CLEAN DEVELOPMENT MECHANISM
SIMPLIFIED PROJECT DESIGN DOCUMENT
FOR SMALL-SCALE PROJECT ACTIVITIES (SSC-CDM-PDD)
Version 02

CONTENTS

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>.

SECTION A. General description of the small-scale project activity

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

>>
9.8 MW Biomass Based Power Plant at Lahari Power & Steels Limited in Champa-Janjgir District, Chattisgarh
Version 4
07/06/2012

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

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The project activity is establishing a 9.8 MW biomass based power plant at Madwa Village of Champa-Janjgir District in Chhattisgarh State, India. The project activity will utilise surplus biomass residues to generate electricity for a grid system owned by the state owned power utility, Chhattisgarh State Electricity Board (CSEB).

The location of the project activity was selected considering all the requirements like biomass availability, water availability, power evacuation facilities etc after due survey has been made by the project proponent. The Champa-Janjgir district is one of the largest paddy growing areas in the state of Chhattisgarh. Paddy, Wheat and Maize are major biomass producing crops cultivated in surrounding areas within 75 km radius of the project location. Many rice mills and saw mills are located in this area supplying agro-residues namely rice husk and saw dust respectively.

The project will generate power by sustainable means without any negative impact on environment and the generated electricity will be exported to 220/132 kV/33kV/11kV Banari substation of CSEB, which is at a distance of 4 km from the project site. The whole process supports in climate change mitigation as it leads to emission reduction of 379,477 tonnes of CO_2eq. over the crediting period of 10 years.

The implementation of the project activity would bring in the following local benefits:

Economic utilization of surplus biomass
Generation of additional income to the rural farmers due to purchase of surplus crop residues
Climate change mitigation, through renewable energy generation and reducing the demand for fossil fuel based power
Contributing to the national electricity capacity through additional power generation Creation of indirect employment for rural youth for collection and transportation of biomass
Contribution to the availability of stable power in the local area

View of project participant about the project activity's contribution to Sustainable Development

Ministry of Environment and Forests (MoEF), Government of India, has stipulated the following indicators for sustainable development in the interim approval guidelines for CDM projects.

1. Social well-being
2. Economic-well being
3. Environmental well being and
4. Technological-well being

The project activity contributes to the above indicators in the following manner.

Social well being

The proposed 9.8 MW biomass based power project caters jobs for number of persons in the vicinity of project site in various areas like construction of the plant, biomass collection, processing of biomass, transportation of biomass as well as in the operation of the power plant. Apart from the direct employment generation, proposed project also encourages indirect employment by setting up other agro industries due to availability of power supply from the proposed project.

Commercial value to agricultural residues will encourage the farmers to collect biomass from fields and effectively utilize the barren and uncultivable lands for energy plantations, which will improve the income levels of the farmers.

The proposed project will engage both genders in construction of the project, biomass collection; biomass processing etc during operation lifetime of the project and this will lead to increase in gender equity and prevents social disparities.

Economic well being

The proposed project will bring in additional capital investment of Rs.425.8 million thus leads to local area development.

The proposed biomass plant will help local farmers in earning extra income by selling crop residues there by helping them to improve their economic standards.

The plant facilitates the availability of continuous and sustained power to the local industries and agricultural farmers located in the region, thereby avoiding the load shedding and low frequency of power. Thus the project acts as a nucleus for other economic activities such as setting up of cottage industries, shops, hotels etc around the region thereby contributing to economic development

Environmental well being

The proposed 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 not result in increase of GHG emissions and cause no negative impact on the environment. The project generates real, measurable and long-term emissions reductions.

Technological well being

The CDM project activity will lead to the increase in utilization of biomass resources for power generation and contributes to energy security in the country.

The above benefits due to the project activity ensure that the project would contribute to sustainable development of the region.

A.3. Project participants:

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Name of the party involved ((Host) indicates a host party)	Private and/or public entity (ies) project participants	Whether party involved wishes to be considered as project participant
India (Host)	**Private Entity:** Lahari Power & Steels Limited, Hyderabad	No

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

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

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A.4.1.1. Host Party(ies):

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India

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

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Chhattisgarh

A.4.1.3. City/Town/Community etc:

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Village: Madwa
Tehsil: Champa
District: Janjgir-Champa

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

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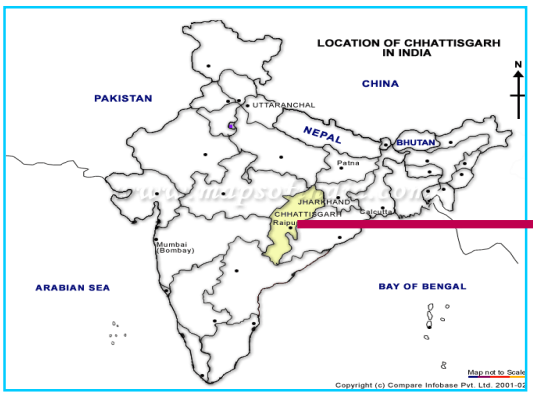
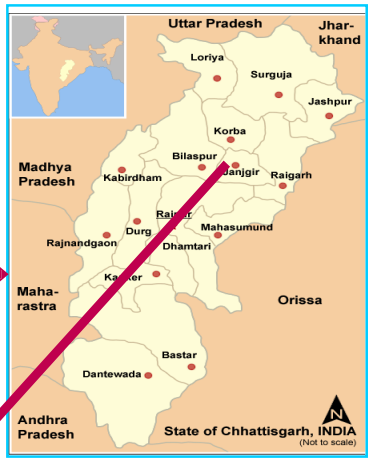
The proposed project is located in Madwa Village, Champa Tehsil, Janjgir-Champa District, Chhattisgarh. The project is located at a distance of 8 kms from Champa - Bilaspur Highway at longitude 81°47'30" E and latitude 21°21'15" N. The nearest railway station is Champa, at a distance of 7 km from the project location and the nearest seaport is Vishakapatnam, at a distance of 700 km.

M/s. Lahari Power & Steels Limited
9.8 MW Biomass based Power Project
Madwa Village (post),
Basantpur Post,
Janjgir Tehsil
Janjgir - Champa District - 495 671,
Chhattisgarh State.

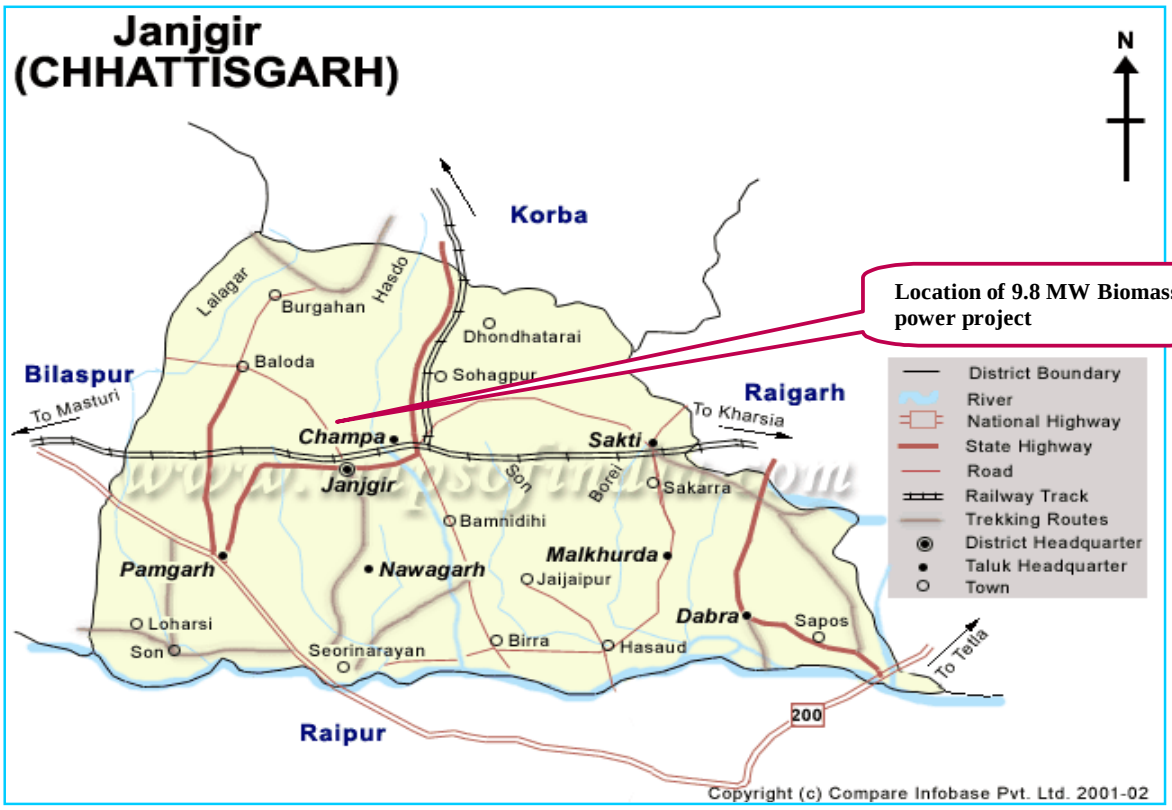
Physical location of the project site is marked in the maps below:



Map1: Location of Chattisgarh (yellow) in India



Map2: Location of Janjgir district in Chattisgarh



Map3: Location of 9.8 MW biomass based power project in Janjgir District

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

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According to the Appendix B to the simplified modalities and procedures for small-scale CDM project activities the proposed project activity fall under the following type and category.

Project type: Type I - Renewable Energy project
Category: I.D - Renewable Electricity Generation for a grid (version 10 dated 23 December 2006)

Since, the capacity of the proposed CDM project is only 9.8 MW, which is well below the qualifying capacity of 15 MW, the project activity can be regarded as a small scale CDM project activity and UNFCCC indicative simplified modalities and procedures can be applied.

Technology

The basic technology is *Rankine Cycle* route where direct combustion of biomass materials takes place through the multi-fuel fired boiler to generate high pressure and high temperature steam, which drives an reaction turbine generator set.

Equipments

The plant and machinery of the project consists of one number traveling grate boiler, one number steam turbine generator set, power evacuation system and fuel handling system etc. The electricity voltage level generated by the turbo generator is stepped to the voltage that is suitable to interface with the grid electricity. Other plant equipment includes HP heater, DM water system, water cooling system/radiator cooling system, compressed air system, fire fighting equipment, fuel and ash handling system, switchgear and switch yard etc. The technology of power generation through direct combustion of fuels is already established in India.

Power Generation

The capacity of the turbo generator is 9.8 MW, which generates electricity at 33/11 kV level for about 7920 hours in a year. It is anticipated that the plant can operate at 70% PLF during the first year and 80% PLF from second year on wards. Annual estimate of power export to the grid system during first year is 48.90 and 55.88 GWhfrom second year on wards.

Table 1: Technical details of Biomass power plant

Boiler	
Type	Travelling Grate, Bi-drum, natural circulation
Boiler capacity (100 % load) / Steam Flow rate	45 tons / hour
Steam pressure at super heater outlet	66 ata
Steam temperature at super heater outlet	485^{o}C +/- 5
Water requirement	67 m^3 / hour
Turbo Generator	
Type	Reaction turbine generator set
Steam pressure at the TG inlet	64 ata
Steam temperature at the TG inlet	480^{o}C
Generator Voltage	11 kV
Frequency	50 Hz

Power factor	0.8
RPM	1500
Condenser type	Surface condenser / Water cooled
Power evacuation	
Grid Voltage	33 kV
CSEB Sub station	Banari, 33/11 kV
Energy production	
Gross power	9.8 MW
Auxiliary consumption (10%)	0.98 MW
Net power for export	8.82 MW

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

Demonstration for being with in the limits of SSC through out the crediting period

Since, the maximum electricity generating capacity is limited by its design and construction, there is no possibility of exceeding the limits of small-scale CDM project activities during the crediting period and the project activity will remain as a small scale project activity.

A.4.3. Brief explanation of how the anthropogenic emissions of anthropogenic greenhouse gas (GHGs) by sources are to be reduced by the proposed small-scale project activity, including why the emission reductions would not occur in the absence of the proposed small-scale project activity, taking into account national and/or sectoral policies and circumstances:

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Project activity and baseline scenario:

The project activity is setting up a 9.8 MW biomass based power plant. The project activity will supply its power to the Western grid of India, leading to the displacement of Carbon intensive electricity by generating electricity from a renewable energy source. Implementation of the project activity is scheduled for completion by July, 2007. The project activity will start generating emission reductions from the date of commissioning on wards.

The baseline scenario in the absence of project activity continuous to be carbon intensive and emission reductions generated by the project activity are additional. The associated emissions are calculated based on the net amount of electricity fed into the grid and the simple weighted emission factor for the grid. The project activity does not result in any direct emissions of green house gases or in any leakage outside the project boundary.

The project activity is not the baseline scenario and the emission reductions would therefore not occur in the absence of the project activity. The project activity is not required by law, and the national and state policies in place are not sufficient to make the project commercially viable on its own. The project faces barriers, which in the absence of CDM would be prohibitive.

In the Indian power sector, the common practice is investing in medium or large scale fossil fuel fired power projects, which is evident from a host of planned projects that comprises mostly large-scale fossil fuel based power generation projects. This is mainly due to the assured return on investment, economies of scale and easy availability of finances. This is also true in the Western Region.

Table 2:Installed capacity of India[1]

2. INSTALLED CAPACITY AS ON 30-06-2006 (FIGURES IN MW)

Sector	Hydro	Thermal				Nuclear	Wind/ RES $	Total
		Coal	Gas	Diesel	Total			
STATE	25461.2	38239.9	3499.8	604.6	42344.3	0.0	2567.5	70373.0
PRIVATE	1092.7	4241.4	5663.0	597.1	10501.5	0.0	3623.3	15217.5
CENTRAL	6172.0	26007.5	4419.0	0.0	30426.5	3900.0	0.0	40498.5
TOTAL	32725.8	68488.8	13581.8	1201.8	83272.4	3900.0	6190.9	126089.0

The share of electricity from renewable small biomass electric projects in India's total installed capacity is very minimal. As shown in the table above published by Central Electricity Authority (CEA) the total installed capacity in all India level is 126089 MW whereas the installed capacity of power plants based on biomass is only 867 MW accounting for only 0.68 %, which is negligible

The Chhattisgarh Renewable Energy Development Agency (CREDA) though has sanctioned 32 biomass based power projects, out of which only few projects have been commissioned till date. This proves the low penetration of the non-conventional energy based projects in Chhattisgarh.

The above-mentioned facts suggest that the biomass based power generation was a riskier business with the barriers and uncertainties mentioned than other alternatives like fossil fuel based power generation.

Additionality:

The project faces barriers, which in the absence of CDM would be prohibitive. These barriers include:

Investment Barrier: The project activity is not a financially more viable or attractive option over other alternative to project activity, which would lead to higher emissions.

Prevailing practice: In the State of Chhattisgarh the most common practise is investing in Coal based thermal power plants. In the total installed capacity as well as power generation of Chattisgarh, the share of biomass based power projects in negligible.

The project proponents having considered the above barriers have taken into account revenue through carbon credits that could offset some of the difficulties. CDM will help to make the proposed project activity viable and the CDM revenues will help to deal with the various risks described above.

For details on baseline, additionality and national / Sectoral policies, please refer to Section B2 and B3.

[1] CEA report as on 30th April 2006.
http://www.cea.nic.in/planning/POWER%20SCENARIO%20AT%AT%20A%20GLANCE/report.pdf

A.4.3.1 Estimated amount of emission reductions over the chosen crediting period:

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Emission reductions due to the project activity depend on the energy fed to the Western regional grid and the content of fossil fuel based generation in the Western grid system. Hence, power fed to the regional grid and the generation mix in the baseline region becomes the basis for estimating emissions reductions.

The chosen crediting period for the project activity is 10 years. It is estimated that the project activity would generate 379,477 certified emission reductions (CER) during the crediting period of 10 years. Annual estimates of emission reductions by the project activity during the above crediting period are furnished below.

S. No	Year	Annual estimation of emission reductions in tonnes of CO2eq.
1.	2007	33,625
2.	2008	38,428
3.	2009	38,428
4.	2010	38,428
5.	2011	38,428
6.	2012	38,428
7.	2013	38,428
8.	2014	38,428
9.	2015	38,428
10.	2016	38,428
Total emission reductions (tonnes of CO_2 eq.)		**379,477**
Total number of crediting years		10
Annual average over the crediting period of estimated reductions (tonnes of CO_2eq.)		37,947

In the above table the year 2007 corresponds from 01.07.2007 to 31.06.2008 considering the expected commissioning date of the project or from the date of registration to successive 365 days, whichever occur later. Similar interpretation shall be applied for the remaining years.

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

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No public funding from Annex I Party is involved in this project activity.

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

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The project proponents hereby confirm that the proposed project activity is not a debundled component of another larger project activity.

The project proponents further confirm that they have not registered any small scale CDM activity or applied to register another small scale CDM project activity within 1 km of the proposed project boundary, in the same project category and technology/measure in the previous 2 years.

SECTION B. Application of a baseline methodology:

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

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Title: Type I, Renewable Energy project, Renewable Electricity Generation for grid.
Reference: AMS I.D, Version 10 (23 December 2006)

B.2 Project category applicable to the small-scale project activity:

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With a proposed installed capacity of 9.8 MW the project activity qualifies as small scale and therefore is eligible to use approved methodology AMS I.D. The application of the methodology is described below:

a) Selection and justification of calculation approach.

The baseline emissions are calculated based on net energy exported to the grid (in GWh / year) and an emission factor for the displaced grid electricity (in tCO2/GWh)

As per paragraph 9 of AMS I.D, it requires that baseline emission factor will be calculated in a transparent and conservative manner based on either
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 ACM 0002.

OR

b) The weighted average emissions (in kg CO_2equ/kWh) of the current generation mix.

The project proponent has opted for approach 'b', as the proposed project is a small scale project activity and the resultant emission factor will be lower and hence more conservative than the combined margin emission factor for the following reasons:

Table 3: Data sources for Baseline calculations

Key Parameter	Value	Data Source	Website
Power generation	Power generated by all sources including hydro, nuclear and RES	All related authentic sources like CEA. Ex-post détermination.	www.cea.nic.in www.mnes.nic.in
CEF for fuel	Carbon Emission factor for each fuel type	India's Initial National Communication to UNFCCC and IPCC default values. Ex-ante determination.	www.ipcc.ch www.unfccc.int
Fuel Type	Type of Fuel used for individual plant	MNES and CEA Ex post determination.	www.mnes.nic.in
Oxidation factor	Oxidation factor for each fuel type	IPCC default values. Ex-ante determination.	www.ipcc.ch/
Net Heat Rate	Net heat rate of individual	CEA and MNES. Ex-post	www.cea.nic.in

	power plants	determination.	www.mnes.nic.in
EFy	Baseline emission factor for the project grid	Calculated for power plants in the Western regional grid. Ex-post determination	-----
EGy	Power export to the grid per annum	From Plant and CSEB Records. Ex-post determination.	------

The total energy demand in Chattisgarh state and also in the whole western region is increasing rapidly. To meet the growing energy demand, various private and public sector utilities have envisaged many new projects that are expected to become operational in near future.

Table 4:Fuel wise breakup of Installed Capacity in the Western Regional grid[2] –

2. INSTALLED CAPACITY AS ON 30-04-2006 (FIGURES IN MW)

Sector	Hydro	Thermal				Nuclear	Wind/ RES $	Total
		Coal	Gas	Diesel	Total			
STATE	5234.3	14291.5	1390.8	17.3	15699.6	0.0	195.1	21129.0
PRIVATE	447.0	2290.0	2398.0	0.2	4688.2	0.0	903.8	6039.0
CENTRAL	1000.0	4360.0	1292.0	0.0	5652.0	1300.0	0.0	7952.0
TOTAL	6681.3	20941.5	5080.8	17.5	26039.8	1300.0	1098.8	35119.9

As per the latest records of power generating capacity of western region as on 30th April 2006[3] furnished in the above tables, the share of thermal power is around 74%, whereas the non-conventional sources like hydro (19%), renewable energy sources (3.1%) are minimal.

[2] Page no.27, Power Scenario at a Glance - 2006, Central Electricity Authority, http://www.cea.nic.in/planning/POWER%20SCENARIO%20AT%AT%20A%20GLANCE/report.pdf

[3] Page no. 27, power scenario at a Glance - 2006, Central Electricity Authority,

Table 5: Actual power supply position, Western Regional Grid during April 2005 – March 2006 [4]

S. No	States in Western Region	Requirement (MU)	Availability (MU)	Surplus (+) / Deficit (-)	
				MU	(%)
1.	Chhattisgarh	12999	12528	-471	-3.6
2.	Gujarat	57129	52428	-4701	-8.2
3.	Madhya Pradesh	36851	31623	-5228	-14.2
4.	Maharashtra	102780	84132	-18648	-18.1
5.	Daman & Diu	1346	1323	-23	-1.7
6.	Dadar Nagar Haveli	2540	2532	-8	-0.3
7.	Goa	2338	2338	0	0
	Western Region	215983	186904	-28079	-13.5

Table 6: Peak Demand / Peak Met, Western Regional Grid during April 2005 – March 2006[5]

S. No	States in Western Region	Peak Demand (MW)	Peak Met (MW)	Surplus (+) / Deficit (-)	
				MW	(%)
1.	Chhattisgarh	2133	1857	-276	-12.9
2.	Gujarat	9783	7610	-2173	-22.2
3.	Madhya Pradesh	6558	5136	-1422	-21.7
4.	Maharashtra	16069	12360	-3709	-23.1
5.	Daman & Diu	324	324	0	0
6.	Dadar Nagar Haveli	387	387	0	0
7.	Goa	368	368	0	0
	Western Region	31772	25257	-6515	-20.5

As seen from the above tables the Energy requirement of Western region during 2005-06 is deficit by 28079 MU or13.5%. The peak energy demand is deficit by 6515 MW or 20.5% during the year 2005-06. Based on the information available on western regional grid capacity additions during 11th plan, it is observed that grid system in future will continue to be carbon intensive due to major share of power coming from coal, gas and diesel based thermal power plants.

[4] Page no. 27-42, Power Scenario at a Glance - 2006, Central Electricity Authority,

[5] Page no. 27-42, Power Scenario at a Glance - 2006, Central Electricity Authority,

Table 7: Installed capacity of Chattisgarh state[6]

2. INSTALLED CAPACITY AS ON 30-04-2006 (FIGURES IN MW)

Sector	Hydro	Thermal				Nuclear	Wind/ RES.$	Total
		Coal	Gas	Diesel	Total			
STATE	125.0	1280.0	0.0	0.0	1280.0	0.0	6.0	1411.0
PRIVATE	0.0	0.0	0.0	0.0	0.0	0.0	28.0	28.0
CENTRAL	0.0	210.0	0.0	0.0	210.0	24.0	0.0	234.0
TOTAL	125.0	1490.0	0.0	0.0	1490.0	24.0	34.0	1673.0

As seen in the table above the power generating capacity of Chattisgarh as on 30 April 2006, share of thermal power is around 89%, whereas the share of renewable energy sources excluding hydro including biomass is only 2%.

As per the data published in CEA website[7], the Energy requirement in the state of Chattisgarh during 2005-06 is 12999 MU and the energy availability is 12528 MU with a energy deficit of 3.6 %. The peak demand for Chattisgarh for the same period is 2133 MW and peak met is only 1857 MW, with a peak deficit of 12.9 %.

To meet the present energy demand and growth in the energy requirement in the state of Chattisgarh, it would be required to add additional capacities for power generation. Based on the proposed conventional power projects in the state of Chattisgarh, it appears that the dependence will be more on conventional power projects.

[6] Page no.29, Power scenario at a Glance – 2006, CEA

Table 8: Proposed power projects in Chhattisgarh[7]

S. No	Project Name	Fuel	Capacity (MW)	Year of commissioning
1.	Korba East – Stage V (2 X 250 MW)	Thermal	500	Unit -1 : November 2006 Unit – 2: March 2007
2.	Korba West – Stage III (2 X 250 - 300)	Thermal	500- 600	2008 – 2009
3.	TPP, Bhaiyathan (2 X 660)	Thermal	1320	Unit -1: April 2010 Unit – 2: Oct 2010
4.	TPP, Madwa (2 X 500)	Thermal	1000	Unit – 1: April 2010 Unit – 2: August 2010
5.	TPP, M/s Jindal Power Ltd., Raigarh (4 x 250)	Thermal	1000	Unit – 1: March 2007 Unit – 2 & 3: Oct 2007 Unit – 4: Jan 2008
6.	M/s Lanco Amarkantak Power Pvt. Ltd., (1 X 250)	Thermal	250	January 2008
7.	M/s Dheeru Power Generating Ltd., (2 X 250)	Thermal	500	2008 – 09
8.	Joint venture project with M/s IFFCO, Surguja (2 X 500)	Thermal	1000	2009 – 10
9.	Bodhgat HPP, Dantewada (4 X 125)	Hydro	500	With held by Govt. of India due to involvement of more forests areas but will be reviewed soon.
10.	Matnar HPP, Bastar (3 X 20)	Hydro	60	2009 – 10
11.	Korba West Mini HPP	Hydro	1	December 2006

As could be seen from the above and the same situation prevailing in other states of the region, western region grid will become more carbon intensive in future. Hence, the resultant Emission factor (combined margin) will be higher than the weighted average emission factor.

Hence, the above scenario justifies the conservative estimation of Emission factor based on weighted average of current generation mix.

The details of the weighted average emission factor calculations are provided in Annex 3. The project is located in the state of Chattisgarh, which falls under the Western part of India. Hence, the baseline emission factor is calculated for the western grid of India.

The baseline emission factor for projection of Emission reductions is based on the latest available data for the fiscal year 2005/06. Actual emission reductions will be calculated *ex post*.

[7] Source: Salient Power Statistics, Chhattisgarh State Electricity Board, 2004 – 2005

b) Calculation of the baseline emission factor

As explained earlier, the baseline for the project activity is kWh exported to the grid by the biomass project multiplied by an emission coefficient calculated in a transparent and conservative manner as the weighted average emissions (in $kgCO_2/kWh$) of the current generation mix of the western region. For this purpose, the generation data published by Central Electricity Authority (CEA) for the western region was used. Baseline emissions were estimated as explained below.

i : Estimation of emissions from each power generating unit in the baseline

Emissions from each fossil fuel source are estimated using the following formula.

Baseline Emissions	=	Net Generation	x	Carbon Emission Factor	x	Net Station Heat Rate	x	Conversion Factor	X	Oxidation Factor
tCO_2		GWh		tC/TJ		TJ/GWh		(44/12)		

For estimation of emissions from each power generating unit in the grid, actual generation data and station heat rates monitored and published by CEA is used. IPCC default emission factors as well as local values (India's Initial National communication) for carbon emission factor (CEF) and IPCC oxidation factors of each fuel type are used. The CEA published data on Net heat rates of Thermal power plants (Performance Review of Thermal power stations) and CEA norms on station heat rates published in MNES Baselines report is considered to calculate the baseline emission factor.

Using the above formula, emissions from each power generating source are estimated. For non-fossil fuel sources such as hydro, nuclear and renewable energy sources GHG emissions are not applicable.

ii: Total grid emissions

Total emissions from all stations in the grid are estimated by summation of emissions from all baseline power generating units.

iii: Estimation of baseline emission coefficient

The baseline emission coefficient for the grid is estimated as the weighted average of all existing generation sources using the following formula.

Baseline Emission Factor	=	Baseline Emissions	/	Total Net Generation
tCO_2/GWh		tCO_2		GWh

Using the above formula and data for the year 2005-2006, the baseline emission coefficient is estimated as 887 t CO_2 /GWh. The detailed data underlying this calculation is furnished in Annex 3. For the purpose of projecting Emission reductions Emission Factor of the year 2005-06 is considered. However, the Baseline Emission factor will be updated ex-post every year during the crediting period.

B.3. 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:

>>

a) Justification for application of simplified methodology to the project activity

The capacity of the CDM project is 9.8 MW and the project activity is generation of electricity for a grid system using biomass. Hence, the type and category of the project activity meets the criteria specified under AMS I.D. in Appendix B of the indicative simplified baseline and monitoring methodologies for small-scale CDM project activities.

b) National Policies and Circumstances

National policy on Coal, Lignite, Oil and Natural Gas:

The Ministry of Power (MoP), Government of India has set an agenda of providing power for all by the year 2012. In line with the Five Year Plan system being followed by the Planning Commission of India, the MoP targeted to add about 41,000 MW during the period 2002-2007 and about 62,500 MW is planned during the period 2007-2012. Emphasis has been laid on setting up large pithead thermal power stations to avoid high costs associated with transporting high ash bearing Indian coal and over-straining the already stretched rail network.

To push forward the power sector reforms further, the Government of India has opened up the coal sector for private participation. Captive coal mining is allowed by the Ministry of Coal to facilitate coal mining by power generating units for their fuel needs. In addition, coal imports are allowed for power projects. This has significantly strengthened the preference of the private sector for coal-based mega power projects over other energy sources.

The Government of India has also opened oil and natural gas exploration for private sector participation. In the oil and natural gas sector, both central sector and private sector organisations are involved and already exploring the potential available in India. The discovery of new reserves is not significant enough to meet the increasing demand for natural gas. As yet the natural gas consumption is limited to a small extent and significant investments are required for natural gas infrastructure.

Biomass power policy in India and Chhattisgarh:

Today in India the grid electricity is dominated by thermal generation, predominantly by coal. The overall nationwide mix of thermal to hydro-electric power generation stands at 83:17 during the year 2005-06 (Source www.cea.nic.in as on March 2006). In the case of Chattisgarh State the share of thermal power generation is around 96 % and the same is expected to continue based on the projects planned in the State.

The Ministry of Non-conventional Energy Sources (MNES)[8] is engaged in development renewable energy sources in India including biomass. MNES has estimated the potential for biomass based power projects in India to an extent of 16000 MW. Against this potential, the country has so far achieved to an extent of 867 MW indicating exploitation of only about 5.4 % of the potential. Inspite of Ministry's resolve to encourage setting up of these projects by providing incentives such as interest subsidy, tax holiday etc., these projects could not be established in a large scale due to various barriers prevailing in the sector. Inspite of all propagation by MNES, the focus of power generation is on thermal projects, primarily based on coal

UNFCCC simplified modalities seek to establish additionality of the project activity as per Attachment A to Appendix B, which listed various barriers, out of which, at least one barrier shall be identified due to which the project would not have occurred any way.

Project participants have undertaken the following analysis in support of additionality.

Investment Barrier:

The project faces investment barrier with respect to uncertainty in price of biomass fuel, which is the main element in determining cost of generation and viability of project. In the state of Chattisgarh, investing in a biomass based power plant is not financially attractive compared to the baseline scenario which is coal based thermal power generation. The state is well known for its huge coal reserves, which offers coal at lower price apart from assured supply and hence, about 95% of power generation in the state is coal based. The cost of coal available in the state is very low at 800[9] per tonne, which is regulated by Coal India Limited (CIL). Where in case of a biomass-based power plant, the biomass fuel has to be procured by the project proponent based on market price. Price of biomass is not regulated by any agency and is driven by market forces. The main Biomass fuel i.e. Rice husk, being the principal input for determining the cost of generation, fluctuation in the cost of rice husk have direct effect on the viability of the project. The cost of biomass fuel at the time of project planning stage was at around Rs.650 per tonnes and subsequently during implementation stage the same is increased by 40–50%. Even though the availability of biomass in the region is surplus, the price of fuel is gone up only due to the commercial consideration of product, which has no market value before envisaging the project activity and making the cost of generation unstable. The trend of increase in price is expected to continue even

[8] Ministry of Non Conventional Energy Sources (MNES), Govt. of India, Annual Report 2005-06

[9] Coal India Limited, http://coalindia.nic.in/. As per the information available in the web site of coal India limited, the basic cost of 'E' grade coal in South Eastern Coal Limited (SECL) located in Chhattisgarh state is Rs. 600/tonne. Since the project is located in Champa district, which is adjacent to Korba district (where coal mines are located), i.e. less than 50 km from coal mines, the maximum transport and handling charges will be at Rs. 100/ tonne. However, a conservative estimate of Rs. 800 is considered for landed cost of coal.

after implementation of project activity, which affects the financial viability of the project. The situation is not same for coal based (baseline) power plant since the coal price in India is regulated by Coal India Limited (CIL), which works under ministry of Coal, Govt.of India. CIL revises and fixes the price of coal depending on the market conditions, last such revision is made on 15.06.2004 and same is applicable till date. This shows the stable and constant price of coal, which is cheaper compared to biomass at present and the same may continue for longer period, which makes the coal based power plants more attractive and less risky. This is evident from the number of coal based plants planned in the State. Though the State has issued licenses for a capacity of 288MW only few plants are established based on biomass indicating the barriers faced by the sector.

An IRR analysis has been made for the project activity and also sensitivity analysis made by considering different Scenarios. The project IRR for the project activity is worked out at 10.23 %. This low project IRR could prevent the investment in the project activity. The benchmark return i.e. Required rate of return been worked out which results at 14.32 %. By considering the CDM revenue the project IRR improves to 15.18 %. Therefore CDM revenues play an important role in taking investment decision to proceed with the project. The IRR for the project activity worked out based on the following assumptions.

Table 9: Assumptions of IRR analysis

Cost of the project/Rs. Million	425.84
Means of Finance Equity Share Capital Term Loan	 143.34 282.50
Plant Load Factor- I Year	70%
Plant Load Factor- II Year onwards	80%
Average Cost of Fuel Rs/ton	750
Fuel escalation /annum	5%
Tariff Rs/kWh	3.00
O & M and Adm. Expenses /annum (on project cost)	4%
Yearly escalation on O & M	5%
Interest subsidy (Subject a limit of Rs.20.00 million)	2%
Income tax holiday / years (Subject to MAT)	10
Interest on Term Loan	12%
Customs/Excise duty concession	10%

A sensitivity analysis has also been made for the project activity considering three probable scenarios as shown below.

Sensitivity Analysis	IRR %
Increase in generation by 10 %	13.23
Decrease in fuel price by 10 %	12.14

As could be seen from the above, the IRR is quite low compared to the Bench mark return. By considering income from sale of emission reductions the IRR will improve to 15.18 % considering income from CDM. Therefore CDM revenues are essential to make the project attractive.

In the light of above barriers the project would not have occur any way with out CDM revenues due to investment barrier and not same as baseline scenario, which is financially more viable leads to higher emissions.

Prevailing practice:

The most common practice in the state of Chattisgarh is coal based power generation. It is evident from statistics published by Chattisgarh State Electricity Board[10] during the past 15 years as furnished below.

S. No.	Year	KTPS, Korba East	HTPS, Korba West	HEP Bango	HEP Gangrel	Mini Micro Korba West	Total Generation (MU)
1	1991-92	1473.96	4649.4	0	0	0	**6123.36**
2	1992-93	1592.21	4853.41	0	0	0	**6445.62**
3	1993-94	1735.95	4940.03	0	0	0	**6675.98**
4	1994-95	1900.08	4454.98	255.87	0	0	**6610.93**
5	1995-96	2132.15	4660.78	296.77	0	0	**7089.7**
6	1996-97	2372.19	4913.06	359.25	0	0	**7644.5**
7	1997-98	2478.12	5031.22	189.13	0	0	**7698.47**
8	1998-99	1797.15	5318.17	**610.93**	0	0	**7726.25**
9	1999-00	2340.63	5017.88	430.43	0	0	**7788.94**
10	2000-01	2182.85	4956.31	233.79	0	0	**7372.95**
11	2001-02	2215.3	5540.49	403.25	0	0	**8159.04**
12.	2002-03	2022.88	5570.37	276.97	0	0.6	**7870.82**
13.	2003-04	2004.38	**5613.11**	295.97	0	3.36	**7916.82**
14.	2004-05	2484.07	5440.92	375.1	7.51	**4.68**	**8312.28**
15	2005-06	**2906.28**	5228.86	331.98	**9.25**	3.82	**8480.2**

As seen from the above table, the power generation in the state of Chattisgarh is predominantly from coal based power plants during the past 15 years. Even considering the generation during the recent two years 2004-05 and 2005-06 the contribution of thermal generation is 95.3% and 95.9% respectively. The contribution of power generation from biomass power projects is meagre, which is not even published in the statistics of CSEB.

In the state of Chhattisgarh, against an estimated potential of 531.25[11] MW, only few plants are commissioned as on the date of commencement of project activity. According to the Annual report 2004-05 published by MNES, the total capacity of independent biomass based power projects in the state of Chattisgarh as on 31.12.2005 is only 11MW. Thus, the above information clearly illustrates that establishing a biomass based power plant is not a common practice in the state of Chhattisgarh.

[10] Chattisgarh State Electricity Board (CSEB), http://www.cseb.gov.in/8.2_gen_10yrs.htm
[11] District Wise Biomass Resource Assessment Study for Chhattisgarh State, ASCI.

Even if consider, the share of generating capacity from biomass based power projects in India's total installed capacity is very minimal. According to the latest statistics published by the Ministry of Non-conventional Energy Sources (MNES)[12] the total installed capacity of independent biomass based power projects is only 376 MW, where as the India's total installed capacity is around 126,089.0 MW[13] which accounts for less than 1% (0.30).

In the light of above circumstances, it is obvious that the establishment of a biomass based power project is not a common practice in the region in the state of Chattisgarh.

Early consideration of CDM

As the project proponents are aware of the potential barriers the project activity is expected to face, have decided to consider revenue from sale of emission reductions even before the commencement of the project activity. A resolution has been adopted by the board to this affect and a copy of the same will be produced for verification of the validator.

In view of the above, the proposed project is additional and not the same as the baseline scenario and would not occur without the CDM benefits.

B.4. Description of how the definition of the project boundary related to the baseline methodology selected is applied to the small-scale project activity:

>>

The project boundary encompasses the physical and geographical site of the renewable generation source, which is considered from the point of fuel supply to the point of power export to the grid where the project proponent has a full control, as per the guidelines mentioned in Type I.D of Annex B of the simplified modalities and procedures for small-scale CDM project activities. Hence, project boundary is considered within these terminal points.

Thus, boundary covers fuel storage and processing, boiler, Steam Turbine generator and all other power generating equipments, and auxiliary consumption units upto the substation where the power will be evacuated.

B.5. Details of the baseline and its development:

>>

The baseline for the project activity is constructed according to the 9.b. i.e. weighted average emissions of the current generation mix (in kg CO_2eq./kwh), applicable for AMS.I.D CDM project activities, as contained in the Appendix B of the simplified modalities and procedures for small scale CDM project activities.

Date of completion of the baseline: 08/11/06
Name of the person / entity determining the baseline: Zenith Energy Services (P) Limited, Hyderabad.

Contact information of the above entity furnished below:

Organization:	Zenith Energy Services Pvt.Ltd
Street/P.O. Box, Building:	10-5-6/B, My Home Plaza, Masabtank,

[12] Ministry of Non Conventional Energy Sources (MNES), Govt. of India, Annual Report – 2005-06

[13] Power scenario at a Glance, CEA as on 30th April 2006.

City:	Hyderabad
State/Region:	Andhra Pradesh
Postfix/ZIP:	500028
Country:	India
Telephone:	+91- 40- 2337 6630, 2337 6631
FAX:	+91- 40- 2332 2517
E-Mail:	zenit@zenithenergy.com
URL:	www.zenithenergy.com
Represented by:	
Title:	Director
Salutation:	Mr.
Last Name:	Reddy
Middle Name:	Mohan
First Name:	Attipalli
Mobile	+91- 9849408485
Direct Fax	+91- 40- 2332 2517
Direct Telephone	+91- 40- 2337 6630, 2337 6631
Personal E.mail	mohan@zenithenergy.com

The above entity is not a project participant.

SECTION C. Duration of the project activity / Crediting period:

C.1. Duration of the small-scale project activity:

>>

C.1.1. Starting date of the small-scale project activity:

>>10/02/2005

C.1.2. Expected operational lifetime of the small-scale project activity:

>>25 years

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

>>Fixed crediting period

C.2.1. Renewable crediting period:

>>

Not chosen

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

>>

Not applicable

C.2.1.2. Length of the first crediting period:

>>Not applicable

C.2.2. Fixed crediting period:

>>

C.2.2.1. Starting date:

>>

01/09/2007 (expected date of commissioning) or from the date of registration of the project activity, which ever occurs later.

C.2.2.2. Length:

>>

10 years

SECTION D. Application of a monitoring methodology and plan:

D.1. Name and reference of approved monitoring methodology applied to the small-scale project activity:

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The name of the monitoring methodology applied for the project activity is "AMS I.D - Grid connected Renewable electricity generation"**.** The monitoring procedure is **"metering the electricity generated by renewable energy technology"**. The reference to the proposed monitoring is para 13 of AMS I.D of Appendix B of simplified modalities and procedures for small-scale CDM project activities.

D.2. Justification of the choice of the methodology and why it is applicable to the small-scale project activity:

>>

The project activity meets the eligibility criteria to use simplified modalities and procedure for small-scale CDM project activities as set out in paragraph 6 (c) of decision 17/CP.7. As the power plant is of 9.8 MW capacity, reference has been taken from indicative simplified baseline and monitoring methodologies for selected small scale (CDM projects less than 15 MW) project activity categories.

The project activity is generation of electricity using biomass potential and exporting the same to the grid system, which is also fed by other fuel sources such as fossil and non-fossil types. Emission reductions due to the project activity are considered to be equivalent to the emissions avoided in the baseline scenario by displacing the grid electricity. Emission reductions are related to the electricity exported by the project and the actual generation mix in the grid system. Ex-post approach is selected for the baseline calculation as the capacity of the biomass project is 9.8 MW. The data to be monitored to ascertain emission reductions out of the project activity is to measure the amount of electricity generated through energy meters. With this information, a reliable estimate of the amount of emission reduction can be made.

D.3 Data to be monitored:

>>

ID number	Data type	Data variable	Data Unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	For how long is archived data to be kept?	Comment
D.3.1	Power	Gross Generation	KWh	m	Daily	100%	Electronic and Paper	Crediting period plus 2 years	Meter is Calibrated and Regularly inspected by authorized third party. The meters are of 0.2s accuracy class The meters are calibrated once a year
D.3.2	Power	Auxiliary Consumption	KWh	m	Daily	100%	Electronic and Paper	Crediting period plus 2 years	Meter is Calibrated and Regularly inspected by authorized third party. The meters are of accuracy class 1 The meters are calibrated once a year once year
D.3.3	Power	Power Import	KWh	m	Monthly	100%	Electronic and Paper	Crediting period plus 2 years	Meter is Calibrated and Regularly inspected by CSEB The meters are of 0.2s accuracy class The meters are calibrated once a year
D.3.4	Power	Power Export	KWh	m	Monthly	100%	Electronic and Paper	Crediting period plus 2 years	Meter is Calibrated and Regularly inspected by CSEB The meters are of 0.2s accuracy class The meters are calibrated once a year.
D.3.5	Fuel	Type of Biomass used	MT	m	Daily	100%	Electronic and Paper	Crediting period plus 2 years	Biomass deliveries are weighted and build upon receipt at the plants, Recorded per type of biomass.
D.3.6.	Fuel	Fossil fuels (coal) used	MT	m	Daily	100%	Electronic and Paper	Crediting period plus 2 years	Fossil fuel deliveries are weighted and build upon receipt at the plants
D.3.7.	Calorific value	NCV of Biomass used	kcal/kg	m	Once in three months	100%	Electronic and Paper	Crediting period plus 2 years	The project proponent will send the sample for testing the calorific value of biomass fuel at regular intervals.
D.3.8.	Calorific Values	NCV of coal used in the plant	kcal/kg	m	batch-wise for coal	100%	Electronic and Paper	Crediting period plus 2 years	If suppliers data on calorific value is available for coal, then the same would be considered without testing the sample again.
D.3.9	Fuel	Diesel used	MT	m	Daily	100%	Electronic and Paper	Crediting period plus 2 years	The amount of diesel procurement, consumption and issuance willl be recorded
D.3.10.	Emission Factor	Grid Emission Factor (EF)	tCO2/GWh	c	Yearly	100%	Electronic and Paper	Crediting period plus 2 years	This data item is required for estimating the baseline emissions and emission reductions.

D.3.11	Fuel (renewable biomass)	Surplus biomass availability (for estimation of leakage)	MT	e	Yearly	100%	Electronic and Paper	Crediting period plus 2 years	The data item is used to estimate the leakage affect due the implementation of the project activity in the project region. The data item is a calculated value derived from the biomass assessment study carried out during the each year of the crediting period.

D.4. Qualitative explanation of how quality control (QC) and quality assurance (QA) procedures are undertaken:

>>

Data	Uncertainty level of data (High/Medium/Low)	Explain QA/QC procedures planned for these data, or why such procedures are not necessary
D.3.1 & D.3.2	Low	This data item will be recorded at the project site which is under the control of project proponent. The energy generated and consumed is measured using calibrated meters and recorded by project proponent.
D.3.3	Low	This data will be recorded at the project site and the energy imported is measured using CSEB calibrated meter. The import values will be used for the purpose of calculating net export to the grid. Sales bills/receipts may be compared as an alternative proof of the power imported from CSEB grid.
D.3.4	Low	This data item will be recorded at the grid substation, which is under the control of CSEB. The energy measured using calibrated meters and recorded at CSEB substation will be monitored. Records of measurements will be used for verification of emissions reductions. Sales bills / receipts may be compared as an alternative proof of the power exported to the grid
D.3.5 & D.3.6 & D.3.9	Low	This data item will be recorded at the inlet of the plant premises. Fuel purchase records can be used for verification of fuel purchases in each category of biomass and fossil fuels. Payments made to fuel suppliers can be used to cross check the fuel purchase records.
D.3.7 & D.3.8	Low	Fuel samples will be tested at reputed laboratories. For coal, will be obtained from coal suppliers (If available) and for diesel default values will be used. For diesel default calorific values will be used.
D.3.10	Low	Based on official data from CEA. Project participants has no influence on quality control procedures.
D.3.11	Low	The biomass assessment study will be carried out by an independent agency, based on the official statistics, scientific approaches and standard practices. Hence, it can be ensured that the compliance with QA/QC and quality of data will be high. Since the data item is not under the control of project proponent, no QA/QC procedures are applicable here.

D.5. Please describe briefly the operational and management structure that the project participant(s) will implement in order to monitor emission reductions and any leakage effects generated by the project activity:

>>

This monitoring plan is developed in accordance with the modalities and procedures for small-scale CDM project activities and is proposed for biomass power project being implemented in Chattisgarh state in India. The monitoring plan, which will be implemented by the project proponent describes about the monitoring organisation, parameters to be monitored, monitoring practices, quality assurance, quality control procedures, data storage and archiving.

The management structure proposed for monitoring of emission reductions due to the project activity mainly comprises a GHG audit team / committee which will be established immediately after commissioning of the plant. The committee performs various functions such as measuring, recording, storage of measured data and reporting to the project participants. The outcome of the committee, in the form of GHG audit reports, are being monitored monthly and annually. The committee comprised representatives of the project participant and other experts as decided from time to time. It was proposed that whenever required external independent GHG auditors would be deputed for the monitoring activities**.**

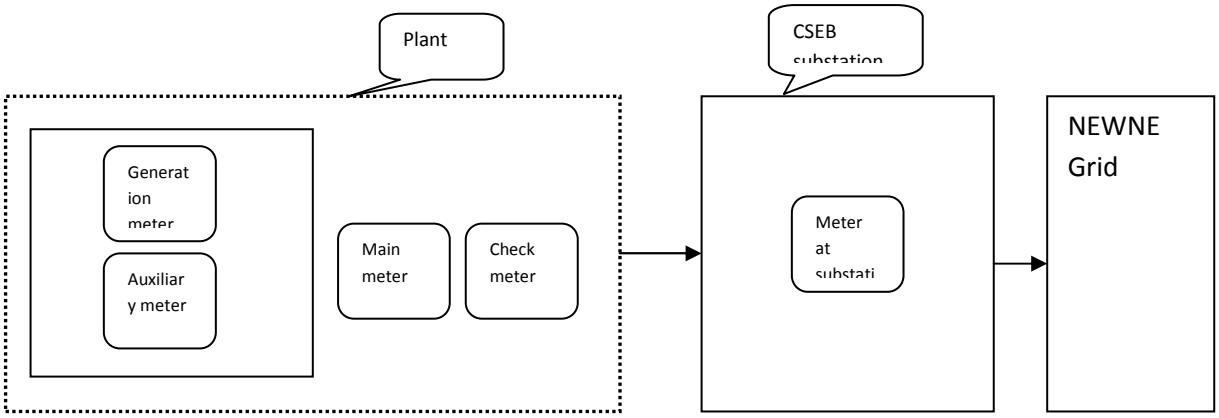
Project Management

The authority and responsibility for registration, monitoring, measurement, reporting and reviewing of the data rests with the Board of Directors. The Board may delegate the same to a competent person identified for the purpose. The identified person will be the in charge of GHG monitoring activities and necessary reports will be submitted to the management or its Committee for review.

Monitoring Requirements

The monitoring plan includes monitoring of parameters i.e. the energy fed to the CSEB grid system, Biomass and fossil fuel consumption, auxiliary consumptions and Imports. Emission reductions resulted from the project activity will be calculated using the energy fed in accordance with the calculations illustrated in Section E of the PDD. Emission reductions generated by the project shall be monitored at regular intervals. The crediting period chosen for the project activity is 10 years.

Monitoring equipment comprises of energy meters and weigh bridge meter, which will monitor the energy content of the project and quantity of fuel procured. The import energy meter monitors the energy consumption of the project taken from grid system. This meter will be installed at the cost of proponent, maintained and calibrated by CSEB as per PPA. The project proponents have no control on the quality parameters of the import meter. The weigh bridge meter will be calibrated by the project proponent as per the industrial standards of India. All the monitoring equipment will be maintained and calibrated as per the industrial standards and procedures of India. Project proponent will appoint a Designated Operational Entity (DOE) for verification of emission reductions resulted by the project activity at regular intervals during the crediting period.
Inside the control room there is a Generation Meter and an Auxiliary Consumption Meter.
In the switch yard there is a Main Meter and a Check Meter. These meters can measure both import and export.
The import billing is done on the basis of the main meter reading at the plant. In case of any failure of the Main Meter, the Check meter reading would be considered for import billing.
The CSEB substation contains only one meter that records both import and export energy. The billing for the energy export is done on the basis of this meter.



The CSEB substation contains only one meter that records both import and export energy. The billing for the energy export is done on the basis of this meter.
As per clause 12.16 of Chhattisgarh State Electricity Supply Code-2011 Interface meters (main meter) shall be installed and maintained by the State Transmission Utility or transmission licensee or distribution licensee for and at the cost of generator seeking connectivity at STU or transmission licensee or distribution licensee system as the case may be.

As per clause 12.22 of Chhattisgarh State Electricity Supply Code-2011, In case of outage of both the main and check meters, if any energy is interchanged in the intervening period the assessment has to be done on the basis of reading recorded in generator's sending end meter if found working properly by considering average of previous 3 months percentage line loss when both interface meter and generators meter were found working properly[1]

Methodology adopted for determining base line emission factor is the weighted average emissions of the generating mix in the Western grid system, which will represent the intensity of carbon emissions of the grid system. The baseline emission factor is calculated ex-post for all the years of the crediting period using the official data published by the Central Electricity Authority for the Western grid and therefore included in the monitoring procedures.

A detailed description of the monitoring plan has been described below:

The project proponent has a well defined project management structure for monitoring the project activity. The monitoring plan describes the operation and management structure, parameters and variables, monitoring practices, QA and QC procedures, data storage and archiving etc.
The project proponent is required to monitor and record power exported to the grid, along with a host of other parameters required for calculating project and leakage emissions, if any. The parameters required to be monitored have been discussed at length in the Section D.4. The following paragraphs describe the monitoring protocol, flow of data and distribution of responsibility for the monitoring, recording, archival and reporting of GHG performance data.
The details of the monitoring plan are given as follows:

Objective:

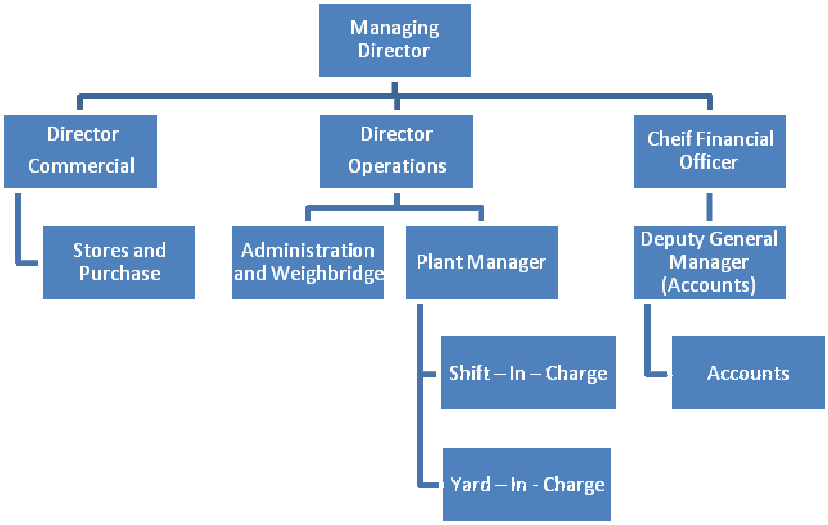
- To ensure proper monitoring and recording of all the parameters required for the computation of emission reductions from the project activity.
- To ensure proper evaluation of the project activity performance at regular intervals.
- To identify the discrepancies in the data monitoring, recording and archiving system and to open up the opportunities for future improvement

Instrumentation and Control System:
The instrumentation and control system is the key aspect for salubrious functioning of any monitoring and verification system of a project activity. The project activity will employ monitoring and control equipment of adequate standard that will measure, record, report, monitor and control various key parameters like total power generated, power used for auxiliary consumption, , amount of each type of biomass procured and consumed, any fossil fuel consumption, its calorific value. The instrumentation and control system for the power plant will be designed with microprocessor-based instruments having

[1] http://cserc.gov.in/pdf/39-Chhattisgarh%20State%20Electricity%20Supply%20Code-2011.pdf

adequate provisions to control and monitor the various operating parameters for safe and efficient operation of the boilers and the steam turbo-generator unit.

Roles and responsibilities:
Project proponent implemented the following operational and management structure in order to monitor emission reductions and any leakage effects, generated by the project activity



Project proponent formed a team/committee comprising of eight persons from relevant departments who are responsible for monitoring of all the parameters mentioned in this section. In the team, a special group of operators were formed and each of them were assigned responsibility of monitoring of different parameters and record keeping. On daily basis, the monitoring reports have been checked and discussed.

The Team

Process Owners and Responsibilities

Plant Manager:

Plant operation with the help of shift-in-charge. One shift-in-charge for each shift and the plant runs for 3 shifts per day. Shift-in-charge will coordinate with yard-in-charge and yard supervisors to monitor receipt of raw materials and its consumptions. He will also coordinate with time office for staff duties and attendance and reject any raw material based if not permitted to use.

Manager Stores and Purchase: Purchase of raw materials and equipments such as spares, etc, in consultation with Director (Commercial) and rejects any raw material based if not permitted to use.

Weighbridge Operator: Weighing of raw materials and reporting the same to Director (Operations) on shift basis. Reject any raw material based if not permitted to use.

Deputy General Manager (Accounts): Submission of bills, raise invoice, collection of payments from CSEB in coordination with accounts department. Reports to Chief Financial Officer on financial matters of the plant.

Accounts:To compile receipts from plant, purchase department, weighment slips, check for quantity and price and verify the bills, report to Deputy General Manager (Accounts) and Director (Operations) for final approval.

Training: Training of workers at Lahari Power & Steels Limited for the operation and preventive as well as periodic maintenance of key equipment will be given in accordance with the contracts signed with suppliers of these equipments.

Leakage Monitoring

The 9.8 MW project is renewable energy type and it utilizes Biomass fuel for power generation. Since no energy generating equipment is transferred from another activity nor existing equipment is transferred to another activity, leakage due to transfer of equipment is not considered. However, leakage due to competing uses of biomass has been included in the monitoring, which will be assessed during each year of the crediting period (in section D3).

Data Recording and Storage

The net energy fed to the grid system, by the project activity will be recorded by project proponents using meter at the CSEB substation in the presence of the representative of CSEB.

The billing of the energy export is done on the basis of the reading taken from the meter available at the CSEB substation. Representatives of both the project proponent and CSEB will sign the document which will contain all details such as the equipment data, calibration status, previous reading, current reading, export, import, net billable units, date and time of recording etc. This document will be used as a basic document for monitoring and verification of the net energy exported to the grid. CSEB will pay to project proponents based on this document.

Biomass and coal (if any) consumption are recorded on daily as well as monthly basis and the same can be verified from invoice data. This document will be used as a basic document for monitoring and verification of the fuel consumption for power generation.

The above document will be preserved for verification of emission reductions from the project, in safe storage. Supporting documents such as receipts of payments released by CSEB will also be preserved in safe storage for later verification by an independent third party. The period of storage will be 2 years after the end of crediting period.

D.6. Name of person/entity determining the monitoring methodology:

>>

The contact information for the entity that has determined the monitoring methodology is given below.

Organization:	M/s. Lahari Power & Steels Limited
Street/P.O. Box, Building:	Suryachakra House, Plot No: 304-L-III, Road No: 78, Jubilee Hills
City:	Hyderabad
State/Region:	Andhra Pradesh
Postfix/ZIP:	500 096
Country:	India
Telephone:	+91- 40- 2355 0597, 2355 0598
FAX:	+91- 40- 2354 1339
E-Mail:	cdm@suryachakra.com,
URL:	
Represented by:	
Title:	Director
Salutation:	Mr
Last Name:	K
Middle Name:	
First Name:	Vijay Kumar

Mobile	
Direct Fax	+91- 40- 2354 1339
Direct Telephone	+91- 40- 2355 0597, 2355 0598
Personal E.mail	vijaykumar@suryachakra.com

SECTION E.: Estimation of GHG emissions by sources:

E.1. Formulae used:

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E.1.1 Selected formulae as provided in appendix B:

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Appendix B of the simplified modalities and procedures for small-scale CDM project activities does not provide specific formulae for the baseline for project Category I.D (AMS ID).

Calculation of the project GHG emissions reductions applies a weighted average emissions factor for all thermal plants that are operational on the Western grid of India as of March 2006.

E.1.2 Description of formulae when not provided in appendix B:

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E.1.2.1 Describe the formulae used to estimate anthropogenic emissions by sources of GHGs due to the project activity within the project boundary:

>>

Due to the project being a CO_2 neutral source of energy, no anthropogenic emissions by sources of GHGs are anticipated within the project boundary due to the project activity, hence no formulae are applicable. However, use of fossil fuels is permitted in exigencies to a maximum of 25% of the total annual fuel requirement for biomass based power projects. Hence, the project may use fossil fuels such as coal in future in case of exigencies.

In the event of coal consumption, the emissions occurring from the burning of coal will be calculated using the following formula.

$$PE_y \quad \sum FF_{i,y} \quad NCV_i \quad EF_{CO2,i} \quad OXID_i$$

Where:

PE_y	are the emissions from the project activity during the year *y* in tones of CO_2
$FF_{i,y}$	is the quantity of fossil fuel type *i* combusted to supplement the biomass residues in the project activity during the year *y* in energy or mass units
NCV_i	is the net calorific value of the fossil fuel type *i* in TJ per unit of energy or mass units, obtained from local fuel supplier or from the country specific IPCC default factors
EF_{CO2i}	is the CO_2 emission factor per unit of energy or mass of the fuel type *i* in tons of CO_2 obtained from the country specific IPCC default factors
$OXID_i$	is the oxidation factor of the fuel (as per the IPCC 2006 guidelines)

For the purpose of estimating the anticipated project emissions due to the project activity, it has been assumed that coal to an extent of 10% of the annual fuel requirement will be used as supplementary fuel. The project emissions will be updated based on the ex-post monitoring of quantity of coal usage and calorific value of coal. The emissions from coal (project emissions) is deducted from the baseline

emissions to arrive Emissions reductions (E 1.2.5) of the project activity. The anticipated project emissions are provided in the table below.

Project Emissions (tCO2)

No.	Year	Biomass consumed	Coal Consumption	Total fuel consumption	coal consumption	NCV of Coal	Emission factor coal ($EF_{CO2,y}$)	Oxidation factor ($OXID_i$)	Project Emissions
		tons	tons	tons	%	kcal/kWh	tCO_2/TJ		tCO_2
Reference --->						CIL values*	India's initial national communuication	IPCC 2006 guidelines	
1	2007	54,766	6,085	60,851	10	4000	95.81	1	9748
2	2008	62,590	6,954	69,544	10	4000	95.81	1	11141
3	2009	62,590	6,954	69,544	10	4000	95.81	1	11141
4	2010	62,590	6,954	69,544	10	4000	95.81	1	11141
5	2011	62,590	6,954	69,544	10	4000	95.81	1	11141
6	2012	62,590	6,954	69,544	10	4000	95.81	1	11141
7	2013	62,590	6,954	69,544	10	4000	95.81	1	11141
8	2014	62,590	6,954	69,544	10	4000	95.81	1	11141
9	2015	62,590	6,954	69,544	10	4000	95.81	1	11141
10	2016	62,590	6,954	69,544	10	4000	95.81	1	11141
Total Project Emissions									**110,017**

* Coal grade considered is 'E' and the calorific values taken in a conservative manner as spcified by Coal India Limited (CIL)

E.1.2.2 Describe the formulae used to estimate leakage due to the project activity, where required, for the applicable project category in appendix B of the simplified modalities and procedures for small-scale CDM project activities

>>

No leakage is anticipated due to the project activity as the generating equipment is not transferred from another activity.

Emission due to Transportaion (Biomass & Ash)

	Parameter	Unit	Value
a	Total biomass required for the project	tonnes/annum	70000
b	Average Return trip distrance for biomass transportation	km	150
c	Total Ash Generation** (anticipated)	tonnes/annum	5600
d	Average Return trip distrance for Ash utilization or disposal	km	20
e	Average load per truck Total	tonnes	10
f	Distance travelled Consumption	km	1061200
g	of Diesel by truck	km/Litre	5
h	Total Diesel consumption for transportation	Litres	212240
i	Density of Diesel	kg/Litre	0.82
j	Total Diesel consumption	kg	174037
k	Energy value of Diesel (IPCC)	$TJ/10^3$ tonnes	43.33
l	Total Energy from Diesel	TJ	7.54
m	Emission factor of Diesel	t CO_2/TJ	74.1
n	Total Transport Emissions	t CO_2	**559**

* AVD considered is the average possible distance from plant site (75, 75+75 = 150 km)

** Ash Generation is considered at 8% of total biomass consumption per year for projection

Since, Emissions due to coal transportation has not been considered while calculating the baseline emission factor of southern regional grid, the project proponent ignored the Leakage Emissions due to transportation of biomass and disposal of Ash from the project activity which is negligible.

The project activity is generation of electricity using Biomass residues or wastes; hence, according to the Attachment C to Appendix B of simplified modalities and procedures, the leakage source applicable is 'Competing use of biomass'. The project proponents conducted a Biomass Assessment Survey in the project region to ensure that the biomass available in the region is in surplus, which is not utilized so far. According to the Biomass Assessment Report, the total generation of biomass residues with in the 75km radius of project is 1.15 million tonnes (mt), where as the consumption of the region is 0.83 mt. The surplus biomass available is 0.32 mt. The leakage calculation is demonstrated in the below table:

Leakage - Competing use of Biomass

	Parameter	Unit	Value
a	Total biomass available in the region (with in 75 km radius)	t/y	1,150,739
b	Total conumption of the reigon	t/y	828,752
c	Biomass requirement of the project activities in the region (9.8 MW)	t/y	70,000
d	Total biomass consumption of the region including project activity	t/y	898,752
e	Total surplus in the region after accounting for all types of consumption	t/y	251,987
f	Percentage of surplus available biomass in the reigon (e/d%)	%	**28%**

The total quantity of surplus biomass in the region is 28 % larger than the total biomass consumption in the region. Hence, the leakage emissions due to competing use of biomass is neglected. The leakage affect due to competing uses of biomass will be monitored every year during the crediting period to ensure that the implementation of project activity does not lead to GHG emissions elsewhere due to usage of other fossil fuels in the project region. A biomass availability survey will be carried out during every of year of the crediting period to asses the surplus avail ability of biomass in the project region, if it is found that the project leads to leakage affect, the emissions due to leakage will be estimated and deducted from the emission reductions.

The main biomass residues i.e. agro industrial and crop residues used for this project, is considered as renewable biomass since their use does not lead to a decrease of carbon pools as defined in Annex 18 of the report of EB 23 meeting.

E.1.2.3 The sum of E.1.2.1 and E.1.2.2 represents the small-scale project activity emissions:

>>

Year	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Project emissions, E.1.2.1, tCO2	9,748	11,141	11,141	11,141	11,141	11,141	11,141	11,141	11,141	11,141
Leakage, E.1.2.2, tCO2	0	0	0	0	0	0	0	0	0	0
Total, E.1.2.1 + E.1.2.2, tCO2	9,748	11,141	11,141	11,141	11,141	11,141	11,141	11,141	11,141	11,141

E.1.2.4 Describe the formulae used to estimate the anthropogenic emissions by sources of GHGs in the baseline using the baseline methodology for the applicable project category in appendix B of the simplified modalities and procedures for small-scale CDM project activities:

>>
As per AMS I.D.

iv. Estimation of baseline emissions

Baseline emissions or emissions avoided by the project activity are estimated using the following formula.

Baseline Emissions tCO_2	=	Grid Emission Factor tCO_2/GWh	x	Net Power export GWh

The power export from the project for the optimum year is anticipated at 61.81 GWh, based on which the baseline emissions are estimated and tabulated.

Baseline Emissions (tCO2)

S.no	Year	Gross energy (GWh)	Net enrgy export (GWh)	Emission Factor (tCO2/GWh)	Baseline Emissions (t CO2)
1	2007	54.33	48.90	887	43373
2	2008	62.09	55.88	887	49569
3	2009	62.09	55.88	887	49569
4	2010	62.09	55.88	887	49569
5	2011	62.09	55.88	887	49569
6	2012	62.09	55.88	887	49569
7	2013	62.09	55.88	887	49569
8	2014	62.09	55.88	887	49569
9	2015	62.09	55.88	887	49569
10	2016	62.09	55.88	887	49569
Total Baseline Emissions					**489494**

E.1.2.5 Difference between E.1.2.4 and E.1.2.3 represents the emission reductions due to the project activity during a given period:

>>

Year	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Baseline emissions, **E.1.2.4**, tCO_2	43,373	49,569	49,569	49,569	49,569	49,569	49,569	49,569	49,569	49,569
Project emissions, **E.1.2.3**, tCO_2	9,748	11,141	11,141	11,141	11,141	11,141	11,141	11,141	11,141	11,141
Emissions Reductions, **E.1.2.4 – E.1.2.3,** tCO_2	33,625	38,428	38,428	38,428	38,428	38,428	38,428	38,428	38,428	38,428

E.2 Table providing values obtained when applying formulae above:

>>

S. No	Year	Annual estimation of emission reductions in tonnes of CO_2eq.
1.	2007	33,625
2.	2008	38,428
3.	2009	38,428
4.	2010	38,428
5.	2011	38,428
6.	2012	38,428
7.	2013	38,428
8.	2014	38,428
9.	2015	38,428
10.	2016	38,428
Total emission reductions (tonnes of CO_2 eq.)		**379,477**
Total number of crediting years		**10**
Annual average over the crediting period of estimated reductions (tonnes of CO_2eq.)		37,947

SECTION F.: Environmental impacts:

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

>>

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), A Rapid Environmental Impact Assessment (EIA) study is carried out by the project proponent. However, the study concluded that no negative impacts are possible from the proposed project activity. Satisfied with the study and Environmental Management Plan (EMP) proposed to implement during construction and Operation Govt.of India has issued its consent for implementation of project activity.

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 type of pollutions, which affect the environment, emanating from the biomass plant can be classified as follows:

Air pollution
Water pollution
Thermal pollution
Noise Pollution

The pollutants generated from the biomass plant are as follows:

Dust & particulate matter in the flue gas
Fly ash from the hoppers
Furnace bottom ash
Effluent from water treatment plant

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 and will be monitored periodically.

Waste as Wealth

The ash collected from the bottom of furnace will be taken to the ash silo through belt conveyors and the as collected in the air heater hoppers and ESP hoppers are taken to an ash silo through a pneumatic conveying system. 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 from Boiler blow down, DM plant, RO plant and Sewage from the power plant buildings.

Waste Water Treatment

The blow down water form boiler will be taken to guard pond for cooling and later will be used for green belt development. Waste water from DM plant and RO plant will be taken to neutralization pit followed by solar evaporation. Sewage water will be disposed to septic tank followed by soak pit.

Noise Pollution Control

The major source of noise pollution in the biomass power plant is from the following:

Rotating equipments like ID, FD, SA fans
Feed pumps
Boiler and super heater safety valves
Start up vent
Steam turbine
DG sets

The project proponent will take various preventive & precautionary steps to control the noise pollution caused by the above mentioned auxiliaries.

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, 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 socioeconomic status of the area.

Hence, the project is not likely to have any significant adverse impacts on the environment during construction and operational lifetime.

SECTION G. Stakeholders' comments:

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

>>
Since the project is small capacity project, stakeholder's comments need not be obtained as per various regulations in force in India. However, the project owners have consulted with various stakeholders as listed below for their comments. The procedure is approaching stakeholders directly and inviting their comments on the proposed project. Public hearings through various media, etc. do not call for due to the small size of the project. However, the project participants assembled the local populace on 15th April, 2006 and informed about the project and asked for their comments. No negative comments are received. During the informal meeting called by the local village panchayat, 10 people have participated. The members expressed their enthusiasm on coming up of the power generation unit in their village and expressed satisfaction.

The project participants, as required for setting up the project, have identified the following stakeholders.

Local populace.
Local populace, represented by the Debadih Gram Panchayat, the elected administrative body of the village Madwa where the project is getting implemented, will issue No-Objection Certificate (NOC) for setting up of the project under the jurisdiction of the village.

*Chhattisgarh State Electricity Board (**www.cseb-powerhub.com**)*

Chhattisgarh State Electricity Board (CSEB), a state utility company with various roles of power

generation, transmission and distribution throughout the state of Chhattisgarh.

*Chhattisgarh State Electricity Regulatory Commission (**www.chhattisgarhserc.org**)*

Chhattisgarh State Electricity Regulatory Commission (CSERC) plays the role of tariff fixation, licensing, grievance redressing, regulating power purchase and procurement processes of the transmission and distribution utilities through out the state of Chhattisgarh.

*Chhattisgarh State Renewable Energy Development Agency (**www.credacg.com**)*

Chhattisgarh State Renewable Energy Development Agency (CREDA), Department of Energy, Govt. of Chhattisgarh, a nodal agency to undertake development, techno-economic viability of renewable energy and facilitates energy conservation in the state of Chhattisgarh.

*Chhattisgarh State Environment Conservation Board.(**www.csecb.org**)*

Chhattisgarh Environment Conservation Board (CECB), a regulatory body to monitor environmental impacts and environmental management of industries, accords clearances for setting up of industries in the state after ensuring adherence to the statutory regulations. Also gives Consent for Establishment (CFE) and Consent for Operation (CFO) for the project if it satisfies with the environmental management and pollution control measures.

*Ministry of Non-conventional Energy Sources, Govt. of India (**www.mnes.nic.in**)*

The Ministry of Non-Conventional Energy Sources (MNES), Govt. of India, is a nodal ministry which looks for all matters relating to new and renewable energy like Bio-Energy, Wind, Hydro, solar, Geothermal, Tidal etc.

The project participants prepared necessary documentation before implementation of the project activity and approached the above stakeholders individually. The project participants have received no negative comments, which is evident from the following approvals and the clearances.

Village Panchayat

Local populace, represented by Madwa Gram Panchayat, the elected administrative body of the village Madwa where the project is implemented, issued NOC (No-Objection Certificate) for the project.

Chhattisgarh Renewable Energy Development Agency (CREDA)

Chhattisgarh Renewable Energy Development Agency (CREDA) has issued license for setting up of project vide **Ref. 6195/ Biomass/RSB/Creda/2003** dated 15.10.2003

Chhattisgarh State Electricity Board (CSEB)

a. Chhattisgarh State Electricity Board (CSEB) has given permission for installation and running of biomass based power plant vide **No. 02-02/SE-I/12/78.01/2230** dated 31st May 2003

b. Power Purchase Agreement was done with Chhattisgarh State Electricity Board (CSEB) on 1st August 2006.

Chhattisgarh State Environment Conservation Board (CECB)

Chhattisgarh Environment Conservation Board (CECB) has given permission for establishing the project vide letter **No.2765/TS/CECB/2004** dated 20th July 2004.

Ministry of Coal

Ministry of Coal, Govt. of India has given permission to use coal as a back up fuel

Chhattisgarh State Electricity Regulatory Commission (CSERC)

CSERC has framed tariff policy for the project through out the state of Chhattisgarh, which is applicable to the proposed project activity also.

Ministry of Non-Conventional Energy Sources (MNES)

MNES has recognised the project activity under Non-Conventional Energy sources

G.2. Summary of the comments received:

>>

No negative comments are received on the project activity, which is evident from the licences / approvals / clearances accorded to the project activity by the stakeholders.

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

>>

No comments received; hence no report is applicable**.**

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	M/s Lahari Power & Steels Limited
Street/P.O. Box, Building:	Suryachakra House, Plot No: 304-L-III, Road No: 78, Jubilee Hills,
City:	Hyderabad
State/Region:	Andhra Pradesh
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E-Mail:	cdm@suryachakra.com,
URL:	
Represented by:	
Title:	Director
Salutation:	Mr.
Last Name:	k
Middle Name:	
First Name:	Vijay Kumar
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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No public funding from the parties included in Annex – I is involved in the project activity

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Annex 3
Baseline Information

Baseline Information for Western Region

Power Stations	Owner	Installed capacity MW	Fuel	Net Generation GWh 2005-06	Station heat rate kcal/kWh	IPCC / Local emission factor tC/TJ	Oxidation factor (IPCC 2006)	Emission factor tCO2/GWh	Emissions tCO2 2006
	1	1	2	1	2	3	3		
GUJARAT									
Dhuvaran	GEB	534	Coal 4F	**1459.63**	2717	26.13	1	1088	**1588252**
Ukai	GEB	850	Coal 4F	**5363.09**	2746	26.13	1	1100	**5897972**
Gandhi Nagar	GEB	660	Coal 4F	**3703.6**	2568	26.13	1	1028	**3808958**
Wanakbori	GEB	1260	Coal 4F	**8472.06**	2561	26.13	1	1026	**8689319**
Sikka REP	GEB	240	Coal 4F	**1404.7**	2926	26.13	1	1172	**1646058**
Torr Pow Sab.	AECO	330	Coal	**2703.14**	2717	26.13	1	1088	**2941340**
Torr Power AEC	AECO	60	Coal	**485**	2717	26.13	1	1088	**527738**
GSECL (G.5)	GSECL	210	Coal 4F	**1743.46**	2717	26.13	1	1088	**1897094**
GSECL (W.7)	GSECL	210	Coal 4F	**1709.31**	2717	26.13	1	1088	**1859934**
Utran GT	GSECL	144	Gas HBJ	**1077.44**	2061	15.3	1	483	**520727**
Dhuvaran CCPP	GSECL	106.6	Gas HBJ	**707.33**	2061	15.3	1	483	**341853**
Hazira CCCP	GSEGL	156.1	Gas HBJ	**1182.21**	2061	15.3	1	483	**571363**
G.T.E CORP	GTE	655	Gas HBJ	**4755.99**	2061	15.3	1	483	**2298572**
Kawas GT	NTPC	644	Gas HBJ	**2884.2**	2061	15.3	1	483	**1393935**
Gandhar GT	NTPC	648	Gas HBJ	**4478.2**	2061	15.3	1	483	**2164316**
Torr Pow.Vat.GT	AECO	100	Gas HBJ	**718.17**	2061	15.3	1	483	**347092**
Essar GT IMP	Essar	515	Gas HBJ	**1800.94**	2061	15.3	1	483	**870395**
GIPCL GT	GIPCL	154	Gas HBJ	**2321.14**	2061	15.3	1	483	**1121808**
Surat LIG	GIPCL	250	Lignite	**1874.15**	2742	28.95	1	1217	**2280174**
Akrimota	GMDCL	250	Lignite	**168.29**	2717	28.95	1	1206	**202882**
Kutch LIG	GEB	215	Lignite	**669.62**	3368	28.95	1	1494	**1000684**
UKai	GEB	305	Hydro	**580.49**				0	**0**
Kadana	GEB	240	Hydro	**209.17**				0	**0**
S.Sarovar RBPH	SSVNL	1000	Hydro	**1752.86**				0	**0**
S.Sarovar CHPH	SSVNL	250	Hydro	**208.65**				0	**0**
Kakrapara	NPC	440	Nuclear	**2366.94**				0	**0**
MADHYA PRADESH									
Satpura	MPGPCL	1142.5	Coal 4F	**7581.25**	3288	26.13	1	1317	**9982970**
Amar Kantak	MPGPCL	60	Coal 4F	**150.26**	2717	26.13	1	1088	**163501**
Amar Kantak Ext	MPGPCL	240	Coal 4F	**952.57**	3918	26.13	1	1569	**1494681**
Sanjay Gandhi	MPGPCL	840	Coal 4F	**4856.34**	2829	26.13	1	1133	**5502109**
Vindh_Chal STPS	NTPC	2260	Coal 3E	**18304.6**	2717	26.13	1	1088	**19917600**
Gandhi Sagar	MPGPCL	115	Hydro	**148.01**				0	**0**
Bargi	MPGPCL	90	Hydro	**565.35**				0	**0**
Pench	MPGPCL	160	Hydro	**422.13**				0	**0**
Madhikhera	MPGPCL	0	Hydro	**0**				0	**0**
Rajghat (MP)	MPGPCL	45	Hydro	**135.68**				0	**0**
Bansagar (I)	MPGPCL	315	Hydro	**996.57**				0	**0**
Bansagar (II)	MPGPCL	30	Hydro	**156.12**				0	**0**
Bansagar (III)	MPGPCL	60	Hydro	**89.19**				0	**0**
Bansagar(IV)	MPGPCL	0	Hydro	**0**				0	**0**
Binsinghpur	MPGPCL	20	Hydro	**55.69**				0	**0**
Tawa	HEGL	13.5	Hydro	**23.88**				0	**0**
Indira Sagar	NHDC	1000	Hydro	**2572.97**				0	**0**

CHATTISGARH									
Korba-II	CSEB	200	Coal 4F	**1610.63**	2946	26.13	1	1180	**1900271**
Korba-III	CSEB	240	Coal 4F	**1587.1**	2946	26.13	1	1180	**1872510**
Korba-West	CSEB	840	Coal 4F	**5746.38**	2653	26.13	1	1062	**6105465**
Korba-STPS	NTPC	2100	Coal 4F	**16001.3**	2717	26.13	1	1088	**17411333**
Hasdeobango	CSEB	120	Hydro	**358.28**				0	**0**
Gangrel	CSEB	5	Hydro	**8.72**				0	**0**
MAHARASTRA									
Nasik	MSEB	910	Coal 4F	**5753.17**	2651	26.13	1	1062	**6108071**
Koradi	MSEB	1100	Coal 4F	**6460.34**	2981	26.13	1	1194	**7712665**
K_Kheda II	MSEB	840	Coal 4F	**5703.99**	2600	26.13	1	1041	**5939354**
Paras	MSEB	62.5	Coal 4F	**479.72**	3198	26.13	1	1281	**614403**
Bhusawal	MSEB	482.5	Coal 4F	**3381.68**	2635	26.13	1	1055	**3568620**
Parli	MSEB	690	Coal 4F	**5161.2**	2665	26.13	1	1067	**5508521**
Chandrapur	MSEB	2340	Coal 4F	**13987.27**	2611	26.13	1	1046	**14626047**
Dhanu	BSES	500	Coal 2W	**4323.11**	2298	26.13	1	920	**3978629**
Trombay	TATA MAH	1150	Coal 3E	**7854.36**	2717	26.13	1	1088	**8546486**
Uran GT	MSEB	672	Gas HBJ	**2430.23**	2061	15.3	1	483	**1174531**
Uran WHP	MSEB	240	Gas HBJ	**1318.35**	2061	15.3	1	483	**637159**
Trombay GT	TATA MAH	180	Gas HBJ	**1330.75**	2061	15.3	1	483	**643152**
Dhaboi GT	ENRON	740	Gas HBJ	**0**	2061	15.3	1	483	**0**
Koyna	MSEB	1960	Hydro	**4463.06**				0	**0**
Vaitarna	MSEB	61.5	Hydro	**170.87**				0	**0**
Tillari	MSEB	60	Hydro	**182.95**				0	**0**
Bhira Tail Race	MSEB	80	Hydro	**98.76**				0	**0**
Eldari	MSEB	22.5	Hydro	**16.3**				0	**0**
Veer	MSEB	9	Hydro	**46.36**				0	**0**
Bhatgarh	MSEB	16	Hydro	**57.76**				0	**0**
Paithon	MSEB	12	Hydro	**24.92**				0	**0**
Bhandardhara	MSEB	44	Hydro	**44.89**				0	**0**
Pawana	MSEB	10	Hydro	**13.51**				0	**0**
Radhanagri	MSEB	4.8	Hydro	**8.97**				0	**0**
Kvasla (Panshet)	MSEB	8	Hydro	**58.24**				0	**0**
K_Vasla (Varsa)	MSEB	8	Hydro	**21.5**				0	**0**
Bhatsa	MSEB	15	Hydro	**85.14**				0	**0**
Kanher	MSEB	4	Hydro	**14.7**				0	**0**
Ujjaini	MSEB	12	Hydro	**44.04**				0	**0**
Surya	MSEB	6	Hydro	**22.62**				0	**0**
Manikhod	MSEB	6	Hydro	**8.05**				0	**0**
Dhom	MSEB	2	Hydro	**10.5**				0	**0**
Dimbe	MSEB	5	Hydro	**10.58**				0	**0**
Warna	MSEB	16	Hydro	**60.9**				0	**0**
Dudh Ganga	MSEB	24	Hydro	**59.02**				0	**0**
Bhira	TATA MAH	150	Hydro	**479.79**				0	**0**
Bhira PSS	TATA MAH	150	Hydro	**701.46**				0	**0**
Bhivpuri	TATA MAH	72	Hydro	**427.83**				0	**0**
Khopoli	TATA MAH	72	Hydro	**414.47**				0	**0**
Tarapur	NPC	860	Nuclear	**3714.63**				0	**0**
GOA									
Reliance Energy	REL	48	Coal	**302.75**	2717	26.13	1	1088	**329428**
Total				**186871.54**					**165707970**

Summary

Year - 2005/06			
	GWh	**Emissions**	**%**
Hydro	15831	0	8
Coal	137242	150139328	73
Gas	25005	12084902	13
Lignite	2712	3483740	1
Nuclear	6082	0	3
Total	**186872**	**165707970**	**100**
Avg $\sum EF_{Baseline}$		**887**	

References

BASE LINE DATA

The methodology adopted for the calculation of the baseline is 'Simple weighted average of the current
generation mix". Year 2005-06 is considered as the base year for prediction of future capacity additions during the crediting period. Western Grid generation data as tabulated in Annex-3 is used for consideration of installed Western grid capacity and energy availability during the period 2005-06.

In order to arrive at the detailed break up of power generation mix in Western Region, various documents and various web sites were refereed. The websites refereed for estimating the generation mix in Western regional grid are:

1 http://.mnes.nic.in
2. http://cea.nic.in
3. IPCC 2006 Guidelines for National Greenhouse Gas Inventories: Reference Manual and India's first Initial national communication to UNFCCC.

As per the availability, actual generation figures as against the sector wise installed capacity were used. Wherever the break up of generation was not available, proportionate calculated figures were used so as to match the total energy availability.

References for completing PDD.

1. Website of United Nations Framework Convention on Climate Change (UNFCCC), http://unfccc.int
2. UNFCCC document: Clean Development Mechanism, Simplified Project Design Document For Small Scale Project Activities (SSC-PDD), Version 02
3. UNFCCC document: Simplified modalities and procedures for small–scale clean development mechanism project activities
4. UNFCCC document: Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories, Version 10, 23 December 2006
5. Detailed project report of project

Annex - 4

Abbreviations

CEA	Central Electricity Authority
CO_2	Carbon dioxide
CREDA	Chhattisgarh Renewable Energy Development Agency
CSEB	Chhattisgarh State Electricity Board
CSECB	Chhattisgarh State Environment Conservation Board
CSERC	Chhattisgarh State Electricity Regulatory Commission
EIA	Environment Impact Assessment
GHG	Greenhouse gas
Gwh	Giga watt hour
IPCC	Inter Governmental Panel On Climate Change
kWh	Kilo watt hour
MW	Mega watt
MNES	Ministry of Non Conventional Energy Sources
PDD	Project design document
UNFCCC	United Nations Framework Convention on Climate Change

Annex - 5

Minutes Of The Stakeholders Meeting With Respect To 9.8 Mw Biomass Based Power Project Of Lahari Power & Steels Limited Held At Gram Panchayat Office Of Madwa Village, Champa-Janjgir District Of Chhattisgarh State.

Lahari Power & Steels Limited., the project proponent of 9.8 MW Biomass based power project have conducted a public meeting with the farmers and Panchayat members of Madwa village on 15th April, 2006 at IST 07:30 AM to ascertain the views of the stakeholders with respect to setting up of the biomass based power generating station. In response to the notice from the project proponent, Panchayat members and number of farmers have participated in the public meeting and expressed their views on the project. Proceedings of the meeting are summarized below.

The following members have attended the meeting.

Panchayat Members

1. Mr. Jeevan Kumar Gord
2. Mr. Krishna Kumar
3. Mr. Yogesh Singh – Vice Surpanch
4. Mr. Mahesh
5. Mr. Pool Singh
6. Mr. Mohan Singh
7. Mr. Gopal Singh
8. Mr. P N P Raju
9. Mr. J B Prasad
10. Mr. B Umamaheswar

Representatives of Project proponent: Mr. Prasad

Consultant's Representative: 1. Reginald V J
2. Balagurunathan S

Minutes of the Meeting:

The company representative, Mr. Prasad who is also the project in-charge initiated the meeting with a thank note to all the members for their presence in the meeting and the help extended by certain members of the village in acquiring the land for setting up the unit.

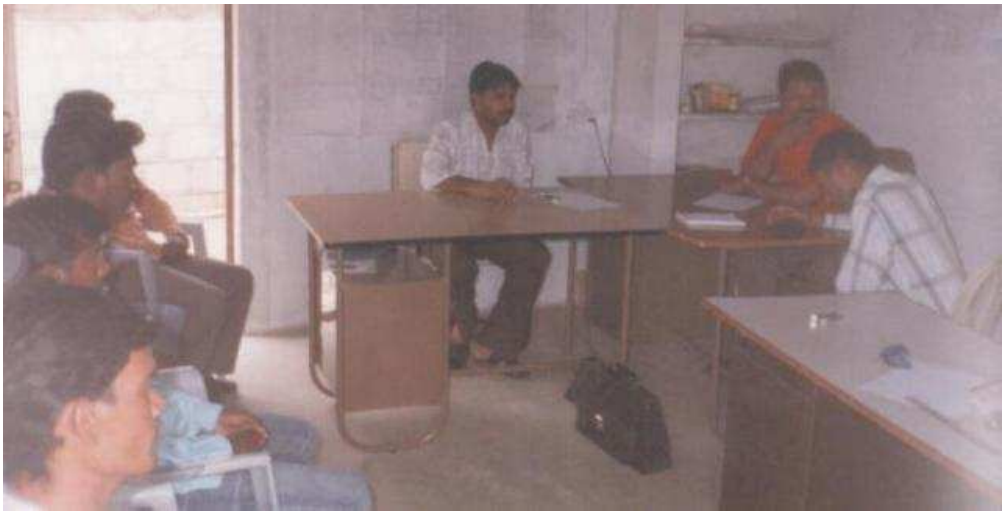
Mr. Prasad explained about the purpose of meeting along with a brief note on the profile of the company and the unit. He also explained the benefits by coming up of the project and its benefit to the region, benefits to the rice millers, farmers, utility etc. especially about the improvement in local grid supply and ended the speech by inviting the members to give their comments.

The members expressed their enthusiasm on coming up of the power generation unit in their village and expressed satisfaction. The members inquired about the raw materials of the unit and its procurement plan, for which Mr. Prasad explained that the unit envisages using rice husks and other crop residues as basic raw material and the same will be procured directly by the company through farmers or agents. Mr. Prasad also mentioned that the company proposes to set up stock yards at different geographical locations of the area for mutual benefit. The members were happy to know that the raw material needed for the

plant will fetch them additional revenue and assured sustainable supply of raw material. The attendees informed that the company will get the required quantity of raw material in Raipur district and suggested the company to put more efforts on stocking and procurement plan of the raw material.

All members were satisfied and expressed happiness for conducting the meeting and wished for commissioning of project at the earliest. No adverse comments were received at the meeting. Below some pictures depicting the members of the meeting and signatures of the attendees are provided.

Fig shows Notice intimating conducting of stakeholder meeting



Figures shows stakeholder's meeting conducted at Grampanchayat Office