CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-SSC-PDD)
Version 03 - in effect as of: 22 December 2006

CONTENTS

A. General description of the small scale project activity

B. Application of a baseline and monitoring methodology

C. Duration of the project activity / crediting period

D. Environmental impacts

E. Stakeholders' comments

Annexes

Annex 1: Contact information on participants in the proposed small scale project activity

Annex 2: Information regarding public funding

Annex 3: Baseline information

Annex 4: Monitoring Information

Revision history of this document

Version Number	Date	Description and reason of revision
01	21 January 2003	Initial adoption
02	8 July 2005	• The Board agreed to revise the CDM SSC PDD to reflect guidance and clarifications provided by the Board since version 01 of this document. • As a consequence, the guidelines for completing CDM SSC PDD have been revised accordingly to version 2. The latest version can be found at <http://cdm.unfccc.int/Reference/Documents>.
03	22 December 2006	• The Board agreed to revise the CDM project design document for small-scale activities (CDM-SSC-PDD), taking into account CDM-PDD and CDM-NM.

SECTION A. General description of small-scale project activity

A.1 Title of the small-scale project activity:

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Shree Nakoda Ispat Ltd 12 MW Biomass power generation project
Version : 06
Date : 02/06/2010

A.2. Description of the small-scale project activity:

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Shree Nakoda Ispat Limited is a mid size company specializing in the manufacturing of Sponge Iron with induction furnace to produce billets / ingots, located in Siltara (Raipur) Chhattisgarh, India since 2005. The company employs around 225 people. In addition, the company provides indirect employment to many other people in and around the plant.

Shree Nakoda Ispat Limited has a capacity to produce around 200 tons per day (66,000 tons / year) of sponge iron, and 365 tons per day (120,000 ton / year) of billets / ingots in their above mentioned plant. With a view to meet the growing market demand in India and for the further growth of the company, Shree Nakoda Ispat Limited is now planning to engage itself in the expansion of production capacity to produce 550 tons (182,000 tons/ year) of sponge iron per day and 365 tons per day (120,000 ton / year) of billets / ingots.

The existing sponge iron, billets / ingots plant is consuming around 8 MW of power as available for which the company draws 3.5 MW from the state electricity board grid whereas the balance 4.5 MW is produced in-house by the existing 6 MW Waste Heat Recovery (WHR) based Power Plant. The 6 MW is the installed capacity of WHR power plant, but the maximum generation in a given month as per the validated monitoring reports is 3328 MWh in the month of December 2006 which is approx. 75% of the maximum generation possible with 6 MW capacity (i.e. 4464 MWh).

With the expansion of the sponge iron and billets / ingots production capacity from 200 TPD to 550 TPD, the power requirement of the sponge iron, billets / ingots plant will go up to 18 MW.

In order to meet the additional power requirement, Shree Nakoda Ispat Limited have options to draw fossil fuel based power from the state electricity grid; generate coal based power in-house or to generate biomass based power in-house. The Shree Nakoda Ispat Limited is not looking at the possibility of expansion of existing Waste heat recovery (WHR) based power plant as the alternative to the proposed biomass based power project because of the fact that existing WHR based power plants is under performing as per the expectations[1]. The actual output of the presently operating WHR plant has never crossed 80% of the expected generation figure assumed in the PDD of the registered project. Shree Nakoda Ispat Limited wants to become independent from the grid by installation of new Biomass based power generation project and this will not be possible with the expansion of existing WHR based power plant. Also, the new WHR based power plant will not be eligible to get CDM benefits, which makes it financially unviable alternative for Shree Nakoda Ispat Limited.

[1] As evident from the previous monitoring reports of the registered WHR project (http://cdm.unfccc.int/Projects/DB/TUEV-SUED1159532983.1/view).

With a view to meet the enhanced power requirement, Shree Nakoda Ispat Limited would like to set up a 12 MW Biomass (Rice Husk) based Power Generation Project (in addition to their existing power generation through waste heat recovery) within the same plant in Siltara (Raipur). The balance power requirement will be met with supplies from the Chhattisgarh State Electricity Board (CSEB) grid. Till the expansion of the steel plant is completed, power generated from the biomass based power plant will be exported to the grid. Also, since the sponge iron and billet / ingot manufacturing process do not consume the same amount of power on a continuous basis, SNIL will undertake export of excess power to the grid when the plant requirement is low even after the expansion of steel plant is operational. The project activity will reduce GHG emissions by generating electricity from biomass (rice husk), which would have been otherwise generated by fossil fuel based power plants connected to the grid.

The state of Chhattisgarh is called the "Rice Bowl of India"[2] due to a large paddy growth in the state. This ensures a consistent supply of rice husk throughout the year from the adjoining towns / villages. The required rice husk will be transported from towns / villages located within a diameter of 50 Kms from the plant location

The Project has a number of sustainable development benefits.

1. Stability of power supply

India is a power deficit country. The demand for power exceeds the availability from the grid, which results in power cuts for domestic as well as industrial usage. The easiest route of improving power supply by building new fossil-fuel powered thermal power stations will only lead to an increase in GHG emissions, accompanying emissions of SOx and NOx, as well as other local air quality problems. The proposed project activity of Shree Nakoda Ispat Ltd. will enable increase in power generation without the negative environmental consequences from the fossil fuel use.

2. Security of fuel supply

With growing oil prices and growing demand from fast expanding Asian economies, security of fuel supply is becoming a major issue at global as well as micro level industrial units. In such a scenario, converting a locally available biomass into a source of energy relieves the pressure on imported oil supplies and represents a more sustainable business model than expansion of fossil fuel power generation.

3. Stimulation of the local economy

The biomass, mostly rice husk to be combusted in the project is an agricultural residue. In the project scenario, this biomass will be purchased for combustion for generating power. This will help local people / farmers to generate income which will stimulate the rural economy.

4. **Generation of employment**

The development of the biomass based power generation plant will provide employment for local people. This project activity will create temporary job opportunities for workmen involved in the design and erection of the biomass power generation facilities. Further, Shree Nakoda Ispat Ltd. will employ people on permanent basis to run and manage the biomass power generation plant. The project activity will also generate job opportunities for people involved in the transportation of the biomass to the project site on a regular basis. The overall increase in economic activity at the plant will therefore provide a number of additional jobs.

[2] http://www.renewableenergyworld.com/rea/news/story?id=45265

A.3. Project participants:

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Name of Party involved (*) ((host) indicates a host Party)	Private and/or public entity(ies) project participants (*) (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
India (host)	Shree Nakoda Ispat Ltd	No

(*) In accordance with the CDM modalities and procedures, at the time of making the CDM-PDD public at the stage of validation, a Party involved may or may not have provided its approval. At the time of requesting registration, the approval by the Party (ies) involved is required.

A.4. Technical description of the small-scale project activity:

A.4.1. Location of the small-scale project activity:

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A.4.1.1. Host Party(ies):

>> India

A.4.1.2. Region/State/Province etc.:

>> Chhattisgarh

A.4.1.3. City/Town/Community etc:

>> Siltara, Raipur

A.4.1.4. Details of physical location, including information allowing the unique identification of this small-scale project activity :

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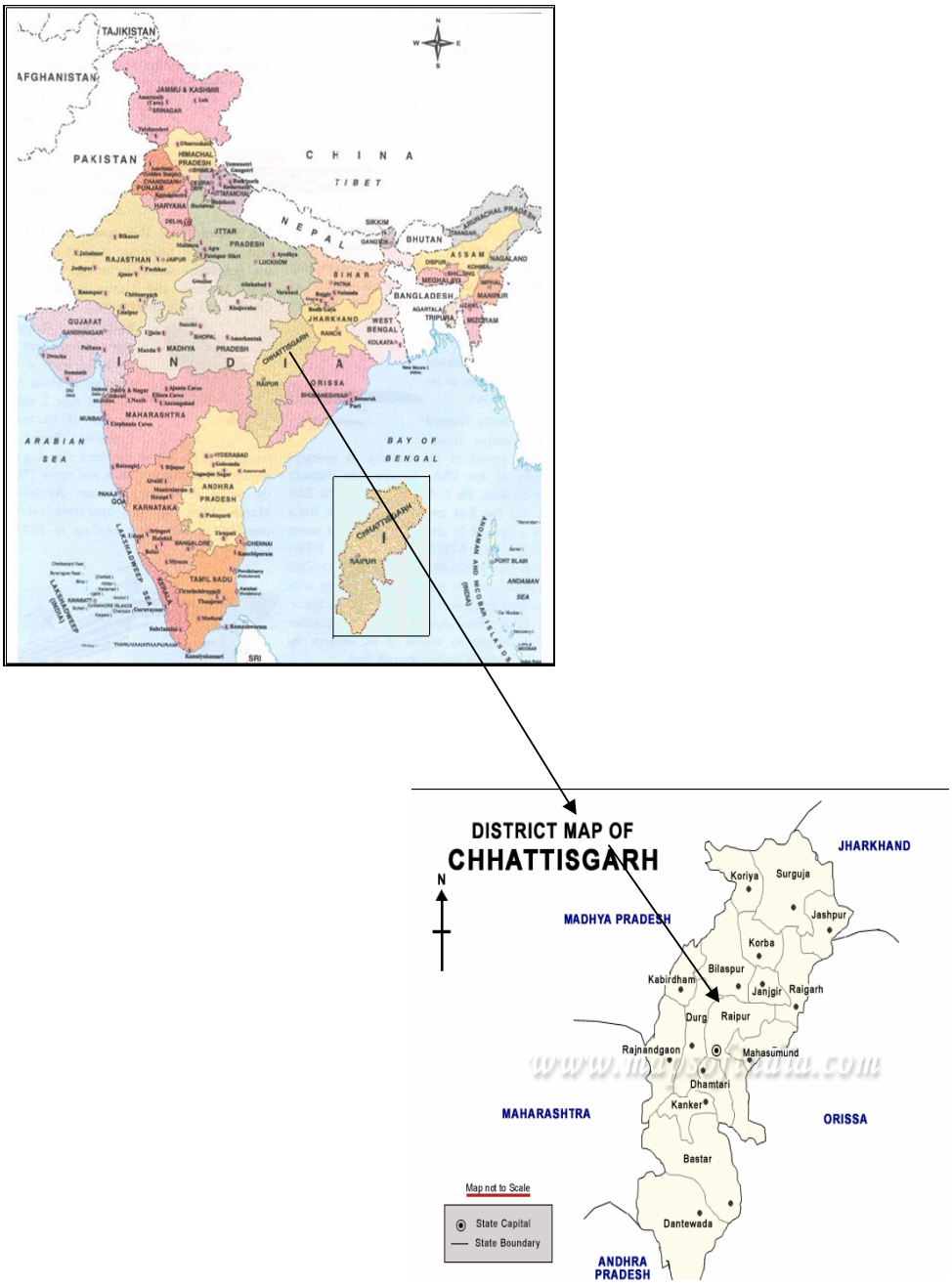
The project is located at Shree Nakoda Ispat Ltd's sponge Iron plant located at Plot number 109, Phase II, Siltara Industrial Growth Centre, Siltara, Raipur, Chhattisgarh, approximately 18 Kms from Raipur city. The plant is located in the designated industrial area having multiple industrial facilities in the vicinity.

The plant site is located at longitude 21 21' 36" deg N and 81 39' 6" deg E[3].. The nearest railway station is Raipur Junction, which is around 11 km away from the project site.

There are no metropolitan cities or ecologically sensitive areas within a radius of 25 km. The site is more than half a kilometre away from the nearest river line and highways. No significant place of

[3] http://wikimapia.org/3020917/Shree_Nakoda_Ispat_Ltd.

archaeological, religious or tourist importance lies within a radius of 10 km from the site. The site includes no forest area. A green belt of adequate width will be provided around the proposed plant.



A.4.2. Type and category(ies) and technology/measure of the small-scale project activity:

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Main Category : Type I - Renewable Energy Projects
Sub Category : D - Grid connected renewable electricity generation

This category comprises renewable energy technologies that supply electricity to and / or displace electricity from an electricity distribution system that is or would have been supplied by at least one fossil fuel fired generating unit.

The project activity is a grid connected rice husk based power plant combusting rice husk in the boiler, with a high pressure steam turbine configuration having a capacity of 12 MW which is well within the eligibility limit of 15 MW as per paragraph 2 under category I. D version 13.

The project activity is a rice husk based power generation plant wherein high – pressure steam turbine configuration will be used. Circulating Fluidized Bed Combustion Boiler (CFBC) technology will be used for generating steam. The technology is readily available indigenously and the project activity does not involve transfer of technology from Annex –I Country.

The specifications of 70t/h High Temperature and Sub-high Pressure CFBB are as follows:-

Boiler parameters	: Rated capacity: 70t/h
Rated steam pressure	: 6.47 MPa
Rated steam temperature	: 485degrees
Feedwater temperature	: 130 degrees
Intaking-air temperature of air heater	: 40 degrees
Exhaust gas temperature	: 150 degrees
Level of platform at operation layer	: 7000 mm
Level of drum center	: 27000 mm

Turbine

The proposed plant will have one Turbine which is of impulse, multistage, single cylinder with horizontally split casing and straight condensing type with air–cooled condenser steam turbine capable of generating 12 MW at 11 KV, 50 Hz, 0.8 Power factor at generator terminals. The Turbine is coupled directly to the Alternator without any Gear Box. Both turbine and generator are 3000 rpm rotation speed. The coupling is a rigidity butt-muff type. The Turbine is designed to operate under the inlet steam conditions of 66ata / 480°C and is equipped with main oil tank to supply lube oil for turbine and generator bearings and also control oil for Governing system and safety system.

A combined rotor, i.e. integral and shrunk-on rotor, has been chosen for this steam turbine. A thrust collar and the wheels of front stages are to be machined out of a solid shaft, with the wheels of last stages and coupling being shrunk on an integral rotor. Both a propeller of main oil pump and emergency governor are fixed to the front end of the main shaft.

Generator

The turbo-generator is a 3-phase non-salient pole generator driven directly by a steam turbine, which feature as compact structure, few auxiliary equipments, convenient and reliable operation. The rated

rotating speed of the generator is 3000 r/min, frequency is 50 Hz, and the cooling mode is Air cooled with closed circuit cooling type. The generator excitation is applied by static silicon controlled excitation device. The device has an automatically voltage regulating (AVR) equipment.

Generator is designed in accordance with IEC34 standards rated for continuous operation with terminal conditions of 11KV, 3 phases, 50 Hz, 0.8 lagging power factor at an ambient temperature of 50°C. Alternator is fitted with resistance type temperature detectors for measurement of stator winding temperatures, bearing temperature and air temperature before and after air cooler elements.

Specifications of generator are as follows: -

Rated capacity at Generator terminals	: 12MW
Rated rotating speed	: 3000RPM
Voltage	: 11KV+/- 5%
Frequency	: 50HZ+/- 3%
Power Factor	: 0.8
Efficiency	: 97.2%
Isolation class	: F
Cooling type of Generator	: CACW
Cooling water temperature	: 32 deg C
Type excitation	: Brushless excitation

A.4.3 Estimated amount of emission reductions over the chosen crediting period:

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Year	Annual estimation of emission reduction in tonnes of CO_2 e
Year 1	54,462
Year 2	57,866
Year 3	57,866
Year 4	57,866
Year 5	57,866
Year 6	57,866
Year 7	57,866
Year 8	57,866
Year 9	57,866
Year 10	57,866
Total estimated reductions expected in 10 years (tonnes of CO2 e)	**575,256**
Total number of crediting years	10
Annual average over the crediting period of estimated reductions (tonnes of CO2 e)	57,525

A.4.4. Public funding of the small-scale project activity:

>> The project has not received any public funding.

A.4.5. Confirmation that the small-scale project activity is not a debundled component of a large scale project activity:

SNIL has a registered Large Scale project activity at the same location, web-link for which is provided below.

http://cdm.unfccc.int/Projects/DB/TUEV-SUED1159532983.1/view

However the proposed (new) project activity is not a debundled component of the earlier large scale project activity, because the present project activity doesn't fall under same project category and technology/ measure.

SECTION B. Application of a baseline and monitoring methodology

B.1. Title and reference of the approved baseline and monitoring methodology applied to the small-scale project activity:

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Title:

Type I, Category D, "Grid Connected Renewable Energy" (AMS I D), version 13

Reference:

The methodology followed will be "AMS 1 D/Version 13 (14th December 2007) – Approved methodology for Small Scale Projects" under the sectoral scope "Grid connected renewable electricity generation" which is most appropriate for this Project and is listed as per the UNFCCC norms.

To calculate the combined margin emission factor "Tool to calculate the emission factor for an electricity system (Version 01.1)" is referred.

B.2 Justification of the choice of the project category:

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1. The project will generate electricity from rice husk, a renewable source for use in the grid connected sponge iron plant of SNIL, which would have otherwise imported electricity from the western grid which is largely dependent upon fossil fuels.
2. The project activity will be a 12 MW biomass based power plant. The technology and the installed equipment such as the boiler and steam turbo generator do not have the capacity to generate more than 15 MW power. Hence the capacity of the biomass power plant will not exceed 15 MW which is threshold limit for small-scale projects
3. The project activity is only renewable power generation and does not include co-generation.
4. The project activity does not involve the addition of the renewable energy generation units at an existing renewable power generation facility.

5. The project activity does not seek to retrofit or modify an existing facility for renewable energy generation.

B.3. Description of the project boundary:

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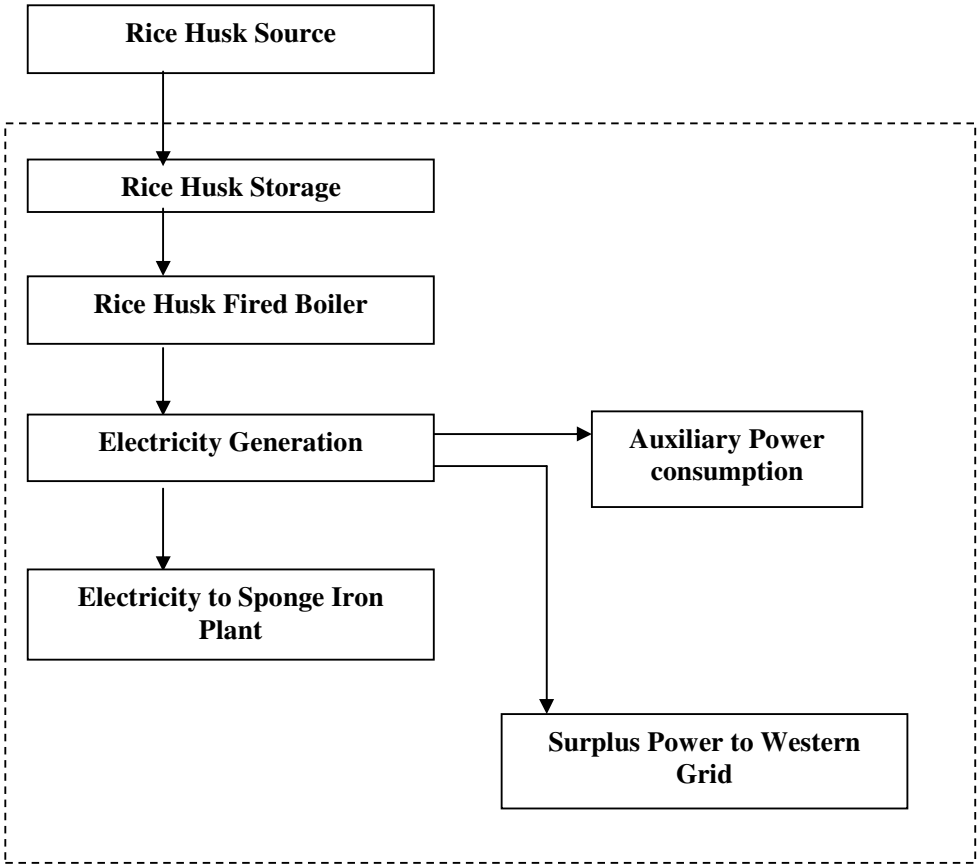
In accordance with Appendix B, Category I.D paragraph 6, the project boundary "encompasses the physical, geographical site of the renewable generation source."



--- Project boundary

Table B-1: Summary of GHG emissions

	Source	Gas	Included in emission calculation? (Justification if not included)
Baseline	Grid electricity generation	CO_2	Yes
		CH_4 & N_2O	No. For conservatism, emissions from this source are not included in the baseline.
Project	Controlled combustion of Rice Husk by the Project.	CO_2	No. CO_2 from biomass is carbon-neutral as per IPCC guidelines.
		CH_4 & N_2O	No. These emissions are considered insignificant and are not counted for simplicity.

B.4. Description of baseline and its development:

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The baseline for emissions from grid electricity is developed as per AMS-I.D. The WESTERN grid has been considered as the baseline since the project activity will avoid the use of fossil fuel by existing power plants in the WESTERN grid for supply of power to Shree Nakoda Ispat Limited.

The Shree Nakoda Ispat Limited is not looking at the possibility of expansion of existing Waste heat recovery (WHR) based power plant as the alternative to the proposed biomass based power project because of the fact that existing WHR based power plants is under performing and not up to the expectations of project developer. Also, the new WHR based power plant will not be eligible to get CDM benefits, which makes it financially unviable alternative for Shree Nakoda Ispat Limited.

The baseline is the annual MWh generated by the project activity times the Combined Margin of 0.7959 tCO2/MWh for the WESTERN grid as calculated according to the information available from the Central Electricity Authority on Power Plants supplying electricity to the WESTERN grid. Reference is made to the calculations made in the section B.6.3.

http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm (Ver-3)

B.5. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered small-scale CDM project activity:

Investment barrier

For Shree Nakoda Ispat Ltd., setting up a 12 MW Biomass based power generation plant will be a significant expense, and seen as a high risk investment as they are not specialists in the Biomass based power generation industry. The project proponent had an alternative to purchase power from the Chhattisgarh State Electricity Board (CSEB) connected to the western grid and could have invested the money in alternative investment proposals or in their core business which would have delivered assured

higher returns in view of the prevailing market situation. The IRR calculations for the proposed project activity reflect that the project has a low rate of return of 8.89% which is significantly low in comparison to the kind of returns expected in the sectors where Shree Nakoda Ispat Ltd.'s core businesses operate.

According to the latest guidelines given by CDM – Executive Board on "Guidance on the Assessment of Investment Analysis (version 02.1)", a simple comparison of the return on investment can be made with the Local Commercial Lending Rate **(Benchmark),** from the bank for the period when the Management made the decision on the project. The Local Commercial Lending Rate for this period stands at **12.00%**[4]**.** This is the most conservative benchmark considered among all the available benchmarks as per EB "Guidance on the Assessment of Investment Analysis (version 02.1)". This means that for all of the risks Shree Nakoda Ispat Ltd would be taking in implementing the Project, their return on investment without CDM benefits, would be lower than the interest rate at which Shree Nakoda Ispat Ltd is typically able to borrow money for expansion.
All financial figures were mentioned in INR (Indian Rupees).The conversion factor of INR to US Dollar is 1US Dollar = 46 INR (Exchange rate during March 2006)

The key inputs used in calculating the IRR were:

Item	Value	Source /Comments
Turbine Capacity	12,000 kW	Purchase Order for Turbine Generator
Days in operation	330 days per year	DPR
Effective power generation		
Ist year	75 % of capacity	DPR(70% for first 6 months & 80% for the remaining 6 months)
IInd year	82.5 % of capacity	DPR(80% for 6 months & 85% the remaining 6 months)
IIIrd year onwards	85 % of capacity	DPR
Initial investment cost	385 Mn INR	DPR(excluding INR 3.77 Mn margin for Working Capital from total investment)
Term Loan	280.40Mn INR	Bank loan approval letters
Equity Share	108.37 Mn INR	DPR
Loan Interest rate	12 %	Bank loan approval letters
Repayment period	8 years	Bank loan approval letters
Specific Fuel Consumption	1.2 MT / MWh	Calculated as per technical spec. and analyzed calorific value of biomass (Refer section B.7.1)
Raw materials (incl. Fuel cost)	1.68 Mn INR/GWh	DPR, quotations from biomass suppliers
Utilities (water)	INR 8000 /Day	DPR
O& M and Admin expenses	As mentioned in the DPR/ IRR calculation sheet	DPR
Manpower Cost (Salaries and	7.898 Mn INR (with 10%	DPR

[4] The Local Commercial Lending Rate of Bank of Baroda (the major lender bank for SNIL) stands between 10.50 % to 13.50 %, average being 12.00 % for the period of Jan to April 2006 when the decision to pursue the project as CDM project was made. A statement from the bank is submitted to DOE as a supporting document.

Wages)	escalation per year)	
Power tariff	3.80 INR/ kWh for 75% captive consumption 1.00 INR/ kWh for 25% in-firm power	As per electricity import tariff bills by Chhattisgarh State Electricity Board (CSEB) As per Power purchase agreement with CSEB
CER Revenue	INR 0.41/kWh	Calculated considering CER price of $10 approx. (@ INR.46/$ during March 2006)
Depreciation	As mentioned in DPR/IRR calculation sheet	As per Income Tax Act
Taxes	Rate of Income tax – 33.66% MAT – 11.22 %	As per Income Tax Act

For further clarity on the main assumptions taken for calculation of the financials for the project, the basis for taking these assumptions were described below:

1) Turbine Capacity: The turbine capacity is the Nameplate capacity of the Turbine – generator set installed for this project activity. The figure is taken from the Specification provided by the Equipment supplier and is mentioned in the purchase order raised by the project developer.
2) No. of Working days: Since the plant is Biomass based power generation, a normative figure of 330 working days per year considered for the project activity.
3) Effective Power Generation (PLF): The PLF considered for this project activity is taken from the DPR submitted by a Third party consultant to the Project developer in March 2006. The same report is considered by the board of directors before giving the approval for the project activity. The same PLF was reported to the Bank authorities along with the request for loan for the project activity. A confirmation letter from the bank authorities on the PLF reported for the project activity is being submitted to the DoE. Hence, the PLF considered for the Project activity is meeting the recent EB "Guidelines for the reporting and validation of the Plant load factors, Version 01" (EB 48, Annex 11) under section 3(a).
4) Initial Investment Cost: The initial investment cost considered for the project activity was 385 Mn INR which is approx. 32.1 Mn INR/ MW. This is well below the mentioned benchmark in the tariff order issued by Chhattisgarh State Electricity Regulatory Commission in year 2006 which mentioned an investment of 39.0 Mn INR/MW for Biomass based project in Chhattisgarh. A copy of this tariff order is being submitted to the DoE.
5) Term Loan, Loan Interest Rate, Repayment period: The project developer has taken loan of amount 280.40 Mn INR from banks. A copy of the term loan approval letters is being submitted to the DoE for validating this assumption.
6) Specific Fuel Consumption (Biomass): This is calculated as per the technical specification and analyzed calorific value of Biomass and detailed calculation presented in Section B.7.1 of the PDD.
7) Cost of Raw Material (Biomass): The cost of Biomass (Rice Husk) was considered as INR 1400/ ton of Rice husk based on the various quotations available with the project developer at the time of preparation of DPR. No price escalation was considered in the Biomass price during financial

analysis, to be on the conservative side. The Project developer decided to purchase the Rice Husk from the Spot market in place of signing a fixed rate long term agreement with individual suppliers. This is done in anticipation of the fact that a surplus of biomass (Rice Husk) is available in the nearby region and this may trigger the lowering of price in near future. However, the price of Rice Husk is increasing every year and now stands at around INR 1800-1900 /ton on average in the spot market. The actual invoices paid to the Biomass (Rice Husk) suppliers are being submitted to the DoE for reference.

8) Utilities (Water): The water requirement of the Project activity is around 800 KL/day as mentioned in the DPR. The Project developer is having an allotted contract demand of the water of 900 KL / day, out of which 600 KL/day is consumed by existing Waste Heat Recovery based power plant located in the same premises. The rest of the water (300 KL) is available for the new biomass based power plant. Hence, the present supply of CSIDC is not sufficient for meeting the requirement of the Project. Water will therefore be procured from outside sources (through private water tanker suppliers). Prevailing rate of CSIDC is INR 10/ KL water, which is used as basis for calculation. However, water procured from outside sources cost about INR 50 – 60 / KL, which varies based on transportation cost (depends on diesel prices). In this regard, a copy of Purchase Invoice for the water procured through outside sources is being submitted to the DoE. A copy of Bill charged by CIBL is being submitted to the DoE for verification of the basic cost of water. Hence, from the above it can be concluded that the project developer is incurring much more water expense then the assumptions taken from the financial analysis.
9) O&M and Administration Expense: The O&M and Administration expenses is divided in various items and described in detail in the IRR sheet. Different escalations were considered for each item based on the previous experience of the project developer from already running power plant. O&M and Administration expense is coming out to be 16.19 Mn INR (4.2% of the initial investment cost) which is an acceptable practice. O&M and Administration expense after 20 Years would be 29.15 Mn INR (7.57% of the initial investment cost) which is a reasonable assumption and comparable with the O&M expense considered in the tariff order issued by Chhattisgarh State Electricity Regulatory Commission in year 2006. A copy of this tariff order is being submitted to the DoE.
10) Manpower Cost (Salaries and Wages): This is presented in detail in the IRR calculation sheet as well as in the DPR. A yearly escalation of 10% is considered in the calculation. A copy of the Profit & Loss account of the audited balance sheet for the last 3 years has been submitted to the DOE for ready reference. It is clear from the Profit & Loss Statements (please refer Payment & provisions to Employees in profit & loss account) that the escalation of 10% considered in the Manpower Cost is a conservative assumption considered by the project developer.
11) Power Tariff: Firm Power tariff was assumed based on the fact that the power produced will be used for captive consumption, which will lead to saving in electricity import from the grid. If we refer to the tariff order of CSEB for biomass projects in Chhattisgarh (Appeal No. 20 of 2006), the fixed tariff approved by CSEB is 2.25 INR/kWh (without escalation for next 10 year) which is much lower than the assumption taken in the IRR computation of the project activity. The escalation is not considered because of the fact that the tariff will remain constant or may go down in coming years because of the net surplus of electricity in the Chhattisgarh State. It is also evident from the energy policy of government of Chhattisgarh, which is in favour of rationalization of the tariff in order to promote the industrial development in the state (http://www.cseb.gov.in/1.2%20ENERGY%20POLICY%2002.htm). The argument can be verified from the tariff rate declared by CSERC for last 3 years (http://cserc.gov.in/tariff_order.htm).

A one year average (2006-07) of electricity imported from the Grid was considered as the average demand for the Company on monthly basis. The approximate tariff charged by CSEB for this average consumption would come around INR 3.8/ unit. A detailed explanation is provided in the excel sheet for greater clarity. The CSEB bill amount is divided into 3 parts: 1) Demand charges, which is the minimum amount that should be charged to the project developer regardless of the plant operation and depends on the sanctioned load to the project. 2) Energy Charges, which depends on the actual energy imported by the project developer from the CSEB. We have presented the last 3 years tariff for the Energy Charges on actual consumption and it is showing a downward trend. 3) Parallel Operation / Misc charge, which is charged at a nominal rate because it is unutilized power available with CSEB during off peak hours. When these 3 parts of the electricity bill are compared it is clear that the largest element is the Energy Charge, which is typically double or more compared with the two other parts. Secondly, the amount paid for Demand Charge and Parallel Operation / Misc charge is generally constant month by month, with little variation. The item with the most fluctuation is the Energy Charge, which is also the largest item on each month's bill. There has been a clear downward trend in the tariff for Energy Charge over the period in question. Hence, considering the reduction in Energy Charges tariff by CSEB in last 3 years, we have considered a flat tariff for the financial analysis, and have also considered that in the sensitivity analysis, an increase in the electricity import bill of 10% would be highly improbably in near future.

The power tariff for sale of infirm(non committed) power is assumed as INR 1.0/unit which is based on various invoices raised by Project developer for the sale of in firm power from the already commissioned WHR power plant in the same premises. Also, it is mentioned in PPA signed between the Project developer and CSEB for sale of excess power from the WHR based power project in October 2007. The applicable rate for the power supplied below the load factor of 70% will be charged at INR 2.32 * (load factor in %) / 70. As per already provided computation by project developer, the in firm power can be supplied at a load factor of 25% or below according to the running cycle of the Sponge iron plant. Hence the maximum tariff Applicable for the project activity will be (2.32*25)/70 = INR 0.828/ unit. Hence the value considered for the financial calculation is reasonable and conservative. A copy of the PPA will be provided to the DoE for reference.

The results are as follows:

Description	**Value**
Project IRR without CDM revenues	10.74%
Project IRR with CDM revenues	17.99%

A sensitivity analysis was carried out, to establish whether variation in performance was likely to bring the return on investment above the benchmark PLR. The following scenarios are analyzed:

Sensitivity Analysis 1: Variation in effective power generation

Shree Nakoda Ispat Ltd's IRR analysis assumed an effective power generation of 85%. The sensitivity analysis looks at a +/- 10 % variation in this figure.

Effective Power Generation	IRR
76.5 %	**7.25%**
85 %	**10.74%**
93.5%	**13.84%***

*Though the IRR surpasses the "Benchmark IRR value of 12%" on 10% increase in Effective Power Generation (PLF), the probability of such an increase in PLF is very low. A certificate from the boiler manufacturer is being submitted to the DoE which clearly shows that with Rice Husk as a fuel the efficiency of the system will not be more than 85%.
Also, it is evident from the first 6 months operation data of the project activity which clearly shows that project is underperforming and not producing as projected in the PDD. The plant has run at approx. 62.15% PLF for the first 6 months compared to the projected PLF of 70% in the DPR.

Sensitivity Analysis 2: Variation in Raw material (incl. fuel) costs

Shree Nakoda Ispat Ltd's IRR analysis assumed a base Raw material (incl. fuel) cost of 1400 INR per ton. The sensitivity analysis looks at a +/- 10% variation in this figure.

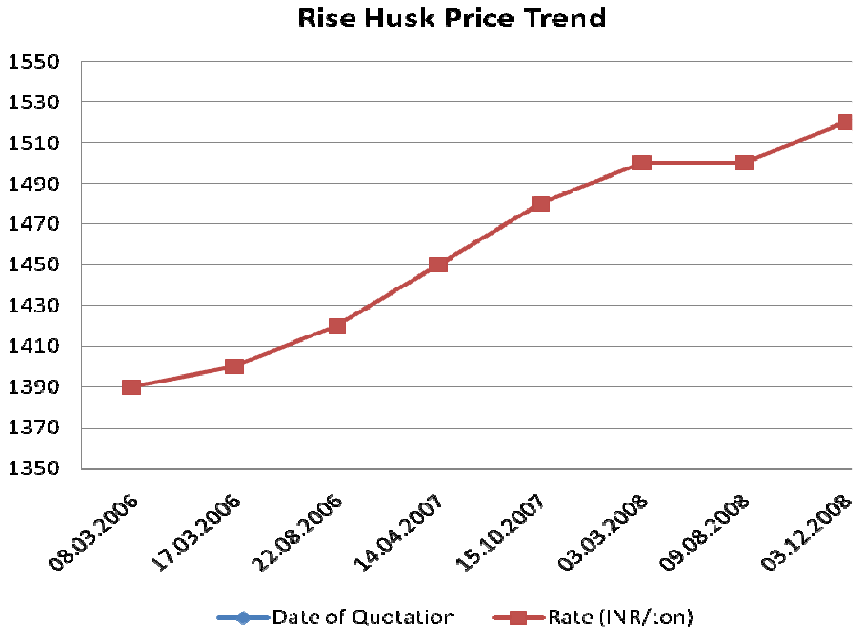
Raw material (incl. *fuel*) **(INR/ Ton)**	**IRR**
1,260	**15.32%****
1,400	**10.74%**
1,540	**5.19%**

**Though the IRR surpasses the "Benchmark IRR value of 12%" on a 10% decrease in the prices of biomass (Rice husk), the probability of such a decrease in the prices of biomass (Rice husk) is very low in view of the growth in the prices of oil/diesel, transportation costs besides increase in demand for biomass (rice husk) from a number of rice husk based power plants in the region. In view of this, a 10% decrease in the prices of rice husk is not likely to happen in the future. Due to the increase in demand for Rice Husk in last 2-3 years because of the new biomass based power plants in the region, the supply of Rice Husk now become organized business in the region. This is one of the reasons for increase in Rice Husk Price despite of the fact that surplus Biomass is still available in the region.

The above argument is supported by the following Trend analysis of the Rice Husk prices in the region which reflects that prices of the rice husk have increased by 9.35% in the last two and a half years. Moreover, not even in a single year, there has been a drop in the prices of the rice husk. The trend analysis has been carried out on the basis of various quotations received by Shree Nakoda Ispat Ltd. for purchase of rise husk from March 2006 to December 2008.

S. No.	Date of quotation	Rate(INR/ton)
1	08.03.2006	1390
3	17.03.2006	1400
4	22.08.2006	1420
5	14.04.2007	1450
6	15.10.2007	1480

7	03.03.2008	1500
8	09.08.2008	1500
9	03.12.2008	1520



The above graph clearly indicates that prices of Rise Husk in the region have gone up continuously and decrease in price of rise Husk is not likely to happen in the future. To support this argument Project developer has submitted the actual invoice paid to various rice husk suppliers since commissioning of the plant.

Sensitivity Analysis 3: Variation in initial investment

Shree Nakoda Ispat Ltd's IRR analysis assumed an initial investment of 385 million INR (excluding 3.77 Mn INR as margin for working capital). The sensitivity analysis looks at a +/- 10% variation in this figure.

Initial investment (Mn INR)	IRR
346.50	**12.66%*** **
385	**10.74%**
423.50	**9.12%**

***Though the IRR surpasses the "Benchmark IRR value of 12%" on 10% decrease in Initial investment Cost, the probability of such an decrease in Project cost is not possible. Since, the project is commissioned in February 2009 and actual Project cost is coming out to be 10% higher than projected in the DPR.

Sensitivity Analysis 4: Variation in O&M and Admin. Costs

The sensitivity analysis looks at a +/- 10% variation in the *O&M and Admin Costs*

O&M and Admin. Costs	**IRR**
Reduction by 10 %	**11.53%**
Present cost	**10.74%**
Increase by 10 %	**9.92%**

It is therefore clear from this benchmark analysis that in none of the scenarios defined above does the Project IRR exceed the Local Commercial Lending Rates of 12.00%. Indeed, in most cases, the IRR remains at or below the current rate local commercial lending rates. It can therefore be concluded that without the CDM, this would not be an attractive project for Shree Nakoda Ispat Ltd, and would therefore not be implemented.

Impact of CDM registration

It is difficult to precisely estimate the value of CDM revenue from the project. However, with a conservative estimation, the Project IRR increases to 17.99 % (bringing it above the benchmark figure of 12.0%) after consideration of the potential CDM benefits. In consideration of this analysis of potential CDM benefits, Shree Nakoda Ispat Limited will go ahead with the project considering the CDM benefits.

Prior Consideration of CDM

At the inception of the project activity, CDM incentives were seriously considered by the project developer to overcome the financial barrier faced by the biomass based power generation project. This was reflected in the Board resolution passed on 15/04/2006 for the implementation of 12 MW Rice husk based power generation project in Raipur when the board agreed to implement the project availing CDM benefits to overcome various barriers.

The chronology of the key events (from inception onwards) related to the project activity is as tabulated below:

S. No.	Activity	Date	Reference
1.	Board Resolution	15/04/2006	Copy of the board resolution
2.	Issue of purchase order*(start date of Project)*	01/11/2006	Copy of purchase order
3.	Beginning of communication with CDM consultant (Mitsubishi UFJ Securities) inviting commercial proposal for CDM Consulting Services	21/11/2006	Email to Mitsubishi UFJ Securities dated 21/11/2006
4.	Email from Mitsubishi UFJ Securities giving various pricing options for providing consulting services	27/11/2006	Email from Mitsubishi UFJ Securities dated 27/11/2006
5.	Email from Mitsubishi UFJ Securities submitting	19/12/2006	Email from Mitsubishi

	revised offer for providing CDM consulting services		UFJ Securities dated 19/12/2006
6.	Email from Mitsubishi UFJ Securities sending draft agreement for providing CDM consulting services	10/01/2007	Email from Mitsubishi UFJ Securities dated 10/01/2007
7.	Appointment of CDM consultant (Mitsubishi UFJ Securities)	25/01/2007	Copy of consulting agreement
8.	Organization of Stake holder's consultation meeting	10/05/2007	Minutes of stakeholders meeting
9.	Appointment of DOE (TUV Sud)	24/07/2007	Work order
10.	Indian DNA meeting	22/10/2007	Letter from MNES dated 10/10/2007
11.	Clarification requested by Indian DNA for HCA	28/11/2007	Letter from MNES dated 28/11/2007
12.	GSP of the PDD	13/12/2007	http://cdm.unfccc.int/Projects/Validation/DB/OF0LFQC2Y9Z7WJ3Z8YJL8JI2VFHPHV/view.html
13.	Site visit by the DoE (TUV Sud) for the project validation	10/01/2008	Email from TUV Sud dated 11/12/2007
14.	Validation protocol from the DoE (TUV Sud)	12/02/2008	Validation Protocol issued by TUV Sud
15.	Submission of Consent Documents from Chhattisgarh Environment Conservation Board to the Indian DNA for obtaining Host Country Approval.	29/05/2008	Letter from Shree Nakoda Ispat Ltd. Dated 29/05/2008
16.	Additional documents submitted to the Indian DNA for Host Country Approval (including Biomass availability report and stakeholder meeting report)	08/07/2008	Letter from Shree Nakoda Ispat Ltd. Dated 08/07/2008
17.	Biomass availability report attested by CREDA submitted to DNA	18/07/2008	Letter from Shree Nakoda Ispat Ltd. Dated 18/07/2008
18.	Host Country Approval	25/07/2008	HCA approval letter from Indian DNA
19.	Re-GSP of the PDD	12/11/2008	https://cdm.unfccc.int/Projects/Validation/DB/00MQX9S5UCU9OOVYT8HPMUXYRSEO9K/view.html

There has been delay in the CDM process due to delay in getting Host Country Approval by the Indian DNA. After the meeting held on 22/10/2007, the Indian DNA desired to receive some additional documents related to environment clearance and biomass availability in the region.

Accordingly, the project developer approached the Chhattisgarh Environment Conservation Board for revalidating the Consent to operate issued by them earlier on 28/07/2006. However, this document was

finally received by the project developer on 21/05/2008. In the meantime, the project developer also obtained the Biomass availability report from the Chhattisgarh Rice Miller Association.
Subsequently, these documents were submitted to the Indian DNA in the month of July 2008, after which the Host Country Approval was issued by the Indian DNA on 25/07/2008.

However, when the Host Country Approval was obtained on 25/07/08, it was nearing the expiry date of the prevailing version of the applicable methodology - AMS I D version 12 (methodology was due to expire on 13th August, 2008) and the DOE (TUV Sud) was not in a position to examine all documents and submit the "Request for Registration" within the remaining period before expiry of the prevailing version of the applicable methodology.

Therefore, it became imperative to amend the PDD in accordance with the new version of methodology (version13) and take the project through the process of GSP again.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

>> The baseline is calculated as per paragraph 9 of AMS I.D. version 13. Under paragraph 9, there are two options for calculating the emission factor of baseline emissions from the power grid.

(a) A combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the "Tool to calculate the emission factor for an electricity system (Version 01.1)". Any of the four procedures to calculate the operating margin can be chosen, but the restrictions to use the Simple OM and the Average OM calculations must be considered

OR

(b) The weighted average emissions (in kg CO2equ/kWh) of the current generation mix. The data of the year in which project generation occurs must be used.

The Project will use option (a), and therefore the baseline emissions for grid power generation will be calculated as follows:

The baseline is the MWh produced by the renewable generating unit multiplied by an emission coefficient (measure in tCO_2equ/MWh) calculated in a transparent and conservative manner by the Central Electricity Authority as the average of the "approximate operating margin" and the "build margin", where:

(i) The "approximate operating margin" is the weighted average emissions (in kg CO_2equ/kWh) of all generating sources serving the system, excluding hydro, geothermal, wind, low-cost biomass, nuclear and solar generation;
(ii) The "build margin" is the weighted average emissions (in $kgCO_2equ/kWh$) of recent capacity additions to the system, which capacity additions are defined as the greater (in MWh) of the most recent 20% of plants or the 5 most recent plants.

As per the "Tool to calculate the emission factor for an electricity system(Version 01.1)", the Project participant shall apply the following six steps for calculation of combined margin emission factor for an electricity system;

Step 1. Identify the relevant electric power system
Step 2. Select an operating margin (OM) method
Step 3. Calculating the operating margin emission factor according to the selected method
Step 4. Identify the cohort of power units to be included in the build margin (BM)
Step 5. Calculate the build margin emission factor.
Step 6. Calculate the combined margin (CM) emission factor.

Step 1: Identify the relevant electric power system

WESTERN grid has been considered for baseline analysis and calculation of anthropogenic emissions by fossil fuels during power generation as the Chhattisgarh state is connected to the same grid. It has been observed that in WESTERN Region, generation mix of the coal, diesel and gas based power projects account for GHG emissions in absence of the project activity.

Step 2. Select an operating margin (OM) method

As per "Tool to calculate the emission factor for an electricity system(Version 01.1)" the OM emissions factor can be calculated in one of four ways:

a) Simple OM
b) Simple adjusted OM
c) Dispatch data analysis OM
d) Average OM

However, in India availability of accurate data on grid system dispatch order for each power plant in the system and the amount of power dispatched from all plants in the system during each hour is practically not possible. Also, still the merit order dispatch system has not become applicable and is not likely to be so during the crediting period. In view of this it is proposed to apply other choices as suggested in the "Tool to calculate the emission factor for an electricity system". Since the power supplied by low cost - must run power plants to the WESTERN grid during 2006-07 (13.9 %) is clearly below 50%, it was decided to apply the simple OM method.

Step 3. Calculating the operating margin emission factor according to the selected method.

Simple OM method
In the Simple OM method, the emission factor is calculated as generation weighted average emissions per electricity unit (tCO2/MWh) of all generating sources serving the system, not including low-operating cost and must-run power plants. The data vintage option selected is the *ex-ante* approach,

where a 3 year average OM is calculated. The most recent three year CEA data published on the emission factor of WESTERN region is considered. Option A has been used to calculate the Simple OM. The relevant formula as given:

$$EF_{grid,OMsimple,y} = \frac{\sum_{i,m} FC_{i,m,y} \cdot NCV_{i,y} \cdot EF_{CO2,i,y}}{\sum_{m} EG_{m,y}}$$

Where:

$EF_{grid,OM\ simple,\ y}$ = Simple operating margin CO2 emission factor in year (tCO2/MWh)

$FC_{i,m,y}$ = Amount of fossil fuel type I consumed by power plant/unit m year y(mass or unit volume unit)

$NCV_{i,y}$ = Net calorific value (energy content) of fossil fuel type i in year y(GJ/mass or volume unit)

$EF_{co2,i,y}$ = CO2 emission factor of fossil fuel type i in the year y (tCO/GJ)

$EG_{m,y}$ = Net electricity generated and delivered to the grid by power plant/unit m in the year y (MWh)

m = All power plants / units serving the grid in year y excepts low-cost/ must-run power plants/ units

i = All fossil fuel types combusted in power plant/ unit m in year y

y = Either the three most recent years for which data is available at the time of submission of the CDM-PDD to the DOE for validation (ex ante option) or the applicable year during monitoring (ex post option), following the guidance on data vintage in step 2

Operating Margin

Most recent three years	**2004/05**	**2005/06**	**2006/07**
Operating Margin (Excluding Imports)	1.0132	0.9936	0.9877
Average of 3 years(tCO2/MWh)	0.9982		

Step 4. Identify the cohort of power units to be included in the build margin (BM)

The build margin is the generation-weighted average emission factor of the most recent power plants, consisting of the larger of (i) the five power plants that have been built most recently; or (ii) the capacity additions that represent 20% of the system generation that have been built most recently. In India, the latter approach generally yields the larger sample and has been followed.

Step 5 – Calculation of the Build Margin

"Tool to calculate the emission factor for an electricity system(Version 01.1)" offers two options for determination of build margin emission factor: *ex ante* and *ex post* determination of the Build Margin (BM). Option 1 is selected wherein the build margin emission factor is calculated *ex- ante* based on most recent information available on plants already built for sample group *m* in WESTERN Region. This simplifies the monitoring procedures, but also offers a conservative approach of BM calculation. The sample group *m* shall be the one having higher power generation between:

(a) Five power plants that have been built most recently and
(b) The capacity additions in the electricity system that comprises 20% of the system generation built most recently.

It is found that in the WESTERN grid the option (b) has higher generation as compared to option (a). Hence option (b) has been selected. Using these steps, the build margin emission factor for WESTERN grid has been determined as 0.5938 tCO2/ MWh for the year 2006-07.

Step 6. Calculate the combined margin (CM) emission factor.

According to the "Tool to calculate the emission factor for an electricity system(Version 01.1)" combined margin emission factor in year *y has been* calculated as the average of the OM and BM emission factors as shown in detail in the section B.6.3. The resulting ex ante Combined Margin calculated is fixed for the entire crediting period.

Key baseline information is furnished in Annex 3. Also, a detailed emission factor calculation based on the data available from the Central Electricity Authority is presented in an Excel sheet to the DoE.

B.6.2. Data and parameters that are available at validation:

(Copy this table for each data and parameter)

Data / Parameter:	$EG_{m,y}$
Data unit:	GWh
Description:	Net electricity generated and delivered to the grid by power plants/units
Source of data used:	Official CO2 database published by the Central Electricity Authority, Ver 3
Value applied:	185,493 (Net electricity generated in WESTERN grid during 2006-07)
Justification of the choice of data or description of measurement methods and procedures actually applied :	Most authentic data, available from a Government source.
Any comment:	

Data / Parameter:	$EF_{co2,i,y}$
Data unit:	gCO2 /MJ
Description:	CO2 emission factor of fossil fuel type i in the year y
Source of data used:	IPCC default values at the lower limit of the uncertainty at a 95% confidence interval as provided in Table 1.4 of Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories

Value applied:	95.8 for Coal 106.2 for Lignite 54.3 for Gas 72.6 for Diesel Oil 75.5 for Residual Fuel Oil
Justification of the choice of data or description of measurement methods and procedures actually applied :	IPCC default values are used, which is one of the choices as suggested in the "Tool to calculate the emission factor for an electricity system".
Any comment:	

Data / Parameter:	EF_y
Data unit:	tCO_2e/MWh
Description:	Emission Factor for WESTERN Grid of which CSEB is a part
Source of data used:	Calculated based on the Official data Published by Central Electricity Authority
Value applied:	0.7959 tCO_2e/MWh
Justification of the choice of data or description of measurement methods and procedures actually applied :	Calculated according to procedure prescribed in the "Tool to calculate the emission factor for an electricity system (Version 01.1)"
Any comment:	

Data / Parameter:	$EF_{OM\,y}$
Data unit:	tCO_2e/MWh
Description:	Operating Margin for the WESTERN Grid
Source of data used:	Calculated based on the Official data Published by Central Electricity Authority
Value applied:	0.9982 tCO_2e/MWh
Justification of the choice of data or description of measurement methods and procedures actually applied :	Calculated according to procedure prescribed in the "Tool to calculate the emission factor for an electricity system (Version 01.1)"
Any comment:	

Data / Parameter:	$EF_{BM\,y}$
Data unit:	tCO_2e/MWh
Description:	Build Margin for the WESTERN Grid
Source of data used:	Calculated based on the Official data Published by Central Electricity Authority
Value applied:	0.5938tCO_2e/MWh

Justification of the choice of data or description of measurement methods and procedures actually applied :	Calculated according to procedure prescribed in the "Tool to calculate the emission factor for an electricity system (Version 01.1)"
Any comment:	

Data / Parameter:	Amount of Surplus biomass (rice husk) available in districts of Chhattisgarh within a radius of 50 Kms. from the project site
Data unit:	Tonnes /Year
Description:	Quantity of surplus biomass (rice husk) that is available in districts of Chhattisgarh within a radius of 50 KM from the project site and can be used for power generation
Source of data used:	Survey or published statistics
Value applied:	There are about 634 rice mills in Raipur and the adjoining districts (Dhamtari, Mahasamund, Durg and Rajnandgaon) generating about 1,376,280 Metric tons of rice husk / year with potential of producing 161 MW of power. Whereas, the currently installed capacity of rice husk based power plants in these districts is only 51 MW, consuming 436,708 Metric tons of rice husk/ year. Therefore, approximately 940,000 Metric tonnes/year of rice husk is available within 50 KM radius of the project site. Expected rice husk consumption at 12 MW power plant of SNIL is to the tune of 100,000 Metric tonnes/year.
Justification of the choice of data or description of measurement methods and procedures actually applied :	Survey was conducted by Chhattisgarh State Rice Milles Association and the report was certified by Chhattisgarh State Renewable Energy Development Agency (CREDA) which is a state government agency.
Any comment:	

B.6.3 Ex-ante calculation of emission reductions:

>>

The Emission Reduction from the proposed project activity have been estimated using the following formula

$ER_y = BE_y – PE_y - L_y$

Where

ER_y = Emission reduction in year y (tCO_2)

BE_y = Baseline emissions in year *y* (tCO2)

PE_y = Project emissions from the Project activity in year *y* (tCO2).

L_y = Leakages from the Project activity in year *y* (tCO2).

Baseline Emissions Factor (EF_y)

The grid emission factors calculated by the Central Energy Authority of India, and prepared as determined in "Tool to calculate the emission factor for an electricity system (Version 01.1)" , are used to calculate the baseline emissions from grid electricity generation.

Step 1: Calculating the Operating Margin Emission Factor

The ex ante OM emission factor has been calculated using a 3 year data vintage.

The $EF_{OM,y}$ is calculated to be:

For the year 2004-05 the $EF_{OM,y}$ is: 1.0132 tCO_2e/MWh
For the year 2005-06 the $EF_{OM,y}$ is: 0.9936 tCO_2e/MWh
For the year 2006-07 the $EF_{OM,y}$ is: 0.9877 tCO_2e/MWh

The final $EF_{OM,y}$ based on the average for 3 years is: 0.9982 tCO_2e/MWh. This resulting ex ante Operating Margin is fixed for the entire crediting period.

Step 2: Calculating the Build Margin Emission Factor

The BM emission factor has been calculated using a 1 year data vintage. This ex ante BM figure will not be changed during the Project's first Crediting Period.

The $EF_{BM,y}$ is calculated for 2007-08 as: 0.5938 tCO_2e/MWh

Step 3: Calculating the Combined Margin Baseline Emission Factor

The Combined Margin baseline emission factor EF_y is calculated as the weighted average of the OM ($EF_{OM,y}$) and the BM ($EF_{BM,y}$).

$EF_y = wOM \cdot EF_{OM,y} + wBM \cdot EF_{BM,y}$

Where the weights for *wOM* and *wBM* are 50% and 50% respectively, and $EF_{OM,y}$ and $EF_{BM,y}$ are calculated as described in Steps 1 and 2 above and are expressed in tCO2/MWh.

Therefore the EF_y is:

$EFY = (0.5 \text{ X } EF_{OM}) + (0.5 \text{ X } EF_{BM})$

$EF_y = (0.5 \text{ X } 0.9982 + 0.5 \text{ X } 0.5938)$

EF_y = <u>0.7959 tCO_2e/MWh</u>

The Baseline Emission factor EF_y is estimated at **0.7959 tCO2/MWh.** The resulting ex ante Combined Margin calculated is fixed for the entire crediting period.

Project emissions

Shree Nakoda Ispat Ltd. intends to use coal as supplementary fuel instead of / along-with biomass in-case of exigencies. Considering the regular stable availability of biomass in the vicinity of the project activity, instances of exigency is expected to be rare, therefore project emissions are considered to be zero.

$\mathbf{PE_y = 0}$

However, in case of usage of coal, CO2 emissions due to combustion of coal will be considered as project emission and subtracted from the baseline emission. The conservative estimations of the CO_2 emissions as a result of use of coal will be made in the following manner as per the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion" version 2 :

$PE_{coal} = FC_{Coal} * COEF_{Coal}$

Where,
PE_{coal} – Project emissions due to combustion of coal for the project activity (tCO_2)
FC_{Coal} - Is the quantity of coal combusted in process during the year (Tonnes)
$COEF_{Coal}$ - Is the CO_2 emission coefficient of Coal (tCO2/ Ton of Coal)

$COEF_{Coal} = W_{C, coal} * 44/12$

Where,
$W_{C, coal}$ = Is the weighted average mass fraction of carbon in Coal (tC/ton of Coal)

Leakages

In accordance with item 12 of Type I.D. of Appendix B of the SSC M&P, Leakage estimation is only required if the energy generating equipment is transferred from another activity or if existing equipment is transferred to another activity. However, as per paragraph 50, EB 44 Meeting report, "*The Board noted that the emission impact of continued use of displaced equipment outside the project boundary is subject to uncertainty and difficult to quantify. It therefore clarified that leakage from equipment transfer from within to outside the project boundary may be excluded from consideration in SSC methodologies*." Thus leakage consideration due to transfer of energy generating equipment has been excluded from further consideration.

Leakage due to usage of type of fuels

In accordance with Methodology AMS I.D. version 13, determination of leakages is considered following the general guidance on leakage in biomass project activities. The following table identifies different emission sources based on the type of biomass being considered:-

Biomass type	Activity / Source	Shift of pre-project activities	Emissions from biomass generation / cultivation	Competing use of biomass

Biomass from forests	Existing forests	_	_	X
	New Forests	X	X	
`Biomass from croplands or grasslands (woody or non woody)	In the absence of the project the land would be used as cropland / wetland	X	X	_
	In the absence of the project the land would be abandoned	_	X	_
Biomass residues or wastes	Biomass residues or wastes are collected and used	_	_	X

For the project activity, the following have been considered to calculate possible emissions due to leakage:

1. As the project activity will use only rice husk i.e. 'biomass residues or wastes' the implementation of this activity will not lead of any shift of pre-project activities.

2. The biomass that is being used in the plant is a waste that is generated from the rice crop. As, the state of Chhattisgarh is called the "Rice Bowl of India" due to a large paddy growth in the state, this waste will anyhow be generated even in the absence of the project activity. Hence there will be no emissions from the production of the renewable biomass due to application of fertilizer and from clearance of lands. The State of Chhattisgarh has around 1,177 rice mills milling around 8,701,200[5] metric tonnes of rice per year producing around 2,601,360 metric tonnes of rice husk per year.

3. Rice husk is generated in huge amounts in the state of Chhattisgarh and a large proportion is disposed through use as fertilizer, fodder, fuel for boilers and in brick manufacturing, tiles manufacturing etc.

4. A "Biomass Availability Report"[6] was prepared by third party to establish surplus availability of biomass in the Raipur and adjoining Districts within 50 Km radius distance from the project site. As per the report, there are about 634 rice mills in Raipur and the adjoining districts (Dhamtari, Mahasamund, Durg and Rajnandgaon) generating about 1,376,280 Metric tons of rice husk / year with potential of producing 161 MW of power. Whereas, according to the information from

[5] Food Department, Chattisgarh data on number of Rice Mills and their production capacities in each block of Chhattisgarh State,

[6] The "Biomass Availability Report" has been prepared for SNIL by Chhattisgarh State Rice Millers Association and will be made available to the DOE

Chattisgarh Renewable Energy Development Agency (CREDA), the currently installed capacity of rice husk based power plants in these districts is only 51 MW, consuming 436,708 Metric tons of rice husk/ year. Therefore, approximately 940,000 Metric tonnes/year of additional rice husk is available in these districts.

5. Expected rice husk consumption at 12 MW power plant in SNIL will be around 100,000 Metric tonnes/year. Therefore surplus biomass available in the region is much higher than the required 25%.

6. SNIL has already issued letters of intent to rice mills in the nearby areas to ensure regular and sufficient supply of rice husk for the power generation.

This clearly indicates that the quantity of rice husk available in the region is much more than quantity of rice husk required for the project activity and ensuring that a consistent supply of rice husk throughout the year.

Leakage from transportation of biomass is estimated, which is around 0.07% of the baseline emission of 57,866 tCO2/annum. Calculation of the project emissions from transportation of the biomass (Rice Husk) will be provided to the DoE. The emissions arising during the transportation of the rice husk would not be very significant as rice husk is abundantly available in the nearby region (within 50 KM radius).

From the foregoing analysis of facts, it can be concluded that the project activity does not have any source of leakage due to type of biomass utilized. Also as per attachment C to appendix B of Indicative simplified baseline and monitoring methodology for selected small-scale CDM project activity categories, as these emissions are less than 10 % of emission reduction, can therefore be neglected in the context of SSC project activities.

Leakages (L_y) = 0

As a part of monitoring schedule, the rice husk assessment in the region districts mentioned above will be carried out annually based on the latest available literature/data from the government sources to determine if the available rice husk is at least 25 % more than the total quantity required by the project activity as well as other existing users.

In case, 25 % excess of biomass availability in the region is not proven, leakages would be considered during the particular crediting period as per methodology AMS I D version 13.

Net Electricity generated by the project

The Net Electricity generated (EG_y) and exported to the sponge iron plant or to the state electricity board grid is calculated as below:

$$EG_y = EG_{Gross\ y} - EG_{Aux\ y}$$

Where
$EG_{Gross\ y}$ = Gross Electricity generated by the project in year *y* (MWh)
$EG_{Aux\ y}$ = Auxiliary Electricity consumption by the project in year *y* (MWh)

The Project will provide a gross power output ($EG_{Gross.y}$) of 80,784 MWh/year, estimated as follows (based on a load factor of 85% to allow for planned and unplanned stoppages):

Power Produced (MWh/year)	=	Max. capacity (MW)	*	Hours per day	*	Days per year	*	Load factor
Power produced	=	12	*	24	*	330	*	85%

$EG_{Gross.y}$ = 80,784 MWh / year

Approximately 10% of the power will be consumed as Auxiliary consumption by the power plant itself i.e.

$EG_{Aux.y}$ = 80,784 * 0.1 MWh / year

= 8, 078.4 MWh / year

Therefore

EG_y = 80,784 – 8,078.4

= 72,705.6 MWh / year

Note that this baseline will be calculated on the basis of metered production of power, once the project is in operation. These calculations are for the purpose of the PDD.

Baseline Emissions

The baseline emissions is calculated as the kWh produced by the renewable generating unit multiplied by an emission factor (measured in kgCO2/kWh) calculated in a transparent and conservative manner.

BEy = EGy * EF y

Where
BEy = Baseline emissions in year *y* (tCO2).
EGy = Net Electricity exported by the project in year *y* (MWh) i.e 72,705.6 MWh / year
EFy = Combined margin emissions factor (Baseline emission factor) for the year *y* i.e. 0.7959 tCO2/MWh

Therefore

$\mathbf{BE_y}$ = 72,705.6 x 0.7959 tCO2 / MWh

Baseline Emissions (BEy) = 57,866 tCO2 / year

Net Emission Reduction

The net emission reduction due to project activity is calculated as

$ER_y = BE_y – PE_y - L_y$

$ER_y = 57,866 – 0 – 0$

The Net emission Reduction (ER_y) = **57,866 tCO2 / year**

B.6.4 Summary of the ex-ante estimation of emission reductions:

>> Calculation of Emission reductions during the crediting period

Year	Estimation of Project activity Emissions (tCO2e)	Estimation of Baseline Emissions (tCO2e)	Estimation of Leakage (tCO2e)	Estimation of overall emission reduction (tCO2e)
Year 1	0	54,462	0	54,462
Year 2	0	57,866	0	57,866
Year 3	0	57,866	0	57,866
Year 4	0	57,866	0	57,866
Year 5	0	57,866	0	57,866
Year 6	0	57,866	0	57,866
Year 7	0	57,866	0	57,866
Year 8	0	57,866	0	57,866
Year 9	0	57,866	0	57,866
Year 10	0	57,866	0	57,866

B.7 Application of a monitoring methodology and description of the monitoring plan:

B.7.1 Data and parameters monitored:

(Copy this table for each data and parameter)

Data / Parameter:	**$EG_{Gross\ y}$**
Data unit:	MWh /Year
Description:	Gross electricity generated at the power plant
Source of data to be used:	Measured by the project developer
Value of data applied for the purpose of calculating expected emission reductions in section B.5	80,784 (ex ante estimate)
Description of	Gross electricity generated at power plant will be metered

measurement methods and procedures to be applied:	
QA/QC procedures to be applied:	Energy meters of 0.2 class accuracy will be put in place to measure the gross electricity generated by the Project. The meters will be calibrated according to manufacturer's instructions, but at least once in every 3 years.
Any comment:	

Data / Parameter:	**$EG_{Aux\ y}$**
Data unit:	MWh /Year
Description:	Auxiliary consumption of electricity for operation of power plant
Source of data to be used:	Measured by the project developer
Value of data applied for the purpose of calculating expected emission reductions in section B.5	8,078.4 (ex ante estimate)
Description of measurement methods and procedures to be applied:	Electricity consumed for operation of power plant will be metered
QA/QC procedures to be applied:	Energy meters of 0.2 class accuracy will be put in place to measure the auxiliary consumption of electricity for operation of power plant. The meters will be calibrated according to manufacturer's instructions, but at least once in every 3 years.
Any comment:	For ex ante estimation, 10 % of the power produced is assumed to be consumed for operation of power plant

Data / Parameter:	**EG_y**
Data unit:	MWh /year
Description:	Net electricity generated and exported to the sponge iron plant of Shree Nakoda Ispat Ltd or the Grid
Source of data to be used:	Measured by the project developer
Value of data applied for the purpose of calculating expected emission reductions in section B.5	72,705.6 (ex ante estimate)
Description of measurement methods and procedures to be applied:	Net electricity supplied to the sponge iron plant and the grid will be calculated as a difference of Gross electricity generation and auxiliary electricity consumption $\mathbf{EG_y = EG_{Gross\ y} - EG_{Aux\ y}}$
QA/QC procedures to be applied:	The record will be kept electronically in the systems and will be crosschecked with the generation log books on monthly basis.

Any comment:	

Data / Parameter:	$Q_{Biomass.y}$		
Data unit:	Tonnes /year		
Description:	Quantity of biomass (Rice husk) fired for power generated		
Source of data to be used:	Measured by the project developer		
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Appx. 96,940 Tonnes / year Based on Specific Fuel Consumption: 1.2 MT / MWh, as calculated below:		
	Parameter	**Value**	**Source**
	Steam at Turbine inlet	51.4 TPH @ 805 Kcal/kg	Equipment supplier
	Hot well outlet	45.8 TPH @ 57°C	Equipment supplier
	Power generation	12 MW	Equipment supplier
	Heat Rate for turbine	(51.5 x 805) /(45.8 x 57) x 12 = 3273 Kcal /kg	Calculated
	Steam Loss GVC & Ejector @ 3 % vent loss at boiler	1.5 TPH 1.6 TPH	Assumed Assumed
	Total steam required	= 51.5 + 3.1 = 54.6 TPH	Calculated
	Feed water temperature	128 °C	Equipment supplier
	Boiler efficiency	86 %	Equipment supplier
	Calorific value of biomass	3100 kcal/kg	Actual analysis report
	Fuel required	54.6 x (805-128) / .86 x 3100 ≈ 14 TPH	
	Specific biomass consumption	= 14 /12 ≈ 1.16 MT/MWh Assuming 3% ground & wind losses, ≈ 1.2 MT/MWh	Calculated
Description of measurement methods	Purchase and consumption records maintained by Shree Nakoda Ispat Ltd.		

and procedures to be applied:	
QA/QC procedures to be applied:	– Actual amount of biomass (Rice husk) consumed will be quantified based on the weigh bridge records of biomass received in the plant and will be cross checked against the financial records of the project developer. – Actual specific consumption of fuel will be calculated based on actual fuel consumed and gross electricity generated. – The calorific value of the biomass will be analysed periodically in-house or through outside recognised laboratory – The weigh bridge will be calibrated according to manufacturer's instructions ,but at least once in every 3 years to ensure the accuracy of measurement
Any comment:	

Data / Parameter:	FC_{Coal}
Data unit:	Tonnes /year
Description:	Quantity of fossil fuel (coal) fired in the power plant during non-availability of biomass
Source of data to be used:	Measured by the project developer
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0 (ex ante estimate)
Description of measurement methods and procedures to be applied:	Plant records maintained by Shree Nakoda Ispat Ltd.
QA/QC procedures to be applied:	– Actual amount of fossil fuel (coal) consumed will be quantified based on the weigh bridge records of biomass received in the plant and will be cross checked against the financial records of the project developer. – The weigh bridge will be calibrated according to manufacturer's instructions ,but at least once in every 3 years to ensure the accuracy of measurement
Any comment:	The "Biomass Availability Report" suggests surplus availability of rice husk in the region and therefore the unit will not required to use coal in the project activity. Therefore $\mathbf{FC_{coal}}$ is taken as '0' as ex-ante.

Data / Parameter:	$W_{C, coal}$
Data unit:	tC/ton of Coal
Description:	weighted average mass fraction of carbon in Coal
Source of data to be used:	As given by coal suppliers
Value of data applied for the purpose of calculating expected	-

emission reductions in section B.5:	
Description of measurement methods and procedures to be applied:	Plant records maintained by Shree Nakoda Ispat Ltd.
QA/QC procedures to be applied:	The value will be provided by the coal supplier along with each consignment. Also these values will be randomly checked by the project developer from outside laboratory through coal analysis.
Any comment:	No value has been considered as the project developer is not intend to use coal in the project activity

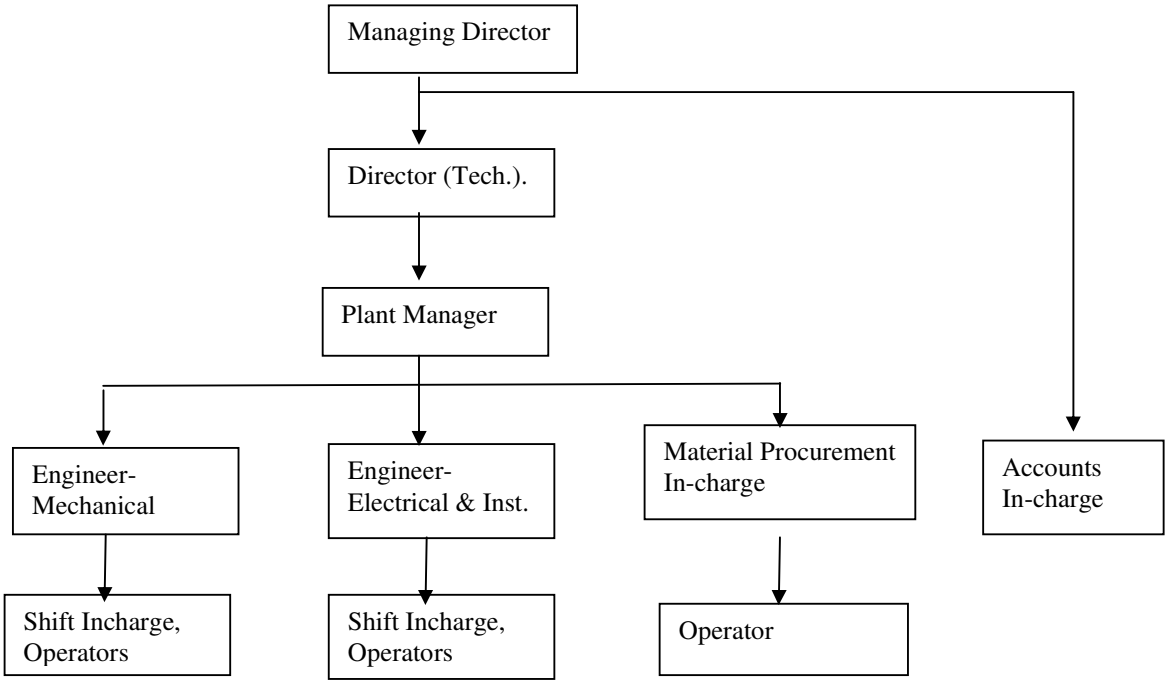
B.7.2 Description of the monitoring plan:

>>

Shree Nakoda Ispat Ltd have formed a CDM team comprising of personnel from the Mechanical, Electrical, Instrumentation and accounts departments, headed by the Managing Director of the company. The personnel in the team perform the dual functions of power plant O&M and compliance with CDM procedures. The structure of CDM team is given in the figure below:

Functions of the CDM Team:

- Monitor and record all parameters in respective log books used for calculating GHG emission reductions due the project activity.
- Prepare periodic summary sheets and maintain records of relevant data for verification of CERs and for additional two years
- Ensure accuracy of data by proper maintenance and calibration of monitoring equipment.
- Operate the power plant in compliance with the CDM Project Design Document
- Preventive and break-down maintenance of the plant
- Taking adequate measures during emergency situation as per emergency & preparedness plan



The detailed Monitoring Plan is given at Annex-4.

B.8 Date of completion of the application of the baseline and monitoring methodology and the name of the responsible person(s)/entity(ies)

>> The baseline methodology to be used in this project is described in section B.1.

The final draft of this baseline section was completed on 26/11/2008

Name of person/entity determining the baseline:

Clean Energy Finance Committee
Mitsubishi UFJ Securities Co., Ltd.
Mitsubishi Building,
2-5-2 Marunouchi, Chiyoda-ku
Tokyo, 100-0005, Japan.

watanabe-hajime@sc.mufg.jp

The Clean Energy Finance Committee, Mitsubishi UFJ Securities Co. Ltd. is the CDM Adviser to the Project and will be the contact for the CDM activity described in this PDD.

SECTION C. Duration of the project activity / crediting period

C.1 Duration of the project activity:

C.1.1. Starting date of the project activity:

>> 01/11/2006

C.1.2. Expected operational lifetime of the project activity:

>>20 years

C.2 Choice of the crediting period and related information:

C.2.1. Renewable crediting period

C.2.1.1. Starting date of the first crediting period:

>> NA

C.2.1.2. Length of the first crediting period:

>> NA

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

>> 01/01/2010(DD/MM/YYYY) or the date of registration with the CDM EB whichever is later.

C.2.2.2. Length:

>> 10 Years

SECTION D. Environmental impacts

>>

D.1. If required by the host Party, documentation on the analysis of the environmental impacts of the project activity:

The Project does not fall under the purview of the Environmental Impact Assessment (EIA) notification of the Ministry of Environment & Forest (MOEF), Government of India. As per MOEF notification dated 13 June 2002[7], the EIA is required for those industries/projects which are listed in pre-defined list of MOEF. The thermal power plants with investment of less than INR 100 Crore have been excluded from the list. Hence the EIA is not required for the project activity.

However, Shree Nakoda Ispat Limited has conducted an EIA study for the project activity to evaluate its impact on various environmental parameters. The study clearly indicates that that the project does not have any adverse environmental impacts. The impacts due to the proposed project activity are positive after implementation of the Environmental Management Plan. (EMP), as mentioned below.

Air Environment

The changes in baseline ambient air quality status with respect to SPM, SO_2 and NO_X are expected to be negligible as a result of the proposed activity. The levels of air pollutants will not exceed the stipulated standards of Central Pollution Control Board (CPCB) in the region. The strengthening of existing green belt shall further reduce impact due to proposed activity.

Noise Environment

The current baseline noise levels within impact zone varied from 44-53 dB (A) during daytime and 34-44 dB (A) in the nighttime. The noise levels are found to be within the prescribed standards in the impact zone. The impact of noise generated from process units at proposed plant on the neighboring population is expected to be insignificant. The workers will be exposed to noise levels more than the stipulated limits. The noise mitigation measures as delineated in management plan will be strictly implemented.

Water Environment

The physio-chemical parameters of raw water are found to be well within the prescribed limits. The water quality in the impact zone was assessed for the month of April 2005. It was observed that all the parameters of water samples from the river and ground water samples are below stipulated standard for drinking water. Groundwater quality around project site shows dissolved solids less than the stipulated standards. The waste water will be used for dust suppression and treated sanitary waste for plantation.

[7] http://envfor.nic.in/legis/eia/so-60(e).html

Dry Fly ash
The ash generated by the combustion of Rice husk for power generation will be collected and used for producing bricks within the plant for preventing its escape into the atmosphere.

Land Environment
There will not be any change in the existing landscape, as the proposed project site has been identified in the developed industrial belt of Siltara Raipur.

Socio-Economic Environment
There will not be any adverse impact on the socio-economic environment of the proposed project activity. Due care will be taken from the planning stage of proposed project for the mitigation of any occupational health impacts along with necessary social welfare activities. The project will create additional employment opportunities for the local population and will favourably affect economic activities in the region. No adverse impact on air, water, noise and land environment is foreseen due to the proposed activities. However there will be a positive impact on socio-economic environment in the region.

D.2. If environmental impacts are considered significant by the project participants or the host Party, please provide conclusions and all references to support documentation of an environmental impact assessment undertaken in accordance with the procedures as required by the host Party:

The environmental impacts are not considered to be significant.

SECTION E. Stakeholders' comments

E.1. Brief description how comments by local stakeholders have been invited and compiled:

>>
A local stakeholders meeting was conducted by Shree Nakoda Ispat Limited on 10th May, 2007. The meeting took place at the Plot No. 109, Phase-II, Industrial Growth Centre, Siltara, Raipur (C.G.), the site where the project will be carried out. Advertisements were placed in the local newspapers. Invitation letters were sent to key stakeholders such as industrialist of local area, NGOs, professionals, local residents, community sarpanch, transporters, rice husk suppliers, officials of Chhattisgarh Renewable Energy Development Agency, Chhattisgarh State Electricity Board, and officials from Chamber of Commerce etc. In addition, pamphlets were distributed and notice was placed at the official notice board of the company.



Mr Virendra Goel, Managing Director- Shree Nakoda Ispat Limited making brief introduction of the project



A section of the stake holder's meeting in progress

The meeting was attended by people, as listed below:

Category / Occupation	Number of attendees
Chhattisgarh Renewable Energy Development Agency	1
Equipment supplier	1

Local residents	6
NGO	1
Neighbouring factory owners	4
Rice husk suppliers	2
Transporters	2
Shree Nakoda Ispat Ltd. Employees	8
Professionals / consultants	5
Chamber of Commerce	1
Total	**31**

The meeting was addressed by Mr. Virendra Goel, Managing Director of Shree Nakoda Ispat Limited and Mr. Amitabh Shome, Director (Technical) of operations of Shree Nakoda's operations in Siltara (Raipur). Mr. Goel explained that the purpose of the meeting was to test the views of local stakeholders on Shree Nakoda's proposed biomass power generation facility, and to underline that the project would help to increase power production using renewable resources, which could help to prevent global warming. Mr. Shome then explained the technical details of the Project. A Q&A session was then held, following which attendees were asked to fill in a questionnaire related to the likely impact of the Project.

E.2. Summary of the comments received:

>>

Person	Comment/question	Response/action to take
Mr Vijit Agarwal	D.M. plant may discharge some acid	SNIL clarified that D.M. plant does not discharge any acids. However at the time of regeneration of the resins of the D.M. Plant, the discharged water may have slightly lower pH value for which SNIL have already planned a neutralization pit after which it will be used for the in- house plantation.
	Disposal of ash	SNIL have already planned to have in-house manufacturing of bricks from the fly ash from the plant.
Mr. C.M. Walekar	Pollutants released from the plant should be quickly disposed off	Electrostatic precipitator (ESP) will be installed to control the air pollution. Also in-house manufacturing of bricks from the fly ash from the plant is planned.

E.3. Report on how due account was taken of any comments received:

>>

The comments received from the attendees were all in favour of the proposed project, and no negative comments have been received. Further, the outcome of the questionnaire was overwhelmingly positive towards the project.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Shree Nakoda Ispat Ltd
Street/P.O.Box:	Near Railway crossing, Mowa, PO Shankar Nagar,
Building:	
City:	Raipur
State/Region:	Chhattisgarh
Postfix/ZIP:	492-007
Country:	India
Telephone:	+91-771-2282230
FAX:	+91-771-2282130
E-Mail:	virendra@nakodagroup.com
URL:	http://www.nakodagroup.com
Represented by:	
Title:	Director
Salutation:	Mr
Last Name:	Goel
Middle Name:	-
First Name:	Virendra
Department:	
Mobile:	+91-9893115000
Direct FAX:	+91-771-2282130
Direct tel:	+91-771-2282230
Personal E-Mail:	virendra@nakodagroup.com

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

NOT APPLICABLE – PROJECT ACIVITY'S HAS NOT RECEIVED ANY FUNDING FROM ANNEX. I COUNTRIES.

Annex 3
BASELINE INFORMATION

Summary of ex ante Baseline Emission Factor calculation for the WESTERN grid

Simple Operating Margin (tCO2/MWh) (excl. Imports)

	2004-05	2005-06	2006-07
Western	1.0132	0.9936	0.9877
Weighted avg. Operating Margin			0.9982

Build Margin (tCO2/MWh) (excl. Imports)

	2006-07
Western	0.5938

Combined Margin (tCO2/MWh) (excl. Imports)

	2006-07
Western	**0.79599**

GENERATION DATA

Net Generation Total (GWh)

	2004-05	2005-06	2006-07
Western	170,726	176,003	185,493

GRID IMPORT DATA

Net Imports (GWh)

	2004-05	2005-06	2006-07
Western	285	11,982	10,473

Share of Net Imports (% of Net Generation)

	2004-05	2005-06	2006-07
Western	0.17%	6.81%	5.65%

EMISSION DATA

Absolute Emissions Total (tCO2)

	2004-05	2005-06	2006-07
Western	157,781,065	153,933,199	157,722,686

Share of Must-Run (Hydro/Nuclear) (% of Net Generation)

	2004-05	2005-06	2006-07
Western	8.78%	11.98%	13.92%

Net Generation in Operating Margin (GWh)

	2004-05	2005-06	2006-07
Western	155,731	154,918	159,681

20% of Net Generation (GWh)

	2006-07
Western	37,099

Net Generation in Build Margin (GWh)

	2006-07
Western	38,242

Absolute Emissions OM (tCO2)

	2004-05	2005-06	2006-07
Western	157,781,065	153,933,199	157,722,686

Absolute Emissions BM (tCO2)

	2006-07
Western	22,707,948

Annex 4

MONITORING INFORMATION

The monitoring plan devised by Shree Nakoda Ispat Ltd to maintain the CDM procedure is as given below:

1. Parameters to be monitored:

Major data to be monitored as per CDM requirements are

- Quantity of biomass and fossil fuel consumption of the project activity
- Calorific values of biomass
- Carbon content in fossil fuel
- Gross Electricity Generation
- Auxiliary Electricity Consumption
- Electricity Exported to the Steel Plant
- Electricity Exported to the grid
- Excess of biomass available in a radius of 50km around the plant

a) Quantity of biomass and fossil fuel consumption of the project activity

The quantity biomass received daily at the plant site would be weighed at the weigh bridge before it is stored in biomass –yard. The monthly fuel consumption report will be prepared by plant manager based on the opening and closing stock of biomass fuel, which will be counter checked by the Head of CDM Team. The quantity of biomass used will be cross-checked with quantity of biomass received at the plant (weigh bridge data) and the invoices raised/ payments made to biomass suppliers by the accounts department. The records shall be maintained for two years in addition to the crediting period. The quantity of coal, if used in case of exigencies, will also be recorded in a similar way.

b) Power Generation & Export Recording Procedure

High precision individual energy meters of 0.2 class accuracy will be installed for recording Gross Power generation and Auxiliary Power consumption by the biomass based power plant. The net power exported to the Steel plant or Gird will be calculated and recorded as difference between Gross Power generation and Auxiliary Power consumption.

The Gross Power generation and the Auxiliary Power consumption will be monitored continuously on hourly basis from the installed energy meters and readings shall be recorded in the respective log sheets by the shift in-charge. The Engineer shall record the shift-wise parameters and will calculate net power exported to the Steel plant or Gird on daily basis and will submit the daily generation report to the Plant Manager.

The electricity exported to grid will be monitored through the joint meter reading of Grid meter. The grid meter reading will be noted once in a month in the presence of plant manager and the Grid Electricity officials. This statement shall be jointly certified by the representatives of the Company and Grid Electricity officials. The reading will be cross-checked with the daily records of internal meters.

A consolidated statement of Power Generation, Auxiliary Consumption and net Export will be prepared on monthly basis and this shall be verified & approved by the Director CDM.

c) Calorific value and carbon content of biomass and fossil fuel

The calorific values for the biomass will be analyzed once in three months through the duly recognized external laboratory.

The calorific value and carbon content for fossil fuel (coal) shall be supplied by the supplier of coal with each coal assignment. The values provided by the coal suppliers will be randomly cross-checked through external laboratory. The monthly averages will be calculated and used for estimating project emissions.

d) Excess of biomass available in a radius of 50-km around the plant

In order to assess that no leakage due to competitive uses of biomass, the biomass availability around the plant (radius of 50km) will be estimated on a yearly basis. The estimation will be performed using published literature, official reports, third party surveys etc.

2. Calibration of measuring equipments

Major monitoring equipments used are Energy Meters and Weigh Bridges. All the metering devices will be calibrated at regular intervals by the third party as per the standards procedures (a provided by the suppliers) so that the accuracy of measurement is ensured all the time.

Calibration of energy meters will be carried out once in a year and whenever any fault occurs to the metering systems. The duly calibrated backup/stand by meters for measuring electricity generation and auxiliary consumption will be provided for the situation in case any of the installed meters fails.

The Grid Meter will be calibrated by Grid Officials according to the standard procedures.

The weigh bridge will be calibrated once in year to ensure accuracy in quantity of fuel received in the plant.

3. Emergency Preparedness:

Any uncertainty like breakdown in plant, inconsistency/discrepancy of data parameters, malfunctioning of energy meters /monitoring equipments etc. will be dealt with various corrective actions. These will be reported along with its time of occurrence, possible reasons and its duration and accordingly, the corrective actions will be undertaken.

All the critical & essential spares & consumables will be kept at project site to reduce the breakdown time. Duly calibrated spare energy meters will be maintained at the site for immediate replacement of faulty meters. The spare meters will also be calibrated on annual basis.

The back-up of recorded monitoring data will be taken at the end of each month, which can be presented in case of loss of original data.

4. Training on monitoring of the project activity.

Regular training will be provided to the CDM team regarding the system and requirement of monitoring as per CDM procedure. The Head of CDM team having experience of implementing and monitoring of CDM project will be responsible for providing the requisite training. The training procedure will include proper recording & maintenance of the data, reporting of data and corrective actions to be taken during the emergency situation. In addition, the O & M staff at the plant would be imparted training based on individual maintenance function such as mechanical, electrical, instrumentation etc. as per the instruction provided by the manufacturer including preventive maintenance, breakdown maintenance, emergency procedures etc. If need arises, the equipment supplier would be asked to provide the desired training either at plant site or at their end.

5. Internal audit and its scope

The Managing Director along with the Accounts in-charge will be responsible for performing internal audit of CDM Project activities to assess effectiveness of the system, deviations from the planned activities and taking necessary measures. The periodicity of the audit shall be once in a year. The scope of internal audit includes,

- Checking of Gross Power generation, Auxiliary Consumption and net Export recording details
- Checking of daily and monthly fuel consumption recording details
- Checking of fuel analysis reports
- Review of biomass fuel supplier assessment records and biomass availability status
- Review of calibration reports of critical equipment
- Review of financial & accounts department status & performance
- Review of O&M activities and team performance
- Suggesting discrepancies in the records, if any
- Suggesting improvement measures to be taken

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