUXILIARIES

STEAM TURBINE

This project envisages 18 MW multi extraction-cum-condensing turbo-generators.
COAL/PETCOKE/
PRIMARY
AIR

BOILER

STARTUP
OIL

AIR

BOTTOM
ASH

TO ASH
POND

H.P FEEDWATER
HEATER

BFP

DEAERATOR

L.P. FEED
WATER

WATER
TREATMENT
PLANT

RESIDUALS, BACK WASH WATER ETC.
TO NEUTRALISATION PIT

AIR COOLED
CONDENSATE

CHEMICAL
DOSING
MAKEUP
WATER

CW PUMP

GASES TO
ATMOSPHERE

CEP

EJECTOR

CONDENSOR

AUXILIARY
EQUIPMENT

FLUE GAS
TREAT-
MENT

SILO

LD. FAN

CHIMNEY

FLUE GASES
TO ATMOSPHERE

STEAM AND CONDENSATE

BOILER BLOWDOWN

GENERATOR

ELECTRICITY UNIT

WATER FROM SOURCE

TO ASH POND

FIG - 4

TYPICAL FLOWSHEET FOR ELECTRIC POWER GENERATION
The turbine will be designed for the operation with the inlet steam parameters at 110 kg and 540 deg C and will be with automatic controlled extraction steam.

The turbine will be horizontal, single cylinder, triple extraction-cum-condensing type. All casings and stator blade carriers will be horizontally split.

The controlled extraction steam from the turbine will be delivered to the heaters/de-aerators in saturated condition.

A de-super heater to bring the steam temperature from the extraction steam temperature down to the required level is envisaged.

(VI) RAW MATERIAL REQUIRED ALONG WITH ESTIMATED QUANTITY, LIKELY SOURCE, MARKETING AREA OF FINAL PRODUCTS/S, MODE OF TRANSPORT OF RAW MATERIAL AND FINISHED PRODUCT.

Fuel proposed for thermal power plant will be Indian Coal / Imported Coal. The maximum consumption of fuel is given below

<table>
<thead>
<tr>
<th>Fuel Considered</th>
<th>GCV of Fuel Kcal/kg</th>
<th>Energy Generated per day</th>
<th>Fuel required per day ton</th>
<th>Fuel required per annum TPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indian coal / Imported Coal</td>
<td>4000</td>
<td>0.38016</td>
<td>304</td>
<td>0.10</td>
</tr>
</tbody>
</table>

The operation fuel will be based on the economic & reliable operation of the Power Plant.

Presently for cement plant coal in being transported to the site by means of rail/Road. The unloaded coal transported to the covered coal shed with the help of belt conveyor and stocking is done with the help of boom conveyor.
(VII) RESOURCES OPTIMIZATION/ RECYCLING AND REUSE ENVISAGED IN THE PROJECT, IF ANY, SHOULD BE BRIEF OUTLINED.

The waste water generated from Power plant will be used in cement plant & the raw water requirement thus is reduced to that extent.

(VIII) AVAILABILITY OF WATER ITS SOURCES, ENERGY /POWER REQUIREMENT AND SOURCES SHOULD BE GIVEN,

**POWER:** The present power requirement of 27 MVA is met from grid.

Currently the cement plant electrical energy requirement is being met from the grid. Plant has 132kV/6.6kV receiving substation having two steps down transformer of 20 MVA, 132kV/6.6 kV.

Maximum power requirement of the Cement plant is 23 MW whereas average power requirement is 21.5 MW.

**WATER:** Water requirement of power plant is 280 m$^3$/day and is sourced from Mine Pit and ground water. Raw water will be tapped from the existing raw water storage tank. Dedicated pumping system and will be installed at existing raw water tank to feed the raw water for CPP.

(IX) QUANTITY OF WASTES TO GENERATED (LIQUID AND SOLID) AND SCHEME FOR THEIR MANAGEMENT/DISPOSAL.

Ash generated (0.034 MTPA) from the power plant will be consumed in cement plant.

Waste water generated in power plant is reused in cement plant

(X) SCHEMATIC REPRESENTATIONS OF THE FEASIBILITY WHICH GIVE INFORMATION OF EIA PURPOSE.

Not applicable.
4 SITE ANALYSIS

(I) CONNECTIVITY

Road connecting Huzur nagar – Mattampally passess at a distance of 0.5 km from the plant site in the SE direction.

The nearest railway station Miryalaguda is at 56 km in WNW direction on Secunderabad – Nadikude section of South Central Railway.

(II) LAND FORM, LAND USE AND LAND OWNERSHIP.

The proposed new unit will be located within the existing cement plant complex of 61.0 Ha. No additional land or site is required. Keeping in view of utilizing some of the common existing infrastructure, SCL proposes to locate the new unit within the existing cement plant complex

(III) TOPOGRAPHY (ALONG WITH MAP)

It is a flat land and the average elevation is 100 m above MSL. Fig – 3 shows the 10 km radius around the plant site.

(IV) EXISTING LAND USE PATTERN (AGRICULTURE, NON-AGRICULTURE, FOREST, WATER BODIES (INCLUDING AREA UNDER CRZ)), SHORTEST DISTANCES FROM THE PERIPHERY OF THE PROJECT TO PERIPHERY OF THE FORESTS, NATIONAL PARK, WILD LIFE SANCTUARY, ECO SENSITIVE AREAS, WATER BODIES (DISTANCE FORM THE HFL OF THE RIVER), CRZ. IN CASE OF NOTIFIED INDUSTRIAL AREA, A COPY OF THE GAZETTE NOTIFICATION SHOULD BE GIVEN)

The proposed new unit will be located within the existing cement plant complex. The land breakup of the plant is given below
LAND BREAKUP (Ha)

<table>
<thead>
<tr>
<th></th>
<th>BEFORE EXPANSION</th>
<th>AFTER EXPANSION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cement plant</td>
<td>16.19</td>
<td>16.19</td>
</tr>
<tr>
<td>Captive power plant</td>
<td>-</td>
<td>2.5</td>
</tr>
<tr>
<td>Colony</td>
<td>20.24</td>
<td>20.24</td>
</tr>
<tr>
<td>Parking area</td>
<td>2.02</td>
<td>2.02</td>
</tr>
<tr>
<td>Greenbelt</td>
<td>18.22</td>
<td>18.22</td>
</tr>
<tr>
<td>Vacant Land</td>
<td>4.05</td>
<td>1.56</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>60.73</strong></td>
<td><strong>60.73</strong></td>
</tr>
</tbody>
</table>

There is no wild life sanctuary, national park, eco-sensitive area within the 10 km radius of the project site.

(V) **EXISTING INFRASTRUCTURE.**

Existing infrastructure include railway siding and well developed roads, storm water drains with adequate storage space for flyash and parking area.

(VI) **SOIL CLASSIFICATION**

Predominantly clayey soil

(VII) **CLIMATIC DATA FROM THE SECONDARY SOURCES.**

The tropical climate of the region is manifested in hot and humid summer, moderately good monsoon and mild winter seasons. May is generally the hottest month in the year. The maximum temperature during the daytime was recorded as 45°C and December the coldest with the temperature during the daytime falling down to about 32°C. The night temperature in winter can be as low as 13°C. The period between March and November is very humid and sticky daytime. The months of December, January and February are considered to have pleasant climate.

(VIII) **SOCIAL INFRASTRUCTURE AVAILABLE.**

All infrastructure facilities such as education, health facilities and other social facilities are adequate.
5. **PLANNING BRIEF.**

(I) **PLANNING CONCEPT (TYPES OF INDUSTRIES, FACILITIES, TRANSPORTATION ETC) TOWN AND COUNTRY PLANNING/DEVELOPMENT AUTHORITY CLASSIFICATION**

The proposed 18MW Coal based power plant will be located within the existing cement plant complex. No additional land or site is required. Keeping in view of utilizing some of the common existing infrastructure, SCL proposes to locate the new unit within the existing cement plant complex. The site is well connected by rail and road network.

(II) **POPULATION PROJECTION.**

No increase in population is anticipated due to increase of production.

(III) **LAND USE PLANNING (BREAKUP ALONG WITH GREEN BELT ETC)**

Land use breakup is given in following table:

<table>
<thead>
<tr>
<th>LAND BREAKUP (Ha)</th>
<th>BEFORE EXPANSION</th>
<th>AFTER EXPANSION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cement plant</td>
<td>16.19</td>
<td>16.19</td>
</tr>
<tr>
<td>Captive power plant</td>
<td>-</td>
<td>2.5</td>
</tr>
<tr>
<td>Colony</td>
<td>20.24</td>
<td>20.24</td>
</tr>
<tr>
<td>Parking area</td>
<td>2.02</td>
<td>2.02</td>
</tr>
<tr>
<td>Greenbelt</td>
<td>18.22</td>
<td>18.22</td>
</tr>
<tr>
<td>Vacant Land</td>
<td>4.05</td>
<td>1.56</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>60.73</strong></td>
<td><strong>60.73</strong></td>
</tr>
</tbody>
</table>

*Fig–5* shows the location of new unit i.e., 18 MW Coal based Power plant within the existing cement plant complex.

(IV) **ASSESSMENT OF INFRASTRUCTURE DEMAND (PHYSICAL & SOCIAL)**

The project will have the following:

- Power house building
Following configurations have been proposed for Power Plant

<table>
<thead>
<tr>
<th>Captive Power Plant</th>
<th>a. No. and ratings</th>
<th>1 no. each of MCR 80 TPH &amp; 540°C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>b. Type of Boiler</td>
<td>Circulating Fluidised Bed Combustion (CFBC)</td>
</tr>
<tr>
<td></td>
<td>c. No. of boiler fans</td>
<td>2 x 60% duty ID &amp; SA and PA-fan for boiler</td>
</tr>
<tr>
<td></td>
<td>d. Type of APCS</td>
<td>Electro static precipitators</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Steam Turbine Generator</th>
<th>a. No. and ratings of turbine</th>
<th>1 no. Turbine with inlet parameters, 110 kg/cm2 &amp; 540 °C</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>b. Capacity</td>
<td>1x 18 MW MCR</td>
</tr>
<tr>
<td></td>
<td>c. No. of controlled extractions</td>
<td>2 nos HP, 1no MP and 1no LP</td>
</tr>
<tr>
<td></td>
<td>d. Type of exhaust</td>
<td>Air cooled condenser</td>
</tr>
<tr>
<td></td>
<td>Condensate Cooling</td>
<td></td>
</tr>
</tbody>
</table>

(V) AMENITIES/ FACILITIES.

All infrastructure facilities such as education, health facilities and other social facilities are adequate at nearest populated area

6 PROPOSED INFRASTRUCTURE

(I) INDUSTRIAL AREA (PROCESSING AREA)

The proposed infrastructure of the power plant is detailed below:

STEAM GENERATOR

The steam generating system for each unit of 18 MW power plant will consist of one no. 80 TPH capacity boiler with all the auxiliaries.
The boilers will be of circulating fluidized bed type, natural circulation, balanced draft, and membrane wall radiant furnace design with three (3) stage super-heaters and inter-stage de-super heater.

The steam generator design parameters will be as follows:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum continuous rating (MCR) (T/hr)</td>
<td>80</td>
</tr>
<tr>
<td>Super-heater outlet pressure (kg/cm² (g))</td>
<td>110</td>
</tr>
<tr>
<td>Super-heater outlet temperature (°C)</td>
<td>540 ± 5</td>
</tr>
<tr>
<td>Feed water inlet temperature (°C) at eco inlet</td>
<td>230</td>
</tr>
<tr>
<td>Excess air (%)</td>
<td>Not more than 25</td>
</tr>
<tr>
<td>Boiler outlet flue gas temperature (°C)</td>
<td>150 (max.)</td>
</tr>
<tr>
<td>Dust concentration at chimney (mg/Nm3)</td>
<td>30 (max.)</td>
</tr>
</tbody>
</table>

The steam generator will be with following auxiliaries:

The steam generator will be provided with a steam drum and the drum will be of fusion-welded type. The steam drum will be with necessary nozzle connections for the steam outlets, safety valves, feed water inlets, down-comers, continuous blow down, level indicators, chemical dosing, sampling connection, drains and vents to assure the required steam purity.

FURNACE

The furnace envelope will be constructed of fully water-cooled membrane/fin welded walls and the construction will be gas pressure tight.

The furnace bottom will be covered with an air nozzle tube plate, below which the fluidizer air plenum will be located. The coal of properly graded size will be brought to the furnace through over bed feeding system.

SUPER HEATER

Super-heater system will be of three (3) stage design with inter-stage de super heating to achieve the rated steam temperature over 60% to 100% MCR load. The super-heater will be combination of convection and radiation type.
The inter-stage attemperator or a de-super-heater of spray type will be located between the two super-heater stages, to control the final steam temperature at $540 \pm 5^\circ\text{C}$ between 60% to 100% MCR load.

**ECONOMISER**

The economiser will be located downstream of the super-heaters and evaporator sections. The economiser will be of bare tube construction, inline arrangement, counter flow type and the economiser will be designed for inlet temperature of $230^\circ\text{C}$.

**AIR HEATER**

Air heater will be arranged as the last heat recovery section downstream of economiser. Air heater will be recuperative type with flue gas flowing inside the tubes and the combustion air flowing over the tubes.

**DRAFT SYSTEM**

The draft system for the steam generator will be suitable of producing a balanced draft with sub-atmospheric pressure condition in the furnace.

The system will comprise of:

- 2 x 60% PA fan
- 2 x 60% ID fan
- 2 x 60% SA fan

**AIR POLLUTION CONTROL SYSTEM**

Environmental considerations and protection measures assume greater importance for the project. SCL will ensure that the proposed power plant causes no adverse impact on the area.

The proposed project is planned to meet all environmental norms and further improve the environs in the area. SCL propose to use State of Art Technology with computer controls to ensure high efficiency in plant operations. This would result in low per unit energy consumption and low particulate emissions.
Air pollution control system (APCS) comprising of Electro-static Precipitator with all its accessories for the boiler will be provided. The APCS will be designed to provide an outlet dust concentration less than 30 mg/Nm³, with the boiler operating with the range of fuel properties indicated.

The ESP will be designed to provide an outlet dust concentration level of 30 mg/N.Cu.m with all field in service, with the CFBC boiler operating with the design basis as specified for the worst operating condition of the fuel composition mentioned and overall dust collection efficiency 99.93% with all field in service.

The aspect ratio of the ESP (electrode zone) will be optimally selected, so as to minimize re-entrainment and carry over of the collected dust, and for assured ESP performance.

SO₂ emissions will be controlled by the proposed Flue Gas Desulphurisation (FGD) system to reduce SO2 emission from flue gases from Coal fired boiler. The Scrubbing shall be done through Open Spray Tower type scrubbing tower with Limestone.

In addition to above, for coal handling system dedicated bag filters will be installed to restrict emission less than 30 mg/nm³.

**HP & LP DOSING SYSTEM**

Steam generator will be with High Pressure (HP) dosing and Low Pressure (LP) dosing system. The HP dosing system will be based on ‘tri-sodium phosphate’ dosing and this will be dosed in boiler water to take care of the ingress of the hardness salts and to increase the boiler water pH. The LP dosing system will be based on ‘hydrazine’ dosing and this is dosed in the feed water to scavenge the last traces of oxygen and to increase the feed water pH.

**BLOW DOWN TANK**

One Continuous Blow Down tank (CBD) and one Intermittent Blow Down tank (IBD) will be provided for boiler. The flash steam from the CBD tank will be piped to the de-aerator and outlet of the IBD tank will be vented to the atmosphere.
DE-AERATOR

One De-aerator of de-aerating capacity equal to twenty percent (20%) higher than the gross MCR steam generation capacity of boiler with a de-aerated water storage tank of minimum 10 minutes operation.

BOILER FEED WATER PUMP

One working and one standby boiled feed water pumps have been envisaged.

STEAM TURBINE AND AUXILIARIES

STEAM TURBINE

This project envisages 18 MW multi extraction-cum-condensing turbo-generators.

- The turbine will be designed for the operation with the inlet steam parameters at 110 kg and 540 deg C and will be with automatic controlled extraction steam.

- The turbine will be horizontal, single cylinder, triple extraction-cum-condensing type. All casings and stator blade carriers will be horizontally split.

- The controlled extraction steam from the turbine will be delivered to the heaters/de-aerators in saturated condition.

- A de-super heater to bring the steam temperature from the extraction steam temperature down to the required level is envisaged.

AIR COOLED CONDENSER

The waste heat produced in the thermal process of the plant will be transferred to the atmosphere by using adequate cooling system. Environmental concern and climatic conditions are the main factors in the selection of the most suitable power station process.
Since water availability is a concern as such to save natural resources & to have sustained generation, an Air cooled Condenser is considered. With Air Cooled Condenser, approx. 90% of the water is saved. The basic configuration of Air cooled condenser is as follows:

**TURBINE CONTROL**

The turbine control will be through the centrally located Distributed Control System. The control system will provide redundancy for key functions by use of separate sensors and monitors. The control system will include all the standard control monitoring and alarming.

In addition to centralised monitoring, some of the essential parameters mounted in local will be:

- Inlet steam pressure, temperature, and flow
- Controlled extraction steam pressure and temperature
- Exhaust steam pressure, temperature, and flow
- Lube oil header pressure
- Control oil header pressure
- Steam turbine/generator speed indicator
- Steam turbine/generator stop push button
- Turbine back propose control
- Emergency shutdown push button
FUEL HANDLING AND PREPARATION

Presently for cement plant coal in being transported to the site by means of rail/Road. The unloaded coal transported to the covered coal shed with the help of belt conveyor and staking is done with the help of boom conveyor.

Adequate capacity is available in existing coal unloading and storage system and same will be utilised for the upcoming power plant.

FLUE GAS DESULPHURISATION (FGD) SYSTEM

The boiler will be designed for indigenous coal / Imported Coal

SYSTEM DESCRIPTION

The proposed Flue Gas Desulphurisation (FGD) system is to reduce SO2 emission from flue gases from Petcoke & Indian Coal fired boiler. The Scrubbing shall be done through Open Spray Tower type scrubbing tower with Limestone.

The proposed system has three main sections

1. Saturator Section
2. Absorber Section
3. Gypsum Dewatering Section

SATURATOR SECTION

The Flue gases are tapped from the ducting between Boiler ID Fan and Stack through a system Damper and Booster Fan. The gases coming to FGD System shall be at a temperature of around 140° C. These gases need to be cooled down to the Saturation temperature before they enter the SO2 Scrubber. The gases are passed through the Saturator, where the gases will be saturated with the help of direct quenching with the help of Spray Nozzles arranged in the co-current fashion and the gases are cooled down to saturation temperature.

Scrubbing liquor will be used to quench the gases in the Saturator.
The Recycle liquor is collected at the Absorber Recirculation Tank.
Scrubbing liquor is recycled back to the Saturator and Absorber, through 2 Nos. Saturator Recirculation Pumps. (1 Working + 1 Stand-by)

**DESULPHURIZATION SECTION**

The saturated clean gases from Saturator will enter into Absorber at bottom and travel upward. Circulating Scrubber fluid is sprayed in counter current fashion in this tower by means of spray nozzles arranged in Stages. The circulating fluid absorbs SO2 from flue gas. The reaction taking place in the SO2 Scrubber is as follows:

\[
\text{SO}_2 + \text{CaCO}_3 \rightarrow \text{CaSO}_3 + \text{H}_2\text{O}
\]

The scrubbing fluid is collected at Absorber Recirculation tank which is re-circulated by means of Absorber Recirculation Pumps. Four (4) nos. of spray levels (3 Working + 1 Stand-by) will be provided. Dedicated pumps are provided for each scrubbing level. We have provided 4 nos. Absorber Recirculation Pumps (3 Working + 1 Stand-by).

The pH of scrubbing liquor is measured and Limestone slurry is fed to the Absorber Recirculation Tank, to maintain the pH value between 5 to 6. The Limestone slurry is controlled by the pH Control Loop.

The Absorber Recirculation Tank is provided with Agitator and Air Sparging arrangement to ensure complete oxidation of Calcium Sulphite to Calcium Sulphate and to form Gypsum. The reaction taking place is as below:

\[
\text{CaSO}_3 + \frac{1}{2} \text{O}_2 \rightarrow \text{CaSO}_4
\]

\[
\text{CaSO}_4 + 2\text{H}_2\text{O} \rightarrow \text{CaSO}_4.2\text{H}_2\text{O}
\]

The cleaned gases pass upward in the Absorber over mist eliminators (Droplet Separator) to separate entrained droplets. The droplet Separator is intermittently washed to prevent any scale build-up. Mist Eliminator Wash Tank and 2 nos. Mist Eliminator Pumps (1 Working + 1 Standby) are provided for this. The clean gases then leave the scrubber at top and are lead back to the Boiler Stack through Absorber Outlet Damper.
Overhead Emergency Tank is provided at an elevation to ensure rushing of emergency water to the Absorber circuit through solenoid operated valve. This would be controlled based on the Temperature at the outlet of Saturator. Emergency water is to protect the Equipment from high temperature, when the FGD system is by-passed through a By-pass Damper located on the duct between Boiler ID Fan and Stack. Mist Eliminator Wash pumps are used to fill the overhead Emergency Water Tank.

**GYPSUM DEWATERING SECTION**

A continuous bleed is taken out to maintain the solids concentration within predetermined concentration and sent to the Filter Feed Tank. The Filter Feed Tank is provided with Agitator and Provision is made to add Limestone slurry to ensure complete neutralization of the Slurry.

The slurry from the tank is pumped to the “Filter Press” by means of Filter Feed pumps (1 working & 1 stand-by). The Filter Press is with semi automatic operation. Filter press shall be equipped with Hydraulic closing with power pack. The cylinder forwarding and reversing would be done through power pack, but the individual plates will have to be opened and cleaned manually. The filter press is installed at an elevation so that a truck / trolley can be put under the same & cake is discharged directly in the same. The slurry is pumped at pressure of 4-5 Kg/Cm2(g) to the filter press. Cake is directly disposed off to truck through a chute. Provision of water & air can be made at the filter press to yield better quality of Gypsum cake from filter press.

The filtrate from the filter press is collected in the “Filtrate Tank” and is pumped back to the FGD system through 2 nos. Filtrate Pumps (1 working + 1 stand-by).

The size of the limestone will be approximately 1mm to 500 microns.

The FGD System is designed to achieve the emission level of SO\textsubscript{X} below 100 mg/Nm\textsuperscript{3}.

The dosing of limestone will work in close loop with SO\textsubscript{X} analyser installed on the stack.
Since, at Mattapalli, limestone will be available from cement plant, limestone before feeding to boiler, 2 stage crushing is anticipated to bring the size within 1mm to 500 microns.

The estimated quantity of the limestone is approximately 15 tpd. Suitable crushing, screening and bunker feeding system will be considered for the power plant.

ASH HANDLING

The fuels proposed to be used in this project will have a gross calorific of 4000 kcal/kg. The ash generated from the above will be about 95 t/day.

Out of this 30% is expected to be Bed Ash and rest 70% will be Fly ash to be collected from Boiler EP/ Economizer/ Cyclone. The details of quantity are as furnished below:-

- Fly ash will be transported pneumatically with the help of dense phase pneumatic to the fly ash silo from Economizer, Cyclone and EP. The fly ash from the silo will be transported to group cement plant by tanker.

- Bed Ash will be collected from overflow spouts into ash cooler hoppers. Ash from the hoppers, after sufficient cooling will be discharged through ash vessel of pneumatic conveying system to bed ash silo. bed ash will be disposed through trucks.

- Fly ash silo has been considered of capacity of 200m$^3$.

- Bed ash silo has been considered of capacity 75 m$^3$.

(II) RESIDENTIAL AREA (NON PROCESSING AREA)

Additional quarters to accommodate captive power plant employees will be provided within existing colony premises
(III) **GREEN BELT**

Green belt in an area of 18 Ha has been developed inside the plant boundary.

(IV) **SOCIAL INFRASTRUCTURE.**

SCL has well-defined CSR policy to Carryout social development and welfare measures in the surrounding villages. Under CSR activity SCL has initiated community development projects, in the fields of health, education and environmental preservation, in and around the plant.

(V) **CONNECTIVITY (TRAFFIC AND TRANSPORTATION ROAD/ RAIL/METRO/ WATER WAYS ETC)**

Adequate facilities with railway siding and roads are existing. No additional connectivity is required.

(VI) **DRINKING WATER MANAGEMENT (SOURCE AND SUPPLY OF WATER)**

Additional water of 280 m$^3$/day will be required and the same will be met from Mine pit and ground water.

(VII) **SEWERAGE SYSTEM.**

SCL is operating a full-fledged sewage treatment plant to treat wastewater generated from Colony. STP capacity is adequate for taking additional wastewater.

(VIII) **INDUSTRIAL WASTE MANAGEMENT.**

Wastewater generated from the power plant will be treated and used in the cement plant.

(IX) **SOLID WASTE MANAGEMENT**

Dust collected from air pollution control equipment is 100% recycled in process, Ash generated in the proposed power plant will be consumed in existing cement plant.
(X) POWER REQUIREMENT & SUPPLY / SOURCE.

SCL is contemplating to have an sustainable, reliable and economic power source to the operation of cement plant. the subject captive power plant will meet part requirement of the cement plant. Balance will be met from 7.0 MW WHRB power plant and grid.

7. REHABILITATION AND RESETTLEMENT (R & R) PLAN.

(I) POLICY TO BE ADOPTED (CENTRAL/STATE) IN RESPECT OF THE PROJECT AFFECTED PERSONS INCLUDING HOME OUSTEES, LAND OUSTEES AND LANDLESS LABORERS (A BRIEF OUTLINE TO BE GIVEN).

Not applicable, since the plant is already existing and new unit will be located within the existing cement plant complex.

8. PROJECT SCHEDULE & COST ESTIMATES

(I) LIKELY DATE OF START OF CONSTRUCTION AND LIKELY DATE OF COMPLETION (TIME SCHEDULE FOR THE PROJECT TO BE GIVEN)

IMPLEMENTATION PLANNING

3 months’ time would be required for pre-project activities from submission of Techno-Economic Feasibility Report till main machinery order placement

18 months’ time would be required for project activities from main machinery order placement till commissioning in each phase

(II) ESTIMATED PROJECT COST ALONG WITH ANALYSIS IN TERMS OF ECONOMIC VIABILITY OF THE PROJECT

Total capital Investment Cost is Rs. 90.0 Crores and Rs. 8.5 crores will be spent for Environmental Management Plan.
Based on the infrastructure aspects Basic requirement, Concept and the Implementation Schedule the project investment works out to be Rupees 90.0 Crores

9. **ANALYSIS OF PROPOSAL (FINAL RECOMMENDATIONS)**

(I) **FINANCIAL AND SOCIAL BENEFITS WITH SPECIAL EMPHASIS ON THE BENEFIT TO THE LOCAL PEOPLE INCLUDING TRIBAL POPULATION, IF ANY IN THE AREA**

The capital cost, for the proposed power plant works out to Rs. 90.0 Crores.

SCL has undertaken the following social welfare programme for upliftment of the area.

The salient features of rural development programme are to provide:

- Health and hygiene through mobile medical clinic
- Agricultural extension
- Drinking water Project
- Educational Programme
- Woman and youth development activities
- Income generating schemes
- Sports and cultural activities