Annexure – II

LAYOUT DIAGRAM OF BSL WITH PELLET PLANT
BSL is located at Meramandali block of Dhenkanal District of Orissa, at latitude 20°46'41" to 20°49'20" N and longitude 85°15'22" to 85°16'21" E. The nearest Railway station is Meramandli on East Coast railway and nearest port is Paradeep which is around 215 Km from the plant site. The NH 42 touches the northern side of plant site.
Date: 27.11.2012

To,
The Member Secretary,
EAC (Industrial Projects-1),
Ministry of Environment and Forest,
Paryavaran Bhawan,
Lodhi Road,
New Delhi-110 003

Kind Attn: Dr. P. L. Ahujarai, Director & Member Secretary
E-mail: plahujarai@yahoo.com

Sub: Application for Environmental Clearance for proposed 7.0 MTPA Pellet Plant at Meramandali, Dhenkanal, Odisha regarding approval of T.O.R.

Dear Sir,

Bhushan Steel Limited (BSL) is operating an Integrated Steel Plant of 5.6 MTPA at Meramandali, Dhenkanal, Odisha. The major product of the steel plant is Hot Rolled and Cold Rolled (HR/CR) products.

Meanwhile, the steel market dynamics has changed drastically. The scarcity of lump iron ore has made life difficult for steel producer. To overcome this situation, Bhushan Steel proposes to establish Pellet Plant to feed its existing Blast Furnace (BF) and DRI Kiln. Also, to remain viable and contribute in National Economic upsurge in steel sector, BSL request this respected EAC to allow us to establish the backward integration in the form of pellet production. We have asked MECON Limited (A Govt. of India Undertaking under MOS) to carry out its environmental study for Pellet Plant. The Form-I along with Pre-Feasibility of Pellet plant enclosed for your consideration. BSL take this opportunity to request this Honorable EAC to allow us this backward integration by establishing Pellet Plant to feed our existing Blast Furnace (BF) & DRI Kilns. BSL may be exempted from public consultation subsequently as we are not enhancing the
production capacity and this proposed facility is within 5.6 MTPA capacity for which MoEF has already accorded EC vide the letter no. F no. J-11011/829/2008-IA - II (I) dtd. 20\textsuperscript{th} July 2012.

Thanking You.

Yours Sincerely,
For Bhushan Steel Limited

(Sanjeev Kapoor)
Asst. Vice President
Email id : sanjeev.kapoor@bhushansteel.com

Encl.: 1. Form -1
2. Pre Feasibility Report
   (With Soft Copy)
BHUSHAN STEEL LIMITED
MERAMANDALI, DIST. DHENKANAL (ODISHA)

PRE-FEASIBILITY REPORT
FOR
7.0 MTPA PELLET PLANT

MECON LIMITED
RANCHI – 834 002

(Annexure- I)
BHUSHAN STEEL LIMITED
MERAMANDALI, DIST. DHENKANAL (ODISHA)

FORM -1

FOR

7.0 MTPA PELLET PLANT

MECON LIMITED
RANCHI – 834 002
01.00 Introduction

01.01 Preamble

Steel being a basic commodity for all industrial activities, quantum of its consumption is considered as an index of industrial prosperity. Since independence, there has been a substantial growth in the steel sector in India from 1.5 MTPA in 1950-51 to about 72 MTPA at present.

The per capita steel consumption continues to remain at a level of about 46 kg only, compared to about 400-500 kg in the developed countries and about 40 – 100 kg in some of the developing countries. Further with nearly 20 % of the world population, India’s consumption is only of the order of 4 % of the world steel production.

Hence, short-term and long-term strategies are necessary in planning the development of the steel industry in the country to improve the productivity and level of per capita steel consumption.

The strategies may include setting up of new steel plant facilities, or expansion of the existing steel plants, or installation of upstream / downstream facilities in already existing plants for production of semis for processing / finished products.

The National Steel Policy of India has declared a target of producing 110 millions tonnes of steel by the year 2020, up from about 72 million tons at present. This has given an incentive to all the major steel producers of India to work out to add capacity.

Bhushan Steel Limited (BSL) has established a fully integrated steel plant for which environment clearance have been obtained for capacity 5.6 MTPA.
M/s BSL is a leading manufacturer of flat products including value added products with total steel value chain right from coal mining, billets, HR coils, pig iron, CR coils, GP/GC, precision tubes, black pipe/GI Pipe, cable tapes, tor steel, wire rod and special alloy steel.

BSL has successfully implemented Greenfield steel and power plant in Odisha with HR Coil making facility - first in private sector in the state of Odisha. BSL is selling its value added range of products in secondary steel sector through a large distribution network in India (comprising more than 35 sales offices) and abroad.

In view of the existing infrastructure facilities available with the company it has been worked out to bring economy of scale by implementing pellet plant to feed pellet to existing blast furnaces and DR kiln. This proposed pellet plant will also optimize the plant production capacity and enhance the production.

This Pre-Feasibility Report is based on proven production technology, market demand, site suitability with respect to environmental norms, available infrastructure and economic viability of the project.
02.00 Market Scenario

Iron Ore Reserve: India occupies sixth position in the world’s Iron ore reserves and is one of the major Iron-ore producer and exporter due to availability of quality ore and skilled mining personnel. India’s Iron ore reserve is around 25,249 million tons apart from Banded Hematite-Quartzite (BHQ) and Banded Hematite Jasper (BHJ) with large reserves of Iron ore containing average grade around 58% Fe (normally Iron ores with Fe content around 62-65% or higher are desirable to achieve better productivity either in blast furnace or direct reduction).

Production Target: India has set itself a target of achieving production capacity of 230 Mtpa of Steel by 2020 and the required quantity of Iron ore is projected at around 400 Mtpa. Over the next few years, demand for Indian Iron ore is expected to rise by more than 200 Mtpa to meet the internal demand and export. Two major shifts in Iron ore supply for the Indian Iron and Steel industry have occurred. First the export to foreign market owing to liberalization in the economy and second the adaptation of beneficiation and pelletization practices to utilize low-grade ores fines.

Futuristic Role of Beneficiation & Pellets: In India for economic and industrial growth, a number of Steel plants have been planned in the states of Orissa, Jharkhand, Chhattisgarh, Karnataka and Maharashtra. As the quality of available raw materials declines, the impact of Iron making processes on pollution control and energy required will worsen in days to come. Most of the ROM (run of the mine) Iron ore contains lot of impurities that needs beneficiation prior to use. Therefore research on utilization of low grade Iron ore to produce quality raw material would play a key role in future which is a fact acknowledged by the Iron and Steel industry. Such a situation warrants for the widespread usage of
beneficiation techniques. Moreover, as mentioned earlier the huge quantities of fines generated in the process of mining & sizing of iron ore needs to be effectively utilized wherein the agglomeration techniques (such as sintering & pelletizing) come into the picture.

**Pellets Demand (BF Grade)**

Use of pellets is restricted in the Indian Blast Furnaces mainly due to high cost of pellets compared to lumps ore and sinter. Availability of pellets was also limited in the country as the existing pellet plants are either captive for internal use like Essar-Hazira & JSW or the pellets are exported from the plants like KIOCL & Mandovi Pellets Ltd due to high demand in the international market. In the recent past, Indian steel producers with major blast furnaces felt the necessity of using pellets in blast furnaces to utilize the iron ore ultra fines generated during mechanized mining.

All India production of Sponge Iron during April 2008- January 2009 is reported as 15.94 MT with share of 4.03 MT from gas based units and balance 11.91 MT from coal based units. Capacity utilization in gas based DRI Units, on all-India basis during 2008-09 works out to about 55%. Therefore, considering the total of all India gas based DRI capacity and anticipated capacity utilization, all India demand for pellets in gas based DRI is estimated at 8.4 Mt in 2011-12 onwards. The total number of working coal based sponge iron units in the country is about 300 with a total capacity of 24 MTPA (incl. some upcoming expansions). Presently, calibrated lump ore (CLO) is being used by cold based DRI units. A few units are also using iron ore pellets to a limited extent. With sharp increase in CLO price and marked difference in price of ultra fines and CLO, the use of pellets in coal based DRI units is inevitable in future years. While the total
installed capacity of coal based sponge iron units is about 24 MTPA, the effective capacity utilization has been roughly 70%. Since about 1.7 – 1.8 ton of ore (incl. The handling loss etc.) is consumed per ton of sponge iron produced; in the near future the pellets replacement quantity (even at 15% replacement) would be in the range of 4.5 - 5 Mn.

Export Market for Iron Ore Pellets

In the export market, the present and future DRI/HBI producers in Southeast Asia, Middle East and North African regions are the potential destinations, as there would be natural markets for pellets. Supplies from Bahrain, Brazil and Sweden are meeting the present Middle East/North African DR pellet requirements. With transportation costs being a competitive factor, Indian pellet producer’s proximity to Southeast Asia, Middle East and North Africa have given them a definite advantage over the suppliers from Brazil, North America and Sweden.

The pellet deficiency in the target market is being currently met from South America (CVRD, Samarco) and Europe. In view of potential market in South East Asian region and exports of iron ore pellets by India in the past, a provision of 40% of total anticipated domestic demand of pellets is kept for export for the present study. Accordingly, the export demand for iron ore pellet has been worked out and given in the table below:

As discussed above Pellet is considered to be a superior feed stock for any primary Iron Making Process. While Smelting Reduction Processes and Gas Based Direct Reduction Process is currently utilizing palletized ore, Blast Furnace based process still prefers to use sinter as it is produced in-house. However sinter plants are not very environment friendly, as such it is predicted
that slowly Blast Furnace will start using a part of its burden as pellet. With increasing trends of pellet usage in Blast Furnaces there shall be great demand for pellets as is evident from the demand from steel in next few years.

**Pellet consumption envisaged in the complex:**

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Description</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Pellet production</td>
<td>7.0 MTPA</td>
</tr>
<tr>
<td>2</td>
<td>Consumption in Blast furnaces</td>
<td>1.86 MTPA</td>
</tr>
<tr>
<td>3</td>
<td>Consumption in Coal based DRI</td>
<td>2.08 MTPA</td>
</tr>
<tr>
<td>4</td>
<td>Consumption in gas Based DRI (future)</td>
<td>1.9 MTPA</td>
</tr>
<tr>
<td>5</td>
<td>Export or sales to domestic market</td>
<td>1.16 MTPA</td>
</tr>
</tbody>
</table>

**03.00 Site & Infrastructure**

Bhushan Steel Limited (BSL) is operating an integrated steel plant for capacity of 5.6 MTPA and located at Village Narendrapur, Tehsil Meramandali, District Dhenkanal, Odisha.

The area of the Plant will be **approx. 24 acres within existing Plant boundary/Premises.**

- Layout diagram of BSL with Pellet Plant – Annexure – II
- Location map of Integrated Steel Plant – Annexure - III
04.00 Project Description

BSL plan to set up 7.0 MTPA pellet plant complex for their 5.6 MTPA integrated steel plant at Meramandali, Odisha. The pellet plant will operate on hematite iron ore concentrate having about 8% moisture.

The plant will be designed to receive the fines from surrounding sources and wash the same. After grinding and filtering the ore concentrate will be conveyed to pellet plant. Limestone and coke breeze from local ground storage will be conveyed to the silos of iron ore concentrate and additive storage unit within the Pellet Plant.

From these silos limestone and coke breeze are collected in preset quantities. After drying material will be ground in a ball mill to get the requisite fineness. Grinding of coarse bentonite will be done separately.

Then the Iron ore concentrate, ground additives and bentonite are transported to the respective silos in ground material storage unit. Further, mixing in high intensity mixer, green pellet formation in pelletizing discs and heat hardening of green pellets in indurating machine will be carried out.

One travelling grate indurating machine of 768 m² grate area will be installed with all other associated service facilities. Mixed gas (mixture of BFG & COG) and coal tar will be used for indurating.

04.01 Salient Features of Pellet Plant

- Production capacity 7 MTPA with 330 days of Operation per year
- Straight Grate process, technology from Outotec Germany for better process
efficiency and less pollution

- Iron ore fines available around Joda – Barbil area
- All process fans will be Variable speed for optimal energy consumption
- High intensity mixers from EIRICH, Germany for better mixing
- Three process ESPs and a Dedusting ESP for process dedusting emission less than 50mg/nm3 with one field down
- All process wastes generated will be consumed within steel plant. Dust from Dust extraction / dedusting units will be reused in the process
- Closed circuit wet grinding station to grind around 8.1 MTPA concentrates
- The induration will use tar (generated in Coke ovens) and mixed gas (BFG & COG) as fuel

04.02 Design Criteria

Capacity : 7.0 MTPA
No. of annual working days : 330 days
Indurating machine area : 768 m2
Pellet Strand width : 4.0 m
Useful strand length : 192 m
Fuel for induration : Coal tar and Mixed gas (CV = 2300 kcal/Nm3)
L/S & coke breeze additive : Ball mill (1 no.)
Bentonite grinding : Roller mill (1 no.)
Mixing : Vertical high intensity mixer horizontal type (2 no.)
Balling : Balling discs (7.5 m dia.) – 11 nos.
Feeding green balls on machine : By double deck roller screen for narrow size (9–16 mm) distribution onto the Indurating machine
Induration : Travelling Grate (TG) Indurating Machine
Separation of hearth layer : By HL vibrating screen
05.00 Process Flow of Pelletizing

Input Iron Ore
13.5 MTPA

→ Washing and Wet Grinding

Washed Sinter feed
2.375 MTPA

→ Washed lump ore for BF
1.94 MTPA

→ Iron Ore concentrate
8.1 MTPA

→ Pelletising

Output Pellets
7 MTPA

- Wet Grinding
  - Iron ore is ground to 80% passing 45 micron screen

- Filtration
  - Slurry from wet grinding is dewatered using pressure filters

- Mixing and Blending
  - Iron ore is mixed with fluxes, solid fuel, binder and water (if needed)

- Balling
  - Mixed material is formed into Green balls of 8 to 16mm

- Induration
  - Green balls are heat hardened in the furnace and cooled

- Product screening
  - Fired & Screened pellets ready for use
06.00 Material Balance for Pelletizing

**Feed**

<table>
<thead>
<tr>
<th>Feed Material</th>
<th>t/a (wet)</th>
<th>Twet / h (@24h/d)</th>
<th>t/t pellets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iron Ore feed to washing and grinding</td>
<td>14310000</td>
<td>1806</td>
<td>2.04</td>
</tr>
<tr>
<td>Iron Ore Feed for Pellet plant</td>
<td>7988851</td>
<td>1008.7</td>
<td>1.141</td>
</tr>
<tr>
<td>Filter Cake</td>
<td>7988851</td>
<td>1008.7</td>
<td>1.141</td>
</tr>
<tr>
<td><strong>Additives</strong></td>
<td><strong>448987</strong></td>
<td><strong>56.7</strong></td>
<td><strong>0.064</strong></td>
</tr>
<tr>
<td>Fine Bentonite</td>
<td>67744</td>
<td>8.6</td>
<td>0.010</td>
</tr>
<tr>
<td>Coarse Limestone</td>
<td>272313</td>
<td>34.4</td>
<td>0.039</td>
</tr>
<tr>
<td>Coarse Coke</td>
<td>108930</td>
<td>13.8</td>
<td>0.016</td>
</tr>
<tr>
<td><strong>Process Water</strong></td>
<td><strong>387785</strong></td>
<td><strong>49.0</strong></td>
<td><strong>0.055</strong></td>
</tr>
<tr>
<td>Fresh Water to Filter Cloth Cleaning</td>
<td>387785</td>
<td>49.0</td>
<td>0.055</td>
</tr>
<tr>
<td><strong>Bivalent Iron content</strong></td>
<td><strong>2624</strong></td>
<td><strong>0.3</strong></td>
<td><strong>0.000</strong></td>
</tr>
<tr>
<td><strong>TOTAL Feed</strong></td>
<td><strong>8828247</strong></td>
<td><strong>11147.7</strong></td>
<td><strong>1.261</strong></td>
</tr>
</tbody>
</table>

**Product**

<table>
<thead>
<tr>
<th>Products</th>
<th>Tpawet</th>
<th>Twet/h (@24h/d)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Washed lump ore for Blast furnace</td>
<td>1944000</td>
<td>270</td>
</tr>
<tr>
<td>Washed sinter feed</td>
<td>2350000</td>
<td>326.4</td>
</tr>
<tr>
<td>Product Pellet</td>
<td>7000000</td>
<td>883.8</td>
</tr>
<tr>
<td>Undersize Pellets</td>
<td>314374</td>
<td>39.7</td>
</tr>
<tr>
<td><strong>Loss on Ignition</strong></td>
<td><strong>341296</strong></td>
<td><strong>43.1</strong></td>
</tr>
<tr>
<td>Evaporation from Induration</td>
<td>772329</td>
<td>97.5</td>
</tr>
<tr>
<td>Induration</td>
<td>11399</td>
<td>1.4</td>
</tr>
</tbody>
</table>
07.00 Raw Materials, Quality and Sources

The annual, daily and hourly requirements of raw materials for the proposed pellet plant are furnished in table below:

07.01 Raw Material Requirement (Wet)

<table>
<thead>
<tr>
<th>Raw materials</th>
<th>Size</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>t/y</td>
</tr>
<tr>
<td>Iron Ore Concentrate</td>
<td>0 – (-10) mm</td>
<td>1,25,00,000</td>
</tr>
<tr>
<td>Limestone</td>
<td>0 – 20 mm</td>
<td>2,72,313</td>
</tr>
<tr>
<td>Coke Breeze</td>
<td>0 – 15 mm</td>
<td>1,08,930</td>
</tr>
<tr>
<td>Bentonite</td>
<td>0 – 5 mm</td>
<td>67,744</td>
</tr>
</tbody>
</table>

07.02 Quality of Raw Materials

The average chemical composition of raw materials to be used for pellet production is shown below.
Chemical Composition of Raw Materials (%)

<table>
<thead>
<tr>
<th>Raw Material</th>
<th>Fe (t)</th>
<th>Fe $^{2+}$</th>
<th>SiO$_2$</th>
<th>Al$_2$O$_3$</th>
<th>CaO</th>
<th>MgO</th>
<th>LOI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iron ore conc.</td>
<td>60 - 65</td>
<td>2 - 5%</td>
<td>3 - 5%</td>
<td>---</td>
<td>---</td>
<td>3 to 5%</td>
<td></td>
</tr>
<tr>
<td>Limestone</td>
<td>0.34</td>
<td>0.12</td>
<td>1.4</td>
<td>0.35</td>
<td>53.1</td>
<td>0.6</td>
<td>42.71</td>
</tr>
<tr>
<td>Coke breeze</td>
<td>3.4</td>
<td>0.56</td>
<td>54.9</td>
<td>27.3</td>
<td>3.8</td>
<td>0.89</td>
<td>83.07</td>
</tr>
<tr>
<td>Bentonite</td>
<td>9.56</td>
<td>0.2</td>
<td>53.0</td>
<td>16.2</td>
<td>1.5</td>
<td>3.6</td>
<td>7.17</td>
</tr>
</tbody>
</table>

07.03 Sources of Raw Materials:

Iron Ore

The Pellet plant will be designed with its own wet grinding unit to grind the iron ore fines from the surrounding Joda – Barbil area. In the later stages BSL is planning to put up a Beneficiation unit near the mines area of Keonjhar which will supply Beneficiated iron ore concentrate of size 80% passing 325 Mesh screen (45micron) in the slurry form. The filtration plant at Meramandali will receive this material and supply concentrate with around 9% moisture to pellet plant.

Bentonite

The bentonite requirement of the proposed plant will be met through purchase from Kutch area of Gujarat. The quality of bentonite envisaged for this plant is as
follows.

Swelling index: 25-30%
pH Value: 8.0-9.0

Limestone

Limestone of (-) 20 mm size required for the pellet plant will be met from local mines or imported.

Coke breeze

Coke breeze of (-) 15 mm size required for the pellet plant will be met through internal fines generated from coke oven plant.

Operating regime

The proposed pellet plant will be operating on the basis of three shifts a day and 330 days in a year after taking into consideration the shutdowns required for the planned maintenance and unscheduled breakdowns.

07.04 Quality of pellets

The expected chemical composition of finished pellets is placed below.

<table>
<thead>
<tr>
<th>Constituents</th>
<th>Value, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fe (t)</td>
<td>&gt; 64</td>
</tr>
</tbody>
</table>
The expected mechanical and metallurgical properties of finished pellets are placed below.

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Item</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>i)</td>
<td>Size + 9 to 16 mm ,&lt;5 mm</td>
<td>&gt;=90 % , &lt; 3 %</td>
</tr>
<tr>
<td>ii)</td>
<td>Porosity</td>
<td>24 to 28 %</td>
</tr>
<tr>
<td>iii)</td>
<td>Cold crushing strength</td>
<td>~ 250 kg/p min.</td>
</tr>
<tr>
<td>iv)</td>
<td>ASTM tumble index(+6.35 mm )</td>
<td>94 % min.</td>
</tr>
<tr>
<td>v)</td>
<td>Abrasion Index (-0.6 mm)</td>
<td>4 % max.</td>
</tr>
<tr>
<td>vi)</td>
<td>JIS swelling index</td>
<td>18 % max.</td>
</tr>
<tr>
<td>vii)</td>
<td>JIS reducibility</td>
<td>70 % min.</td>
</tr>
<tr>
<td>viii)</td>
<td>Compression strength after reduction</td>
<td>30 kg/p</td>
</tr>
</tbody>
</table>
08.00 Technological Facilities

The pellet plant proper will comprise the following major technological units.

08.01 Raw Material Handling:

There will be a separate iron ore yard with mechanized handling equipment. The yard will be designed to stack ore required for around 15 days of Pellet plant operation.

The plant will be provided with a mechanized blending station to blend the various grades of ore received from various suppliers to homogenize the quality.

The Limestone also would be provided with a store yard.

All the above material along with coke fines would be sent to Pellet plant bins by conveyors.

Additive storage and grinding station:

Pellet plant would be provided with bins for storing additives like limestone and Coke fines. There would be closed yard for storage of bentonite to store material for three months of consumption at pellet plant.

All the additives would be provided with grinding systems to grind to fineness of 80% passing 325 mesh screen.
Ore grinding station:

There will be provision of grinding 9.0 MTPA of Iron ore concentrate required for Pellet Plant. To accommodate the output there will be a wet grinding system to process ores up to 13.5 MTPA with a provision to wash the lumps and fines suitable for Blast furnace and Sinter Plants. The material of fineness of less than 1mm will be used for pelletizing after grinding. There will be filtration units provided for filtering the slurry to produce filter cakes with 9% moisture. This facility will also be used for filtration of the slurry which will be pumped from the future beneficiation plant.

Blending and Mixing area

- Four (4) bins for Iron ore concentrate
- Two (2) bins each for fine ground bentonite and solid fuel
- Four (4) bins for limestone
- Two (2) mixers (high-intensity bowl type)

Green Pelletizing

- Eleven (11) pelletizing discs (and space for one additional disc)
- Single roller deck screens under each pelletizing disc
- One (1) green pellet collecting conveyor with reciprocating head to minimize the number of transfer points and ensure even distribution of the green pellets onto the indurating machine

Pellet Induration

- One (1) double deck roller screen at feed station of the indurating machine, to separate undersize pellets.
- Indurating machine – travelling grate type - with a reaction area of 768 m².
- Hood covering the entire traveling grate equipped with burner chambers and lined with heat resistant refractory.
- Three (3) process gas fans with frequency controlled drives
- Dual fuel burners (coal tar & mixed gas)
- The exhaust fans with VFDs for exhausting the process gas through ESP after cleaning.

The complete pellet induration process takes place in the following zones, through which the pellets are conveyed (the zone distribution below)

Product Screening and Handling

- Two (2) Product screens to separate undersize pellets and the portion of the product pellets required for the hearth layer system from the product pellets

Process Gas and Plant De-dusting
• Three (3) process gas fans with frequency controlled drives
• Process gas cleaning by three (3) electrostatic precipitators (ESP)
• Central plant de-dusting for induration and screening area with one (1) ESP and one plant de-dusting fan
• Wet transport of ESP dust back to the battery limit

Apart from the above units, all major services facilities like material handling, water supply system, compressed air, mixed gas, ventilation and air-conditioning, plant de-dusting, building structures, civil works and industrial safety, electrics, instrumentation and automation have been envisaged for the proposed pellet plant.

08.02 Pellet Plant Input & Output
09.00 Utilities & Auxiliary Services

Water:

The makeup water requirement will be approximately 330 M3/hr which will be sourced from existing allocation from Baitarani River to BSL complex. The water is mainly used for ore washing and grinding. The water recovered after filtration will be reused in the process.

Fuels:

The plant will require around 450 MT /day of Coal tar which will be generated as a waste by product in the Coke ovens.
Mixed gas requirement is 40000 Nm$^3$/h, which will be mixture of Blast furnace gas (BFG) and Coke oven gas (COG) both are produced as byproducts at respective plants.

**Electricity:**

Power requirement is 86 MW which will be sourced from own power station of BSL complex.

**10.00 Civil structural and Construction planning:**

The various estimated volume of work will be as mentioned below,

- Civil (RCC) : 100,000 m$^3$
- Structural (Steel) : 40,000 MT
- Equipment : 25000 MT

The entire project will be completed in 36 months from the date of start to commission.

**11.00 Manpower:**

Manpower required to operation and maintenance of the Pellet plant and allied material handling and grinding station will be around 350.

**12.00 Environment Management:**
The wet grinding and pelletizing plant is being designed with Zero Discharge concept with no solid or liquid waste disposal. The wastes like fines generated and dust collected are being reused in the process of pelletizing. The wastes generated in other plants like Coke Ovens are being used for firing in Pellet plant. The process gases will be dedusted using three large ESPs and many other bag filters to regulate emission to less than 50mg/nm3. The work zone emissions will be regulated as per stipulated Indian standards.

13.00 Project Cost:

The estimated capital cost of the plant worked out to be Rs 2000 Cr. This is covering the cost of Pelletizing Facility, Wet grinding station, Material handling systems and Pellet distribution systems.

14.00 LAYOUT OF PELLET PLANT