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

CONTENTS

Annexes

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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Title of the Project Activity: 7.5 MW Rice-husk based Power generation of M/s Neeraj Power Pvt. Ltd.
Version: 1
Document completion date: 23rd August 2007

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

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The purpose of the project activity is to generate renewable energy for the grid utilising rice husk as the primary fuel. The 7.5 MW rice husk based power generation plant is located at the Neeraj Power Pvt Ltd site at Harinbhatta village, Simga Taluk, Raipur District, Chhattisgarh, India. The plant was commissioned in mid 2006 and utilises rice husk as the primary fuel, and coal as the secondary fuel for supply of electricity to the grid. This small scale activity was conceived bearing in mind the financial additionality of the income from Certified Emission Reductions, without which the project is non-viable. The non-viability of this rice-husk based renewable energy power plant is due to the low tariff paid by the Chhattisgarh Electricity Board, the high cost of finance, and the high cost of rice husk. In India the supply of electricity to the Electricity Board and the tariffs which govern such a supply are regulated under the National Electricity Act 2003. As Power generation is a concurrent subject, the States, in this case the State of Chhattisgarh, have discretion over the rules and regulation of generation, transmission, distribution as well as purchase and sale conditions. Currently most of the power generated in India is generated with coal, with some hydro also in the generation mix. The proposed Clean Development Mechanism project activity utilises rice husk in a high pressure boiler and will thus provide renewable energy in place of what would otherwise be a mix of sources consisting predominantly of coal. The project activity will thus reduce carbon dioxide emissions compared to the Western Regional grid, of which the State of Chhattisgarh State Electricity Board is a part.

The project involves the installation of a high pressure 38 tonnes per hour 66 kilograms / cm^2 505^o C Cethar Vessels AFBC Boiler and an 8 MW condensing Triveni turbine generator and is expected to provide 7.5 MW of electrical power to the Chhattisgarh State Electricity Board at 33 KV through the local substation. The electricity will be supplied to the grid via the Duldula substation at Simga, 3 kilometres from the plant. The technologies are readily available in India and similar systems have been supplied to other Independent Power Producers using agro-residues. Other on-site generation units consist of a 320 KVA Jackson India Diesel generation set. This unit will be used for backup power in emergencies and for maintenance work when the power plant is not operating and the grid is down. It will not supply electricity to the grid and will therefore be outside the project boundary. The project will also involve investment in environmental technologies to mitigate the risks of ash, boiler flue gases and fugitive dust generated during the operation of the plant. The plant location was selected based on surplus availability of biomass in the form of rice husk, an agro-industrial residue. The annual biomass requirement for the 7.5 MW plant running on 100% rice husk is estimated as 75,000 tonnes. Normally approximately 10'000 tonnes of coal will be co-fired in the boiler, an ex-ante assumption of 14.9% of total fuel. A detailed survey for fuel availability was carried out. Thanks to the close association of the project owners with rice mills in the region, including ownership of their own rice mills, and plenty of paddy for milling thanks to Government contracts, it is found that surplus biomass in the form of rice husk is available in this District for the plant. The maximum quantity of coal that can be co-fired is

restricted by the Ministry of New and Renewable Energy of India to 25% of the annual total fuel requirement. The project proponents consider a usage of coal to an extent of about 10%- 20% of total fuel as supplementary fuel during the operational life time of plant.

Apart from the export of power to the Chhattisgarh Electricity Board, the other objectives of the project activity are:
a) Sustainable Development, through utilisation of biomass and crop residues
b) Climate change mitigation, through renewable energy generation and reducing the demand for fossil fuel based power
c) Contributing to the national electricity capacity through additional power generation

The following local benefits are expected due to the project
i) Proper utilisation of locally available biomass resources;
ii) Generation of additional income for rural farmers due to creation of commercial value for the neglected biomass;
iii) Generation of eco-friendly green power and contribution to the availability of quality power in rural areas (due to the project located in rural area);
iv) Creation of indirect employment for rural unemployed youth due to the need to collect biomass throughout the year;
v) Creation of direct employment for both skilled and unskilled person during the operation of the plant;
vi) Contribution to the sustainable development through generation of renewable energy for a grid system that is predominantly conventional fossil fuel based. By utilising renewable energy sources the project reduces demand / use of fossil fuels for power generation.

In the view of the project participants, the project contributes to sustainable development by in the following areas:

1. Social well being
The 7.5 MW biomass based power project creates around 50 permanent jobs. In addition around 50 persons gain indirect jobs through the supply of biomass to the plant. Apart from the direct and indirect employment generation, the project also encourages indirect employment by setting up other agro-industries due to availability of power supply from the project. The commercial value of rice husk encourages local farmers to collect it systematically. The ash from the power plant is returned to the field as fertiliser.

2. Economic well being
The project will bring in additional capital investment and indirectly support the creation of local infrastructure like roads, schools and other basic civic amenities. The capital investment in the local area is around Rs.284 millions. The biomass based power generating plant facilitates the availability of continuous and sustained power to the local industries and agricultural farmers located in remote areas, there by avoiding the load shedding and low frequency of power.

3. Environmental well being
The project activity utilises biomass potential available for power generation, which otherwise is dominated by fossil fuels such as coal, lignite and gas. The project will over all not result in increase of GHG emissions, and will not cause any negative impact on the environment. The project generates real,

measurable and long-term emissions reductions. The project utilizes surplus biomass residues and thereby reduces dependence on fossil fuels.

4. Technological well being
The CDM project activity leads to increase in utilization of biomass resources for power generation and contributes to the energy security in the country. The various other benefits due to the project activity ensure that the project is contributing to the sustainable development of the region by bringing in new technologies and processes to a backward region. The technology is indigenous and by implementing such projects the country is adding to its technical and scientific knowledge of boiler design for agro-residues; as well as to local distributed power generation and management skills.

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	Neeraj Power Pvt. Ltd.	No

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

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

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Harinbhatta Village, Simga Taluk, Raipur District, Chhattisgarh, India.

A.4.1.1. Host Party(ies):

>>
India

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

>>
The State of Chhattisgarh

A.4.1.3. City/Town/Community etc:

>>
Harinbhatta Village, Simga Taluk, Raipur District

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

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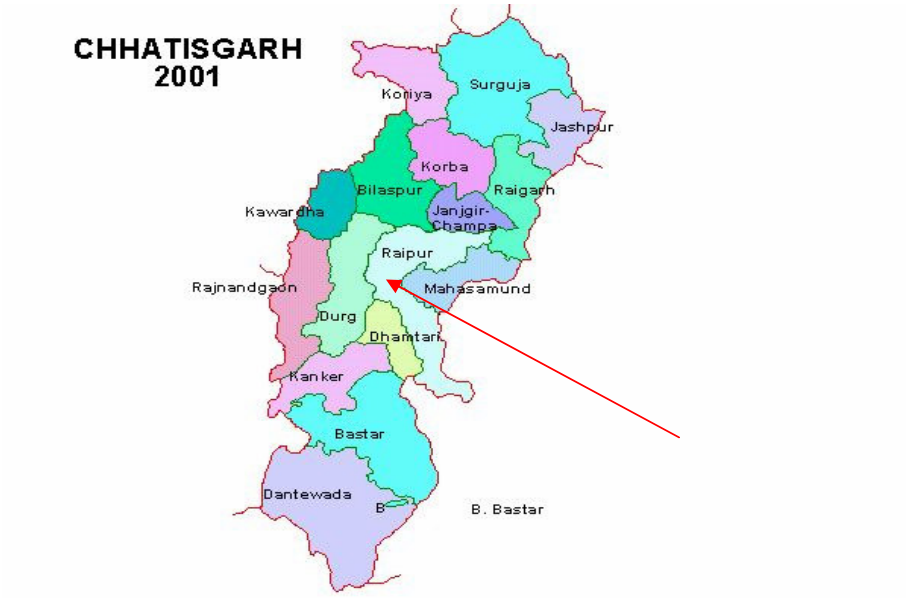
The project is located at Harinbhatta Village, Simga Taluk, Raipur District of Chhattisgarh. The plant is well accessible by road. The exact location is : Latitude: 21:38:00N (21.6334) Longitude 81:42:54E (81.7151).

Map of India showing Chhattisgarh



Map of Chhattisgarh showing the District of Raipur

Map of Raipur District showing Simga

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

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The type and category is the indicative simplified methodology for small scale CDM project activities Type I.D./Version 12 Sectoral Scope 01, EB 33. Renewable Energy Projects – I.D. Grid Connected renewable electricity generation.

The technical details of the project activity are summarised here. The project is a grid connected renewable energy generation station using rice husk. There is one condensing turbo-generator unit with a matching boiler of Fluidised Bed Combustion (FBC) design. FBC boiler is selected primarily due to its efficiency and its capability to burn rice husk and coal. The plant is configured with a Maximum Continuous Rating as 35 tonnes per hour at a steam pressure of 66 ksca, steam pressure of 495^{o}C to cater to the steam requirements of the turbogenerator set of installed rating of 7.5 MW.

No technology transfer is envisaged for the proposed CDM project activity.

The auxiliary facilities of the power plant include cooling tower, water demineralisation plant, cooling water system, fuel storage and handling system, electrical evacuation system, ash handling system, fire fighting system, compressed air system, instrumentation and control system, all designed according to the stipulations of the statutory authorities such as the Central Pollution Control Boards and Electrical Inspectorate. The capacity of the turbo generator is 7.5 MW, which exports an average of 55482 MWh per annum to the grid, at 11 kV level.

The plant has pollution control measures such as provision of Electrostatic Precipitator, chimney with adequate height, dust suppression system, ash disposal system, plant effluent quality control, noise control, and water recycling. The pant water requirement will be met from bore-wells. This water will be sufficient to meet the cooling water needs of the plant, including the water requirements for the conventional water cooled condenser system.

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

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Year	CER
2008	30801
2009	30801
2010	30801
2011	30801
2012	30801
2013	30801
2014	30801
Total estimated reductions (tonnes of CO_{2e})	215607
Total number of crediting years	7
Annual average over the crediting period of estimated reductions (tonnes of $CO_{2\,e}$)	30801

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

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No Official Development Aid will be given to this project.

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

This proposed small-scale project activity is not a debundled component of a large project activity as there is no registered small-scale CDM project activity or a request for registration by another small-scale project activity:

•By the same project participants;
•In the same project category and technology/measure; and
•Registered within the previous 2 years; and
•Whose project boundary is within 1 km of the project boundary of the proposed small-scale activity at the closest point.

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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The title and reference of the approved baseline and monitoring methodology is: The Indicative simplified baseline and monitoring methodology for selected small scale CDM project activities Type I.D./Version 12 Sectoral Scope 01, EB 33. Renewable Energy Projects – I.D. Grid Connected renewable electricity generation.

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

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The methodology is justified as this category comprises renewable energy generation units such as renewable biomass. The following is the justification that the biomass is renewable. The GHG emissions of the combustion process, mainly CO_2, is consumed by plant species during growth, representing a cyclic process. Since, the biomass contains only negligible quantities of other elements lime Nitrogen, Sulphur etc. release of other GHG are considered as negligible. The biomass fuel is thus CO_2 neutral if it is renewable. In this project activity the biomass is renewable. This follows the guidelines on renewable biomass provided by the EB.[1] The biomass is renewable if:

> "4. The biomass is a biomass residue[2] and the use of that biomass residue in the project activity does not involve a decrease of carbon pools, in particular dead wood, litter or soil organic carbon, on the land areas where the biomass residues are originating from. For example, if bagasse from sugar production would in the absence of the CDM be dumped or left to decay and is used for energy generation under the CDM, it can be assumed that the use of the bagasse does not affect the sugar cane cultivation practices and hence the carbon pools of the respective soils. In contrast, where a CDM project involves the collection of dead wood from a forest, which would not be collected in the absence of the CDM, the extracted biomass cannot be regarded as renewable, since it would result in a decrease of carbon stocks.".

[1] EB 23, Report Annex 18, page 1, Annex 18, Definition Of Renewable Biomass

[2] Biomass residue is defined as biomass by-products, residues and waste streams from agriculture, forestry, and related industries. (Please refer to Annex 8 of the report of the twentieth meeting of the Executive Board, see http://cdm.unfccc.int/EB/Meetings/020/eb20rep.pdf).

Rice husk is a biomass residue and the use of rice husk in the project activity does not involve a decrease of carbon pools, in particular dead wood, litter or soil organic carbon on the land areas where the biomass residues are originating from. The rice husk from paddy production, which is the only biomass used in this power plant, would in the absence of the CDM be either

a) dumped in a scattered and unmanaged manner at the sites of the mills without going back into the soil. It is never returned to the fields as the mills where the paddy is milled and the rice husk is generated are too far away from the dispersed fields from where the paddy is procured. This is because the paddy in Chhattisgarh does not only come from the locality, but from all over North India through the Government procurement system.
b) In some cases the rice husk would be sold for brick making or hotels. This baseline activity thus does not contribute to increased soil carbon, and the project activity thus does not contribute to a reduction in soil carbon.
c) In some cases when the mills are remote and far away from users of the rice, the rice husk would often be disposed of as a waste product on open ground near the mill and left to rot. Some residual methane may even be generated in these conditions, which is however not taken into account in the baseline emission assessment as the quantities are uncertain. This is because rice husk has a good market these days and rather than piling the rice husk up, the mill owners would rather sell it for uses such as in b) above.

In the project activity the rice husk is used for energy generation under the CDM. In the absence of the CDM rice husk would be not be dumped or left to decay in such a manner as to increase carbon pools; the use of the rice husk does not affect the paddy cultivation practices and hence the carbon pools of the respective soils. In fact the project activity involves returning the ash from the power plant operation to the fields near the power plant. Thus in fact soil carbon is improved by the project activity. No other biomass is being used in this project.

Justification 2: The renewable biomass supplies 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.

Justification 3: The methodology is applicable as, though the unit co-fires fossil fuel, the capacity of the entire unit does not exceed the limit of 15MW.

B.3. Description of the project boundary:

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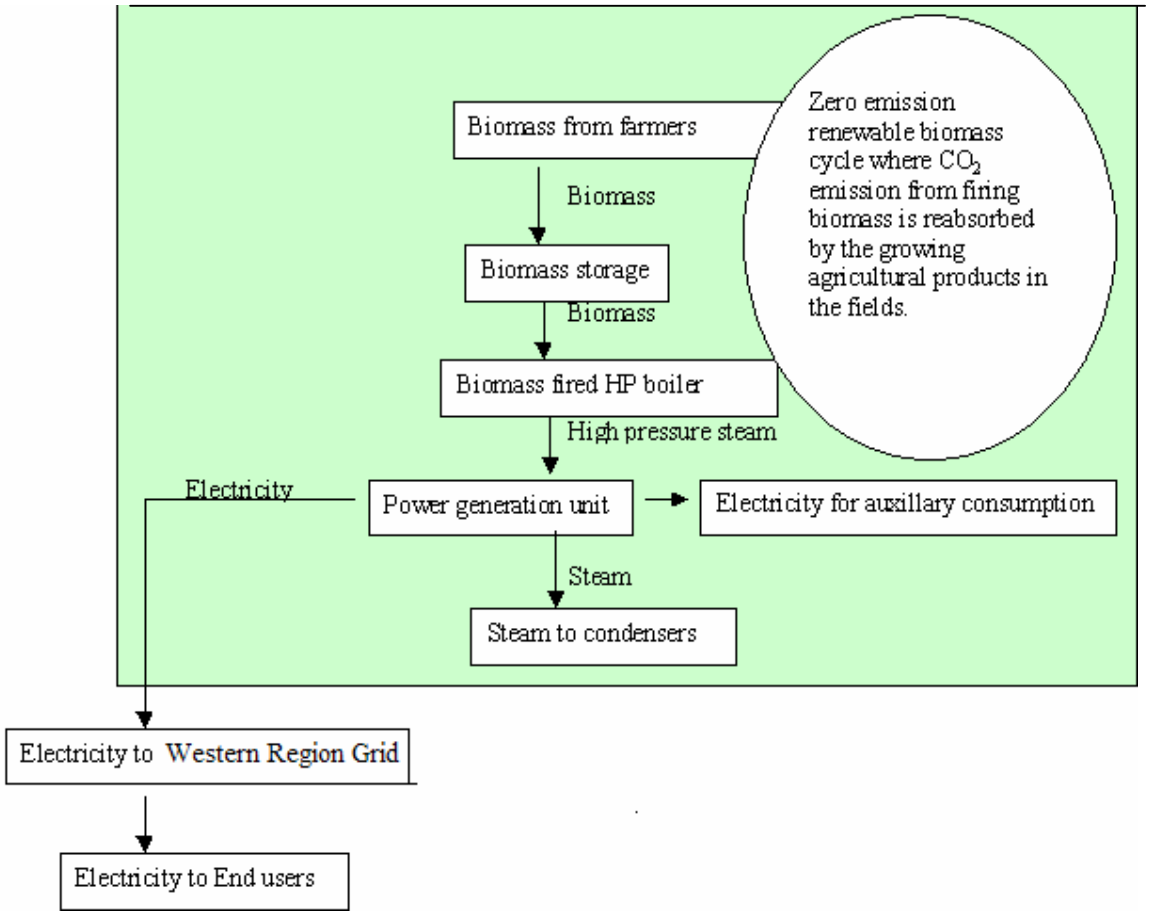

B.4. Description of baseline and its development:

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The Baseline methodology Type I.D. version 12 specifies that the baseline is:

"the kWh produced by the renewable generating unit mulitplied by an emissions coefficient (measured in kg CO2e/kWh) calculated in a transparent and conservative manner as:

(a) A combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the approved methodology ACM0002. 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.

As data for current year is not available, option (b), the weighted average emission factor, can not be used, and choice (a) is suitable.

The baseline methodology requires that calculations be based on data from official sources (where available) and made publicly available. For India this data comes from the Central Electricity Authority. The approach dividing India into regional systems, and the detailed calculations for the Western Region Grid are also provided by the CEA.[3] The baseline methodology requires that plant emission factors for plants in the regional grid system should be obtained in the following priority: highest priority is that it should be acquired directly from dispatch centre and power producers; or secondly, calculated in three different ways. CEA has calculated for simple Operating Margin due to non availability of dispatch data. Simple OM is fixed ex-ante and calculated as the 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 prevailing baseline emissions based on the data for the Fiscal Year 2005-06 are calculated based on generation, fuel consumption and fuel quality data obtained from the power stations. Typical standard data were used only for a few stations where information was not available from the station. Inter-regional and cross-border electricity transfers were also taken into account for calculating the CO_2 emission baseline.[4] As the biomass power plant in the project activity uses coal during periods of low rice-husk availability, the power plant is not a highly off-peak type of project. There is no need to apply a special CM, for example by giving extra weight to the OM in calculating the CM. 50% OM and 50% BM is applied, and the CM emission factor is thus **0.81 tCO_2/MWh** as given by CEA for the year 2005-2006.

Project emissions:

Project emissions are based on estimated coal consumption.

Year	Kg coal	MJ/kg	MJ	t CO_2/MJ [5]	t CO_2
2008	10000000	15.7	157000000	0.00009006	14139.42
2009	10000000	15.7	157000000	0.00009006	14139.42
2010	10000000	15.7	157000000	0.00009006	14139.42
2011	10000000	15.7	157000000	0.00009006	14139.42
2012	10000000	15.7	157000000	0.00009006	14139.42
2013	10000000	15.7	157000000	0.00009006	14139.42
2014	10000000	15.7	157000000	0.00009006	14139.42

Emission reductions over the first crediting period are thus estimated as:

[3] www.cea.nic.in

[4] www.cea.nic.in user_guide_version2

[5] See Fuel Emission Factors (EF) (Source: Coal/Lignite - Initial National Communication– in Base Parametres and Assumptions, copy of CEA Database publishing_version2. on www.cea.nic.in and attached here in Appendix 3.

Year	Estimation of project activity Emissions tCO_2	Estimation of Baseline Emissions tCO_2	Estimation of leakage tCO_2	Estimation of overall emission reductions tCO_2
2008	14139	44940	0	30801
2009	14139	44940	0	30801
2010	14139	44940	0	30801
2011	14139	44940	0	30801
2012	14139	44940	0	30801
2013	14139	44940	0	30801
2014	14139	44940	0	30801
Total estimated reductions (tonnes of CO_{2e})	98976	314583	0	215607
Total number of crediting years	7	7	7	7
Annual average over the crediting period of estimated reductions (tonnes of CO_{2e})	14139	44940	0	30801

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:

Attachment A to Appendix B of the simplified Methodologies and Procedures for small scale CDM project activities requires additionality to be proved by showing that the small scale project activity has to overcome any one of a list of barriers in order to achieve the emission reductions over and above what would have happened in the absence of the project activity. If there are barriers to the project, which do not apply in the business as usual or baseline case, then the project activity cannot be considered a business-as-usual project. The present project suffers from a common practice barrier.

It is common practice in India for State Electricity Boards to fix tariffs for renewable energy by comparing the cost of generation of the renewable source of energy with the cheapest alternative, which is generally coal. The Chhattisgarh Electricity Board is no exception. During the very initial hearings for setting the tariffs for rice-husk based power generation by Neeraj Power Pvt Ltd., Chhattisgarh State Electricity Board (CSEB) expressed its lack of willingness to pay a tariff based on the real generation cost of rice-husk based power. It was for this reason that Neeraj Power Pvt Ltd applied for CDM during the planning phase in 2006. The CDM registration was delayed due to disagreements over methodology with the project consultants; and new consultants were appointed. It is felt that it is not possible to show that methane emission is avoided due to risk husk burning. The main benefit of this project in terms of emission reductions is the avoided burning of fossil fuels in energy mix of the regional grid.

The analysis of the common practice barrier demonstrates that the power tariff which the CSEB is willing to pay is also not enough to cover the cost of operating the plant, considering the fuel costs and financing costs. The tariff for Neeraj Power Pvt Ltd in 2006 under a 10 year PPA was fixed at 2.67

Rs/kWh [6] Tariff declared by Chhattisgarh State Electricity Regulatory Commission as per the order passed on 7/5/2005 for Biomass Power Plants incorporates an escalation of around 0.06 Rs/kWh per annum. The tariffs applicable for the individual years covered by the PPA are thus:

	Fixed		Variable
Year	Rs./Unit	Year	Rs./Unit
1	1.55	2005-06	1.12
2	1.51	2006-07	1.18
3	1.48	2007-08	1.28
4	1.44	2008-09	1.31
5	1.40	2009-10	1.37
6	1.37	2010-11	1.43
7	1.34	2011-12	1.51
8	1.30	2012-13	1.58
9	1.27	2013-14	1.66
10	1.24	2014-15	1.74

Neeraj Power Pvt Ltd started was synchronised on 3rd November 2006. The applicable tariffs are:

Year	Rs./Unit
2006-07	2.73
2007-08	2.79
2008-09	2.79
2009-10	2.81
2010-11	2.83
2011-12	2.88
2012-13	2.92
2013-14	2.96
2014-15	3.01
2015-16*	3.05

*For the year 2015-16 there is only fixed cost and by mistake the Variable cost has not been declared, but it is presumed that there will be increment and that Rs.3.05 as total tariff will be paid for that year.

The assumptions used to fix this tariff are [7]:

Cost of fuel: Rs 400 per kg
Interest rate: 10.5% - 2% interest rate subsidy

The Cash flow and Sensitivity analysis show that these wrong assumption taken by CSEB in setting the tariff for biomass plants in Chhattisgarh has led to the present project activity running at a loss of 10 million Rs in the second year. With a CER income of Euros 35/CER, the project shows an IRR of 4.12%. Even this is much lower than a typical benchmark IRR for renewable energy plants in India of 16%. Also

[6] http://www.cseb.gov.in/ARR-TP.pdf; Aggregate Revenue Requirement & Tariff Petition for FY 2006-07

the rice husk prices are escalating more even than assumed in the analysis. The reason why CSEB is not willing to increase the tariff for biomass power is that CSEB is buying from other captive power plants at Rs 2.32 / kWh; from central sector coal fired power plants at an average of 1.21 Rs / kWh; and from other fossil based captive plants selling surplus power at 2.13 Rs/kWh. Coal fired power from power traders is being bought at an average price of 2.74 Rs/kWh. Thus CSEB is not at all willing to pay more to Biomass Power suppliers. Thus the project activity is not part of the baseline scenario. The baseline scenario in the case of this project activity is that the grid continues to operate, and its expansion of the grid is based predominantly on cheap coal based power generation, such as the power seen as being supplied from the central sources to CSEB. Neeraj Power Pvt. Ltd. thus faces common practice barriers which it can only overcome with the additional revenue stream from the sale of Certified Emission Reductions. If CERs are not available the plant will certainly have to increase the consumption of coal in order to prevent closure due to non-viability.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

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Step 1: emission factor: For the emission factor, CEA provides explanation of methodological choices in its user manual: user_guide_ver2 on its website. The applied value is **0.81 tCO_2/MWh** as provided in Annex 3 to this SSCPDD.

Step 2: Project activity emissions: For coal, the calorific value and the initial emission factor is from IPCC Chapter 1.6. Table 1-2, other bituminous coal. The final emission factor is calculated in CEA user_guide_ver2 page 24, taking into account EF based on NCV, Delta GCV NCV, EF based on GCV, and Oxidation Factor, thus giving a Fuel Emission Factor for coal of **90.6 gCO_2 /MJ**.[8]

Step 3: Leakage: As the energy generating equipment is not transferred from another activity, and as no existing equipment is transferred to another activity, leakage is not considered.

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

(Copy this table for each data and parameter)

Data / Parameter:	
Data unit:	KWh
Description:	Total export to CSEB – monthly metre reading statement; summed for annual figure
Source of data used:	Neeraj Power Pvt Ltd Invoice to CSEB with attached signed Departmental certificate of the same
Value applied:	55482 MWh per annum
Justification of the choice of data or description of measurement methods and procedures actually applied :	As per methodology
Any comment:	-

[8] Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories : Workbook, Chpt 1.6, Table 1-2. And CEA data as given above.

Data / Parameter:	
Data unit:	Kg coal
Description:	Total used – computerised daily feed values
Source of data used:	Neeraj Power Pvt Ltd computer data
Value applied:	10000 tonnes per annum
Justification of the choice of data or description of measurement methods and procedures actually applied :	As per methodology
Any comment:	-

Data / Parameter:	
Data unit:	Kg Rice husk
Description:	Total used – computerised daily feed values
Source of data used:	Neeraj Power Pvt Ltd computer data
Value applied:	60690 tonnes per annum
Justification of the choice of data or description of measurement methods and procedures actually applied :	To cross check coal consumption
Any comment:	-

Data / Parameter:	
Data unit:	Kg rice husk/ KWh
Description:	Specific fuel consumption biomass
Source of data used:	DPR
Value applied:	1.13 kg/kWh
Justification of the choice of data or description of measurement methods and procedures actually applied :	As per DPR
Any comment:	-
Data / Parameter:	
Data unit:	Kg coal/ KWh
Description:	Specific fuel consumption coal
Source of data used:	DPR
Value applied:	1.19 kg/kWh
Justification of the choice of data or description of	Calculated from DPR

measurement methods and procedures actually applied :	
Any comment:	-

B.6.3 Ex-ante calculation of emission reductions:

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Baseline: Based on baseline calculation method in Type I.D., version 12, and with reference to the CEA Baseline Emission Factors of Western Region Grid issued by CEA India on June 2007, the CM including imports of Western Region Grid is 0.81 tCO_2e/MWh. The detailed calculations provided by CEA are given in Annex 3. According to the Detailed Project Report of the project activity, the electricity output of the Project is estimated as 55'482 MWh per year, therefore the baseline emissions of the Project is estimated as 55'482 MWh x 0.81 tCO_2e = 44940 tCO_2/yr.

Project activity emissions: the coal consumption is conservatively estimated at 10'000 tonnes per annum, thus causing 14866 tCO_2 emission per annum, calculated as 10'000'000 kg coal x 15.7 MJ per kg x 0.00009006 tCO_2 / MJ[9] = 14139.42 tCO_2 per annum.

Leakage: As described in section B.6.1, the leakage of the Project will be 0 tCO_2e.

Emission reductions: The ex-ante annual emission reductions are estimated as 30'801 tCO_2e per year.

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

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Year	Estimation of project activity Emissions tCO_2	Estimation of Baseline Emissions tCO_2	Estimation of leakage tCO_2	Estimation of overall emission reductions tCO_2
2008	14139	44940	0	30801
2009	14139	44940	0	30801
2010	14139	44940	0	30801
2011	14139	44940	0	30801
2012	14139	44940	0	30801
2013	14139	44940	0	30801
2014	14139	44940	0	30801
Total estimated reductions (tonnes of CO_{2e})	98976	314583	0	215607
Total number of crediting years	7	7	7	7
Annual average over the crediting period of estimated reductions (tonnes of $CO_{2\,e}$)	14139	44940	0	30801

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

The methodology requires that:

"13. Monitoring shall consist of metering the electricity generated by the renewable technology;

"14. For projects where only biomass or biomass and fossil fuel are used the amount of biomass and fossil fuel input shall be monitored.

"15. For projects consuming biomass a specific fuel consumption[9] of each type of fuel (biomass or fossil) to be used should be specified ex-ante. The consumption of each type of fuel shall be monitored.

"16. As fossil fuel is used, the electricity metered should be adjusted to deduct electricity generation from fossil fuels using the specific fuel consumption and the quantity of fuel consumed.

"17. (not applicable)

"18. The amount of electricity generated using biomass fuel calculated as per paragraph 16 shall be compared with the amount of electricity generated calculated using specific fuel consumption and amount of biomass used. The lower of the two values should be used to calculate emission reductions."

B.7.1 Data and parameters monitored:

(Copy this table for each data and parameter)	
Data / Parameter:	
Data unit:	kWh
Description:	Total export to CSEB – monthly metre reading statement; summed for annual figure
Source of data to be used:	Neeraj Power Pvt Ltd Invoice to CSEB with attached signed Departmental certificate of the same
Value of data	55482 MWh per annum
Description of measurement methods and procedures to be applied:	-
QA/QC procedures to be applied:	The data should be cross-checked against relevant electricity sales receipts and/or records from the grid for quality control. Since the data required to be monitored is consist with the data required during project operation by the project owner and the grid company, the Power Purchase Agreement between these two parties can be used as guidance on data collection and documentation. Calibration of Meters & Metering should be implemented according to national standards and rules. And all the records should be documented and maintained by the project owner for DOE's verification.
Any comment:	

[9] Specific fuel consumption is the fuel consumption per unit of electricity generated (e.g. tonnes of biomass per MWh)

(Copy this table for each data and parameter)	
Data / Parameter:	
Data unit:	Tonnes coal
Description:	Total used – computerised daily feed values
Source of data to be used:	Neeraj Power Pvt Ltd computer data
Value of data	10'000 tonnes
Description of measurement methods and procedures to be applied:	Sensors at the conveyor belt feed the data to the computer
QA/QC procedures to be applied:	The values can be cross checked against the daily purchase records and stocks records.
Any comment:	

(Copy this table for each data and parameter)	
Data / Parameter:	
Data unit:	Tonnes Biomass
Description:	Total used – computerised daily feed values
Source of data to be used:	Neeraj Power Pvt Ltd computer data
Value of data	60690 tonnes
Description of measurement methods and procedures to be applied:	Sensors at the conveyor belt feed the data to the computer
QA/QC procedures to be applied:	The values can be cross checked against the daily purchase records and stocks records.
Any comment:	

(Copy this table for each data and parameter)	
Data / Parameter:	
Data unit:	Kg Biomass/kWh
Description:	Specific Biomass consumption
Source of data to be used:	Calculated from Neeraj Power Pvt Ltd computer data
Value of data	1.13 kg/kWh
Description of measurement methods and procedures to be applied:	Sensors at the conveyor belt feed the data to the computer; the calculation is done using the data; the value will be compared with the ex-ante value.
QA/QC procedures to be applied:	The values can be cross checked against the daily purchase records and stocks records.
Any comment:	

(Copy this table for each data and parameter)	
Data / Parameter:	
Data unit:	Kg coal/kWh
Description:	Specific Coal consumption
Source of data to be used:	Calculated from Neeraj Power Pvt Ltd computer data
Value of data	1.19 kg/kWh
Description of measurement methods and procedures to be applied:	Sensors at the conveyor belt feed the data to the computer; the calculation is done using the data; the value will be compared with the ex-ante value.
QA/QC procedures to be applied:	The values can be cross checked against the daily purchase records and stocks records.
Any comment:	

B.7.2 Description of the monitoring plan:

>>

1. Implementation of the monitoring plan

The Project owner, M/ssrs Neeraj Power Pvt Ltd., will take the responsibility of the monitoring plan implementation. In this PDD, emission factor of the Project is determined ex-ante. Therefore the electricity supplied to the grid by the Project is defined as the key data to be monitored. The monitoring plan is designed first of all to focus on monitoring of the electricity output of the Project. The second critical data to be monitored is coal consumption. Therefore the second focus of the monitoring plan is the coal consumption data, and the verification method for the coal consumption data. The other elements following the monitoring methodology concern the comparison of values using two different approaches, and choosing the more conservative of two values.

As per the methodology,

- Monitoring shall consist of metering the electricity generated by the renewable technology.
- For projects where only biomass or biomass and fossil fuel are used the amount of biomass and fossil fuel input shall be monitored.
- For projects consuming biomass a specific fuel consumption[10] of each type of fuel (biomass or fossil) to be used should be specified ex-ante.

- The consumption of each type of fuel shall be monitored. If fossil fuel is used the electricity generation metered should be adjusted to deduct electricity generation from fossil fuels using the specific fuel consumption and the quantity of fossil fuel consumed.

2. Monitoring of the electricity supplied to the grid by the Project

The electricity delivered to CSEB by the Project will be continuously monitored through metering equipments installed both in the project site and substation (interconnection facility connecting the

[10] Specific fuel consumption is the fuel consumption per unit of electricity generated (e.g. tonnes of bagasse per MWh).

Project to the grid). Staff from the Project owner and Grid Company will be responsible for measured data collecting and recording on site monthly. All the relevant data records will be kept by the Project owner during the crediting period and two years after for DOE's verification. Sale of power will be measured by automated sensors (current transformers) installed at the 33 kVA step up transformer for export of the power to the grid, and through sealed metres installed at the power generation project by the Chhattisgarh State Electricity Board. Monthly readings form the CSEB metres will be taken jointly by the personnel from the CSEB and the plant, and these readings form the basis for the payments of the power sold. This data will be the primary source for the monitoring plan but may be cross checked against the metres at the step up transformer.

3. Monitoring of biomass and coal consumption

Biomass consumption and Coal consumption will be monitored by checking the daily feed data at the Central Control Room.

The specific fuel consumption of biomass and coal specified ex-ante is:

Biomass: 1.13 kg/kWh
Coal: 1.19 kg/kWh

The consumption of each type of fuel will be monitored, and the electricity generation metered will be adjusted to deduct electricity generation from fossil fuels using the specific fuel consumption and the quantity of fossil fuel consumed.

4. Monitoring of coal consumption:

The ex-ante assumed consumption of coal in this PDD 10000 tonnes of coal per annum. This is a specific coal consumption of 1.19 tonnes per hour. The expected rice husk consumption at this level of coal consumption would be 60'690 tonnes per annum, or 7.23 tonnes of rice husk per hour.

5. Monitoring of rice husk consumption

The ex-ante specific rice husk consumption is 1.13 kg rice husk per MWh. Monitoring of rice husk consumption will be done by taking the daily feed data at the Central Control Room.

6. Comparison of values:

The amount of electricity generated using biomass fuel calculated by adjusting the electricity metered to deduct electricity generation from fossil fuels using the specific fuel consumption of coal and the quantity of coal consumed; shall be compared with the amount of electricity generated calculated using the specific fuel consumption of biomass and the amount of biomass used. The lower of the two values should be used to calculate emission reductions.

7. Quality assurance and quality control

The quality assurance and quality control procedures involves of data monitoring, recording, maintaining and archiving, and monitoring equipment calibration. The electricity delivered by the Project to CSEB will be monitored through metering equipment at the Project site and substation. The data should be cross-checked against relevant electricity sales receipts and/or records from the grid for quality control. Since the data required to be monitored is consist with the data required during project operation by the project owner and the grid company, the Power Purchase Agreement between these two parties can be used as guidance on data collection and documentation. Calibration of Meters & Metering should be implemented according to national standards and rules. And all the records should be documented and maintained by the project owner for DOE's verification.

CDM – Executive Board

8. Verification

It is expected that the verification of emission reductions generated from the Project will be done annually.

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

>>

22nd August 2007

By Anandi Sharan-Meili

The person is not a project participant.

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:

>>

1st October 2006

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

>>

25-y-0-m

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:

>>

30th November 2007

C.2.1.2. Length of the first crediting period:

>>

7-y-0-m

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

>>

N/A

C.2.2.2. Length:

>>

N/A

SECTION D. Environmental impacts

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

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The project does not fall under the purview of the Environmental Impact Assessment (EIA) notification of the Ministry of Environment and Forest, Government of India. This is because as per the prevailing regulations of the Host Party i.e. India (represented by the Ministry of Environment and Forests (MoEF), Govt. of India and also the line ministry for environmental issues in India), Environmental Impact Assessment (EIA) studies need not to be done for the projects less than Rs.1000 millions. Since the total cost of the proposed project is only Rs.284 millions and also comes under the small scale category of CDM projects as per UNFCCC guidelines, there is no need for an EIA. However prior to implementation, the project must notify to the Chhattisgarh Environment Conservation Board (CECB) for necessary evaluation and approval. As required for implementation of the project activity, the project participant had studied the possibility of environmental impacts and concluded that no negative impacts are possible due to the project activity. Hence, no documentation or summary is provided here. However the design philosophy of this biomass based project activity is driven by the concept of providing the renewable energy with negligible impact on the environment hence the environment and safety aspects of the project activity are discussed here. The possible type of pollutants emanating from a normal biomass plant are Air Pollution, Water Pollution, Thermal pollution, Noise Pollution etc. which are also common to the proposed plant, but it is negligible. The project proponent has planned various preventive and precautionary steps to control all forms of pollutants so as to safeguard the environment.

Air Pollution Control

The main air pollutants in the biomass based plant are Dust and particulate matter in the Flue gas, Fly ash from the hoppers, Furnace bottom ash etc. and the steps to be taken are:

Electrostatic Precipitator

The proposed biomass plant will have an Electrostatic Precipitator (ESP), which will separate the dust from the flue gas and has an efficiency of 99.2 %. The dust concentration in the flue gas leaving the ESP will be within the permissible limit of statutory norms.

Waste as Wealth

The ash from the silo will be disposed off to the farmers, who can use the ash as manure for the crops and to local industries, who will utilize the ash for manufacture of bricks and for road building materials.

Water Pollution Control

The main forms of water pollutants in the plant are effluents from water treatment plant, Boiler blow down, Sewage from the power plant buildings.

Water Treatment Plant

The water utilized for the operation of the plant is treated before letting off so as to maintain it in neutral pH.

Sewage through trenches
The Sewage from the various power plant buildings will be taken to a common septic tank through trenches. The sewage from the septic tank will be disposed off through concrete trenches so as to prevent the soil from getting contaminated.

Thermal Pollution

Cooling Tower
The water used in the surface condenser to condense the steam, will be cooled in a cooling tower of either induced or forced draft type. The water let out from the cooling tower will have a temperature very close to the ambient.

Cooling Pond
The boiler blow down water which will be at temperature of 100oC is taken to effluent pond so as to get cooled naturally

Noise Pollution Control
The major source of noise pollution in the biomass power plant is from rotating equipments like ID, FD, SA fans, Feed pumps, Boiler and super heater safety valves, Start up vent, Steam turbine, DG sets etc. and steps to be taken to control all these are

Silencers
The start up vent, safety valve outlets and the DG sets will be provided with silencers to reduce the noise level to the acceptable limits.

Equipment Design
The rotating equipments are designed in such a way, so that the sound level will be between 85 to 90 dBA as per the OSHA standards.

Land Environment
Selected tree species will be planted in the area after considering attenuation factors for air and noise pollution.

Green Belt Development
The project proposed to develop Green Belt with in the project premises , which is the one of the major component of Environmental Management Plan (EMP). Green Belt will enhance environmental quality through mitigation of fugitive emissions, attenuation of noise levels, balancing eco-environment, consumption of treated effluents, prevention of soil erosion, creation of aesthetic environment.

Socio Economic Environment
The project will provides an opportunity for local people to get employed directly or indirectly in upliftment of socio-economic status of the area. It is also proposed to do awareness and welfare programmes, upliftment of social, health, basic needs of drinking water supply and provision of educational facilities.

Hence the project is not likely to have any significant adverse negative socio-economic environmental effects during execution or after commissioning during or during the operational lifetime.

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:

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None

SECTION E. Stakeholders' comments

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

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The local stakeholders were consulted in the following way:

A notice was placed in *Amrit Sendesh* on 17th December 2005, providing the information on the project and inviting comments.

The *Gram Panchayat* issued a no objection certificate in August 2004. This was renewed in October 2005 after local elections took place.

The *Gram Sabha* also issued a no objection certificate.

Other stakeholders were approached through The Chhattisgarh State Electricity Board and the Boiler Inspectorate amongst others. All statutory authorities agreed to the project and provided the necessary approvals.

E.2. Summary of the comments received:

>>
None

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

>>
The Neeraj Power Pvt Ltd 7.5 MW renewable energy power plant running on rice husk and coal is a model power plant in the region. It has the highest PLF of any biomass power plant in the country and has run continuously without break since commissioning.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Neeraj Power Pvt Ltd
Street/P.O.Box:	58 Gandhi Chowk
Building:	
City:	Neora
State/Region:	Raipur, Chhattisgarh
Postfix/ZIP:	493114
Country:	India
Telephone:	07721 233409
FAX:	07721 233418
E-Mail:	Neeraj1_power@yahoo.com
URL:	
Represented by:	
Title:	Mr
Salutation:	
Last Name:	Agrawal
Middle Name:	
First Name:	Prem
Department:	
Mobile:	0091 9425209695
Direct FAX:	
Direct tel:	
Personal E-Mail:	

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No public funding is expected or has been received for this project

Annex 3

BASELINE INFORMATION

CENTRAL ELECTRICITY AUTHORITY: CO2 BASELINE DATABASE

VERSION	**2.0**
DATE	**21 June 2007**
BASELINE METHODOLOGY	**ACM0002 / Ver 06**

Combined Margin in tCO2/MWh (incl. Imports)

	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06
West	0.87	0.89	0.88	0.88	0.89	0.81

CENTRAL ELECTRICITY AUTHORITY: user manual: user_guide_ver2 – page 24
Appendix B – Assumptions for CO2 Emission Calculations
Fuel Emission Factors (EF) - (Source for Coal - Initial National Communication)

	Unit	Coal
EF based on NCV	gCO_2/MJ	95.8
Delta GCV NCV	%	3.6%
EF based on GCV	gCO_2/MJ	92.5
Oxidation Factor	-	0.98
Fuel Emission Factor	gCO_2/MJ	90.6

Annex 4

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