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:

"8.5 MW Biomass based Power Project" By Shivalik Power & Steel (P) Ltd
Version: 1.2
Date: 15th February 2006

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

M/s Shivalik Power & steel (P) Ltd. (SPSL) is a new company incorporated on 29th April 2004 and proposes to invest in power plants as well as energy intensive businesses of steel castings. The company is planning to setup a new power plant using biomass (mainly rice-husk) available in the region. The power generated in the plant will be used by own steel plant (expected to start operations in 2007) using direct transmission line. Till the time steel plant is commissioned power would be wheeled to other users using state grid (M/s Vindhyavasini Industries Pvt. Ltd. (a group company) and M/s Gold Star Pvt. Ltd). After steel plant commissioning additional power not used in the steel plant would be exported to third parties using state grid. Apart from rice husk other agro wastes such as rice-straw etc will also be used for power generation

Since, Chattisgarh state has a major shortage of power, promoters have decided to set-up one 8.5 MW grid interfaced power plant at Village Belsonda, Mahasamund District at Chattisgarh state. To achieve lower carbon emissions, biomass will be used as fuel for power generation. The proposed project shall use the surplus biomass available from the region and thus not impact the current use areas of the biomass.

Though the biomass availability in the region is abundant it has been observed (in many Indian states such as Punjab, Uttar Pradesh, and Andhra Pradesh etc) that biomass prices escalate substantially with increased usage. Carbon Credits from this project shall also be utilized in mitigating the fuel risks and to make investments in developing dedicated fuel sources.

The proposed project shall use the conventional combustion and steam-power cycle. The pressure and temperature chosen are at 67 Kg/ Sq. cm. and 480 Deg. C respectively. The pressure and temperature are less than more efficient rankine cycle plants (operating at 87 Kg/Cm2 or 105 Kg/Cm2). This lower pressure technology has been chosen to facilitate the use of biomass. Registering the project under Clean Development Mechanism of UNFCC and availing CERs will compensate lower efficiency as well as lower Plant Load Factor (PLF) of the plant compared to normal coal fired power plants.

Sustainable Development:
Proposed CDM project activity has following sustainable development aspects:

Social well being:

It is estimated that Chattisgarh is expected to have a peak shortage of around 540 MW[1] during the current financial year and continue to remain so till 2009-10 in spite of the increase in the installed capacities. The proposed project thus shall help in meeting demand-supply gap in the state.

[1] Ministry of Power (MOP) data

The use of biomass shall provide an additional source of income to this mainly agriculture dependent community. Setting up of collection & delivery channel will generate employment for the local community.

Economic well being:

Apart from direct employment in the plant (1428 man-months/annum in plant operations and 1600 man-months during construction of plant, there will also be indirect employment generation mainly in biomass collection & delivery network.

The company proposes to launch large-scale biomass fuel resource development program that will employ significant numbers in the activity. This program will be developed using revenue from sale of carbon credits of the project.

Environmental well being:
The burning of biomass fuels result in zero emission of GHGs as amount of CO2 generated during combustion is taken in during the growth of the biomass.

There are no endangered species to be affected due to the proposed project. There will be no impact on soil, forest cover and water quality in the region due to proposed power project.

Technological well being:
The technology used in the power plant is well proven and safe.

A.3. Project participants:

Name of Party involved (*) ((host) indicates a host Party)	Private and/or public entity(ies) project participants (*) (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
Government of India (Host Party)	Shivalik Power & steel (P) Ltd.	No

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

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

The proposed project site is located in the State of Chattisgarh in India.

A.4.1.1. Host Party(ies):

India

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

The proposed project site is located in the State of Chattisgarh

A.4.1.3. City/Town/Community etc:

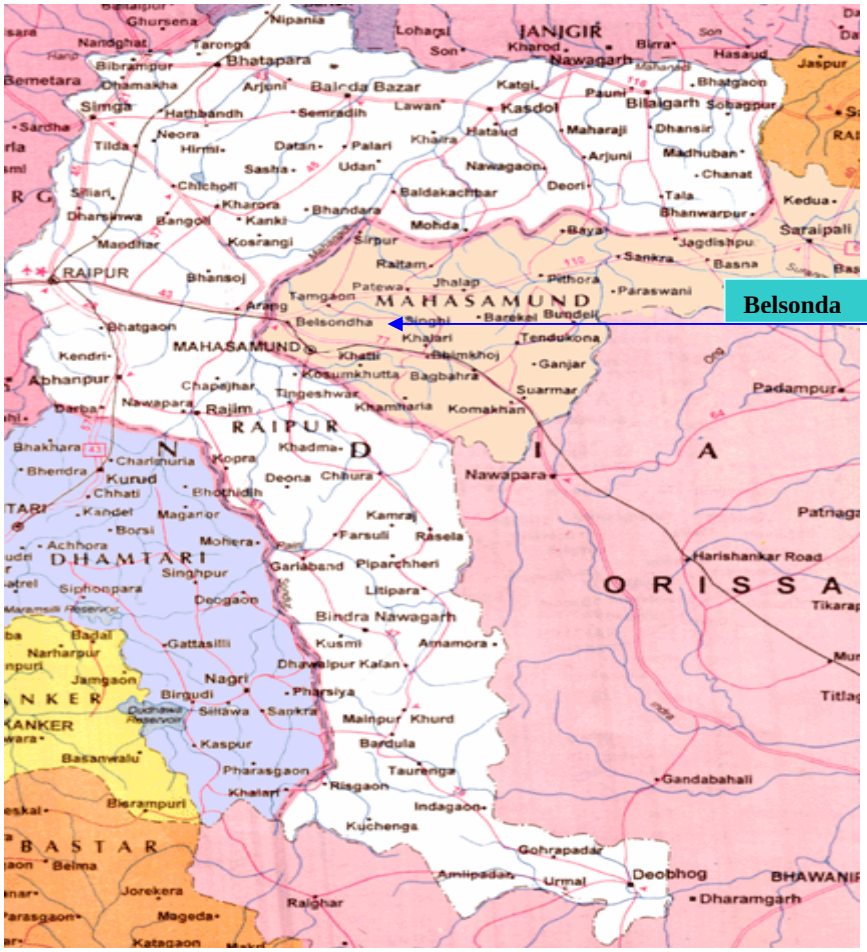
Village : Belsonda
Block : Mahasamund

Tehsil & District : Mahasamund

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

The plant site is located in village Belsonda of Mahasamund district, which is one of the well developed and largest paddy growing areas in the state of Chattisgarh. There are 187 rice mills located within the range of 75 km radius, supplying agro residue namely rice husk. Apart from rice husk other agro wastes such as rice-straw etc will also be used in the plant.

Physical location is depicted in the following map(s):



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

Project Type: I– Renewable Energy Projects

Project Category: I.D. 'Grid connected renewable electricity generation'

The project conforms to the project category since the project is a biomass based renewable energy project. It has an installed capacity of 8.5 MW which is below the maximum capacity of 15MW mandated under category ID.

The proposed project shall use the conventional combustion and steam-power cycle. The pressure and temperature chosen are at 67 Kg/ Sq. cm. and 480 Deg. C respectively. The project capacity will never increase above 15 MW using following equipments as required by Type I.

Boiler	
Capacity	40 TPH
Type	FBC, Fluidised Bed Combustion
Steam Pressure at Boiler Outlet	67 Kg/sq. cm.
Steam Temp. at Boiler Outlet	480 Deg. C
Turbine	
Capacity	8.5 MW
Turbo Generator Type	Condensing

No Technology transfer from annex-1 countries to host country is taking place.

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:

As per IPCC guidelines power generation using biomass is considered GHG neutral thus the project will reduce anthropogenic GHG emissions by replacing fossil-fuel electricity generation with GHG-neutral biomass electricity generation. In addition it will prevent current ways of inefficient burning or rotting of biomass in open fields.

Biomass based power generation is not the most attractive option for the project promoters. Taking into account financial and supply related constraints Project Proponents would have chosen coal as the choice of fuel for their proposed power plant. Also uncertainties involved in the biomass procurement (supply and price variation) impose barriers for biomass based power projects. However taking into account CERs benefits under CDM and to help reduce GHG emissions from fossil fuel burning, project proponent have decided to use biomass as a fuel for power generation.

Total anticipated reductions in tones of CO2 equivalent: 322,688 **tCO2** *(for 7 years- first renewable crediting period)*

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

Emission Reduction Estimation

Year	Annual Estimation of emission reduction in tonnes of CO2e
May 2006 -March 2007	31,725
April 2007- March 2008	46,228
April 2008 -March 2009	48,947
April 2009 -March 2010	48,947
April 2010 -March 2011	48,947
April 2011 -March 2012	48,947
April 2012 -March 2013	48,947
Total estimated reductions (tonnes of CO2e)	322,688
Total number of crediting years	7 years (first renewable crediting period)
Annual average over the crediting period of estimated reductions (tonnes of CO2e)	46,098

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

No Public Funding in this case

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

Project Sponsor has not registered any project of same technology for CDM activities and has no project of same nature in nearby area (within 1 KM). It therefore satisfies all conditions listed in "appendix C to the simplified M&P for the small-scale CDM project activities for guidance on how to determine whether the proposed project activity is not a debundled component of a larger project activity"

SECTION B. Application of a baseline methodology:

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

Category ID: *Grid Connected Renewable Electricity Generation*
Version: Version 07, 28 November 2005
Reference: Appendix B of the simplified modalities & procedures for small-scale CDM-project activities

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

The Project is generating electricity for the user and it replaces the electricity purchased from fossil fuel dominated grid. Additionally this is a small-scale project (capacity < 15 MW). Hence it qualifies for category I D.

Baseline Scenario

The baseline is the kWh produced by the renewable generating unit multiplied by an emission coefficient (measured in kg CO2equ/kWh) calculated in a transparent and conservative manner as, the average of the "approximate operating margin" and the "build margin", where:

- The "approximate operating margin" is the weighted average emissions (in kg CO2equ/kWh) of all generating sources serving the system, excluding hydro, geothermal, wind, low-cost biomass, nuclear and solar generation;

- The "build margin" is the weighted average emissions (in kg CO2equ/kWh) of recent capacity additions to the system, which capacity additions are defined as the greater (in MWh) of most recent 20% of existing plants or the 5 most recent plants."

Following information is required for baseline selection.

SN	Key Information	Information Source
1	Biomass based power project technical features	Detailed Project Report (DPR)
2	Analysis of alternative fuel options	Norms specified by CEA, details provided by technical consultant and technology suppliers.
3	Biomass availability	Assessment done by a third party
4	Grid Emission factor	Western Region Electricity Board Annual Reports

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:

Proposed project activity is eligible to use simplified methodologies as

- It's a small scale renewable energy project with a generation capacity of 8.5 MW (<15 MW, according to Paragraph 6 (c) of decision 17 CP.7)
- It conforms to project category in "Appendix B of the simplified modalities & procedures for small

scale CDM-project activities under TYPE ID It is not a debundled component of a larger project activity, as it qualifies guidelines in "appendix C to the simplified M&P for the small-scale CDM project activities for guidance on how to determine whether the proposed project activity is not a debundled component of a larger project activity"

Project Additionality Analysis:

Additionality of the project activity is analysed in the following section as per barriers outlined in attachment A of Appendix B.

Barrier Analysis

A: Investment Barriers

Project has been evaluated as per the guidelines provided for investment comparison analysis in Step-2 of Additionality Tool for large projects.

- Levelized cost of electricity production (Rs/KWh) for biomass based power project (Rs 2.58/KWh) is much higher than a similar coal based power project (Rs 1.96/KWh). Coal is the least cost option for fuel in the proposed power plant. Biomass is 32% costlier (fuel cost) than Coal for producing 1 KW Hr of power.

Power Generation cost / KW Hr

a. Alt-1 Coal : Rs 1.96 / KW Hr
b. Alt-2 Fuel Oil : Rs 4.30 / KW Hr
c. Alt-3 Biomass : Rs 2.58 / KW Hr

- A sensitivity analysis done on different price points for biomass shows that biomass is not an economical fuel option even on 50% of current prices (Rs 450/T as against Rs 900/T). So in case of a price-hike, biomass based power would be in disadvantageous position vis-à-vis coal based power.

Biomass Price/Ton	600	800	900	1000	1200	1500
Differential Unit Cost vis-à-vis Coal Option	-0.2	-0.5	-0.6	-0.8	-1.0	-1.5

- There is a limit imposed by Pollution control board on the amount of coal that can be used in biomass based power plant. So in case of crop failure/ off-season coal can be co-fired only to a limited extent, after this plant will have be closed down. This is a big risk, as in this scenario steel plants operations would be seriously hampered.

Investment Requirement

Investment required for setting up power project using multi fuel capabilities (Coal & Biomass in this case) is also higher than investment required for coal based power plant. The difference in investment in these two types of projects is mainly due to additional investment required in setting up biomass handling facilities in the plant.

Biomass energy requires > 1.9 times the investment compared to the FO based DG sets (least investment intensive) and costs 1.32 times more than Coal (the option with least cost of generation).

Getting investment for biomass based project is a difficult task in India. Project proponent is trying to arrange debt for the project since Oct'2004 from various banks[2]. These projects are assessed to be risky by financial institutions due to risks of crop failure, lack of biomass delivery & collection network, risks of sudden price rise, higher project costs as compared to coal based plant. This is evident in the type of questions raised by the banks.

It would have been much easier for the project proponent to arrange debt for a coal based power project in coal rich state of Chattisgarh.

Though Coal is financially more viable option, but power plant based completely on coal as fuel option would have led to higher emissions.

B: Operational barrier: Biomass Availability and Price Risk

Biomass, though abundant in supply, doesn't have proper logistics network for collection and delivery. In normal practice it is burned inefficiently or is left to rot in the field. Since project site is located only 1 Km from Railway Station it has advantage of bulk/cheap transportation of coal through Railway Wagon. But biomass being collected from un-organized sector does not have this advantage. This is a fuel availability risk, and to ensure continuous & economical fuel supply Project Proponents will have to develop a viable fuel collection mechanism.

This is the first project of its kind in the district where the project is located. Hence there is no past history of prices for bio-mass for a situation where it is regularly used for commercial power generation.
However it has also been observed in other parts of India that biomass prices increase significantly as bio-mass is used increasingly demand in bio-mass based power plants in the region. This happens due to lack of proper collection mechanism and delivery of biomass. This leads to short-term shortage and thus increased prices. Prices move up from low of ~Rs 600-700/T to Rs 2000-2200/ton as seen in areas such as Punjab, Uttar Pradesh and Andhra Pradesh etc.

C: Common Practice Analysis

Using coal for power generation is normal practice in the region; this is evident by the fact that 91.43 % of total power generation is done using coal (TERI Report-2003/04) and also despite a projected potential of 200 MW using biomass, current generation capacity commissioned is only 11 MW.

Installed Capacity (MW) in Chattisgarh[3]			
Fuel	**Coal**	**Hydro**	**Bio-mass**
Capacity (MW)	1280	120	11

There is no regulatory or policy requirement for selecting a particular type of fuel for power generation.

Impact of CDM Registration

2 Evidences shown to DOE

[3] **As on 31 December 2004 ;** Source- Ministry of Non-conventional Energy Sources (MNES) Annual report 2004-05

Financial benefits arising from selling CERs shall be utilised to build robust biomass collection & delivery network, as well as dedicated bio-mass source in nearby wasteland (for which land procurement work has begun) which will in turn help in mitigating biomass availability risk. These benefits will also compensate for the lower profitability of proposed project as against coal based power project.

Summary

The project activity is additional to the baseline scenario as it reduces emissions below baseline level and faces many barriers which prohibit its implementation. Carbon credits will help bridge the profitability gap between Coal based power project and bio-mass based power project, as well as provide financial support for investing in development of dedicated bio-fuel, thus reducing the impact of some of the barriers.

Comparison Chart of fuel options	Alt- 1, Coal Based Power Plant	Alt- 2, DG Set based on Fuel Oil	Alt- 3, Biomass based multi-fuel power plant
Investment Cost (Rs/ KW Hr)	4.18	2.85	5.39
Power Generation Cost (Rs/KW Hr)	1.96	4.30	2.58
GHG Emissions	High	High	Nil
Operational Issues	Easy to handle	Easy to handle	Handling mechanism require d in the plant
Supply Side Issues	Abundant Supply, Low Prices, Robust Delivery Mechanism	No issues with supply	Surplus Availability, Weak Collection & Delivery mechanism, Risk of Price Escalations

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:

As per the Appendix B of simplified modalities & procedures for small-scale CDM-project activities, the project boundary is "The physical, geographical site of the renewable energy generating unit and the equipment that uses the electricity produced delineates the project boundary."

The project boundary includes the entire power plant site including all machinery & equipments required for power generation in this plant, the intervening grid (of State Electricity Board) and the consumer's power interconnection point. It also covers equipments where power is used and area used for biomass storage.

The gases and sources of generation are explained as follows –

Gas	Source of generation	Remarks
Baseline		
CO_2	Electricity generation from coal based power plants	Main emission source
CH_4	Biomass rotting in open fields	Not taken in calculations, conservative.

Project Activity		
CO_2	Power generation by biomass combustion	Zero GHG emission impact
N2O, CH4	Power generation by biomass combustion	Not taken in calculations, ease of calculation
Leakages		
CH_4	Biomass Storage	Very low, as the storage period at the plant site is low (~ 1 month)
CO_2	Biomass Transportation to site	Due to fuel combustion
CH_4	Biomass Transportation to site	----------do----------
N_2O	Biomass Transportation to site	----------do----------
CO_2	Biomass transportation within-site	Very Low

Leakages

The leakages can occur from following sources –

- The transportation of the biomass from the city centres to the plant site can lead to leakages in the form of fuel burning in the various modes of transport used. But this leakage is compensated by reduced emissions due to transportation of lesser quantity of coal compared to what would have been transported in case of only coal as fuel option.
- Storage of the biomass at plant site can lead to CH4 generation if kept for longer duration. However the storage time for biomass (~ one month) is very small for the project activity and hence can be neglected.
- The leakage by the diversion of the biomass from other use areas is not applicable in the proposed project as the biomass used for the power generation is available in surplus to what is being used in other current use areas e.g. domestic burning, industrial use etc. An independent assessment estimates surplus quantity of Biomass available is at 273833 MT/annum[4], in the 75 Km radius around the site of project activity which is good enough to support 25 MW power generations.

However the project proponent is planning to

- Source from those suppliers who certify the bio-mass to be surplus and not having alternative use.
- Use CERs to finance development of the unused land in the region for growing biomass[5] that would support the project activity in future. This shall help improve the ecosystem in the region and also reduce the risks involved concerning the biomass availability in future.

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

Establishing Baseline:

[4]Source: study conducted by a technical consultant

[5] juliflora, Jatropha etc

The baseline is the kWh produced by the renewable generating unit multiplied by an emission coefficient (measured in kg CO2equ/kWh) calculated in a transparent and conservative manner as, the average of the "approximate operating margin" and the "build margin", where:

- The "approximate operating margin" is the weighted average emissions (in kg CO2equ/kWh) of all generating sources serving the system, excluding hydro, geothermal, wind, low-cost biomass, nuclear and solar generation;

- The "build margin" is the weighted average emissions (in kg CO2equ/kWh) of recent capacity additions to the system, which capacity additions are defined as the greater (in MWh) of most recent 20% of existing plants or the 5 most recent plants."

Grid Selection:

The project will supply power to Chattisgarh State electricity board which is a part of Western Grid in India. Hence Western grid has been selected for estimating grid emission factor for the project.

05/08/2005

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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:

Power generation is expected to start from May 2006. Benefits from registering project activity as CDM Project are considered during project conceptualisation stage (DPR made in December 2004) and are the basis for undertaking the investment.

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

25 y

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

Renewable Crediting Period

C.2.1. Renewable crediting period:

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

01.06.2006

C.2.1.2. Length of the first crediting period:

7 yrs

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

C.2.2.2. Length:

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:

The monitoring plan refers to the guidelines for Project Type ID as given in 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 monitoring methodology and baseline are selected here as suggested in the document 'Simplified Modalities and Procedures for Small-Scale CDM project activities'. As suggested in AMS I, actual power wheeled to user is monitored.

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
1.1	**EB**$_y$: Total Power wheeled to the users	*Electricity*	KWH	*(C)*	*Monthly*	*100%*	*Electronic*	*Crediting period + 2 years*	*This is summation of power wheeled using grid and direct transmission line*
1.2	**Aux**$_y$: Total Power used for auxiliary consumption in the power plant	*Electricity*	KWH	*(m)*	*Monthly*	*100%*	*Electronic*	*Crediting period + 2 years*	
1.3	**QBU**$_y$: Biomass Consumption	*Biomass consumption*	Tons	*(m)*	*Monthly*	*100%*	*Electronic*	*Crediting period+2 years*	*Use of material balance - purchase, inventory data for calculations*
1.4	**QCU**$_y$: Coal Consumption	*Coal consumption*	Tons	(m)	*Monthly*	*100%*	*Electronic*	*Crediting period+2 years*	*Use of purchase, inventory and purchase data for calculations*
1.5	**CCV**$_y$: Coal Net	*Calorific*	Kcal/Kg	(m)	*Every*	*>95% of all*	*Electronic*	*Crediting*	*Periodic sample testing*

	Calorific Value	*value*			*delivery*	*deliveries*		*period+2 years*	*(to be done in-house) is to be made part of normal purchasing activity This data will be averaged (wtd average) over the year.*

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

ID Number	Uncertainty level of data (High/Medium/Low)	Explain QA/QC procedures planned for these data, or why such procedures are not necessary.
1.1	*L*	*The data can be very accurately measured. The meters installed on uploading station (Connected to grid) will be used to measure mentioned variables on a continuous basis. Every month these meter readings will be recorded by plant personnel & CSEB, these records will be archived for cross-checking yearly figures. The meters at the uploading station will be two way meters and will be in custody of State electricity board.* *Power directly supplied to steel plant will be measured by meters installed by SPSL. Proper maintenance & calibration procedures would be followed to ensure accuracy & reliability of the meter.* *Meter reading to be taken for auxiliary power consumption in the plant. Proper maintenance & calibration procedures would be followed to ensure accuracy & reliability of the meter.* *The readings in these meters will be taken and the same reading may be used to determine the net power wheeled to the user and determine the extent of mitigation of GHG over a period of time.*
1.2- 1.5	*L*	*Periodic sampling to be done for calorific value calculations, same can be cross-checked with supplier's data. Purchase data to be used for quantity measurements.*

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:

Project Management Planning:

A CDM project team will be constituted with participation from various departments like production, finance, purchase and quality. People will be trained on monitoring plan. This team will also be responsible for data collection and archiving. This team will meet periodically to review CDM project activity check data collected, emissions reduced etc. On a periodic basis (monthly), the monitoring reports will be checked and discussed by the seniors CDM team members/managers. In case of any irregularity observed by any of the CDM team member, it is informed to the concerned person for necessary actions. On monthly basis, these reports are forwarded to the management level.

- Technical Director: Overall responsibility of CDM registration and compliance with the CDM monitoring plan.
- Plant Head: Responsibility for completeness of data, reliability of data (calibration of meters), and monthly report generation
- Shift In-charge: Responsibility of daily report generation

Electrical generation from the project activity will be metered at the plant and meter readings will be recorded at the end of each month. These meter readings will form the basis of the monitoring plan and be made available at the time of verification. Project level emissions will be determined from the combustion of fossil fuels on-site, and this will be monitored through the electricity generation from the fossil fuel based boiler. This data will also be monitored on a monthly basis and made available at the time of verification.

Training of CDM team personnel:
The training of the CDM team and plant personnel will be carried out on CDM principle, CDM activities, monitoring of data and record keeping through a planned schedule made in advance and a record of various training programmes undertaken would be kept for verification.

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

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SECTION E.: Estimation of GHG emissions by sources:

E.1. Formulae used:

E.1.1 Selected formulae as provided in appendix B:

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

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:

In cases when biomass is not available, coal would be used in the plant for power generation. There will be GHG emissions due to burning of coal in the plant.

$$PE_y = QCU_y \times CEC_y \times EF \times OXID$$

Where:

PE_y	Project Emission	T CO2/ annum
QCU_y	Total quantity of coal used in a particular year	Tons
CEC_y	Net coal calorific Value	TJ/Ton
EF	IPCC Default carbon emission factor for coal	T CO2 /TJ
OXID	Coal oxidation factor (IPCC Default)	%

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

The transportation of the biomass from the city centres to the plant site can lead to leakages in the form of fuel burning in the various modes of transport used. But this leakage is *compensated* by reduced emissions due to transportation of lesser quantity of coal compared to what would have been transported in case of only coal as fuel option.

Leakage due to transportation		
Biomass load per truck	12	Tonnes
Total number of trips	4393.45	No
Average distance between collection center and plant	35	KM
Consumption of diesel/trip (to & fro) @ 5 KM/Lt	61508.3	Lt
Emission factor for diesel	0.00276	T CO2/Lt of Diesel
Emission due to transportation of biomass	169.76	T CO2

Calculations in above table also show that effect of leakage is negligible (<~0.5%, without accounting for compensating reduction in coal transportation) in the project activity. Hence leakage effect is not taken in calculations.

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

$PE_y = QCU_y$ X CEC_y X EF X OXID

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:

$BE_y = EB_y$X GEF_y

Where

BE_y	Baseline emissions	T CO_2 /annum
EB_y	Energy Baseline	KWH
GEF_y	Grid Emission Factor	T CO2/ KWH

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:

$ER_y = BE_y - PE_y$

Where

ER_y	Emission Reductions	T CO_2 /annum

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

SN	Particulars	Units	2006	2007	2008	2009	2010	2011	2012
	Baseline Emissions								
1	Grid Emission factor	TCO2/Mwh	0.830	0.830	0.830	0.830	0.830	0.830	0.830
2	Plant Capacity	MW	8.5	8.5	8.5	8.5	8.5	8.5	8.5
3	Plant Load factor	%	70%	85%	90%	90%	90%	90%	90%
4	Operating time	Hrs	7,300	8,760	8,760	8,760	8,760	8,760	8,760
5	Power Generation	MW-hrs	43,435	63,291	67,014	67,014	67,014	67,014	67,014
6	Net Power Output	MW-hrs	38,223	55,696	58,972	58,972	58,972	58,972	58,972
7	Total Baseline Emissions	T of CO2	31725	46228	48947	48947	48947	48947	48947
	Project Emissions								
8	Coal Conusmption	Tons	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	Total Project Emissions	T CO2/annum	-	-	-	-	-	-	-
	Total CER Generation	Units	31,725	46,228	48,947	48,947	48,947	48,947	48,947
	Cummulative CER value	Units	31,725	77,953	126,900	175,847	224,794	273,741	322,688
								average over 1st credit period	46,098.26

SECTION F.: Environnemental impacts:

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

Approval from Pollution Control board of Chattisgarh State has been taken.

An Environment Impact Assessment (EIA) was done by DSCL energy Services Company Ltd. A summary of EIA is as follows –

During construction Phase

The construction of the proposed project would not require any tree uprooted. There are no endangered species to be uprooted due to the proposed project. At initial stages of the construction, bore wells shall be constructed for meeting the site water requirement including that of drinking water, for which necessary treatment facilities shall be installed.

There would be short-term negative impacts on socio economic environment due to increase in population of workmen and labour. However by providing adequate housing, water, power, and sanitation facilities to construction workmen and labour, these impacts shall be contained within the site.

During Operational phase

The thermal energy emitted in the environment by power generating units has long-term negative impacts; however the proposed installation is insignificantly small to bring about any climatic change.

The air pollution from burning of such fuel is less harmful due to the lower quantity of sulphur in it (~0.6%) as compared to other fossil fuels.

The particulate emission would be arrested by ESPs and thus little negative impact is envisaged.

The fly ash generated as a result would be collected in ash silos from the one ESP installed at the site. The fly ash shall be used in brick manufacturing and land filling through trucks. The ash handling system shall be arranged in a way that no ash escapes to the atmosphere

The requirement of water is proposed to be met from the bore well at the site. No surface water bodies are available in the vicinity and thus surface water would not receive any negative impact. Further the effluent and the blow down water used for green belt development, ash quenching and sprinkling over fuel would percolate to the ground water and cause recharge of the ground water body.

GHG emission reduction

The burning of biomass fuels result in zero emission of GHGs as amount of CO2 generated during combustion is taken in during the growth of the biomass.

SECTION G. Stakeholders' comments:

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

Government Agencies:

Agency	Process for getting Concurrence	Status
Pollution Control Board	Approval Application/letter	Consent on the project has been obtained
Chattisgarh State Electricity Board (CSEB)	Approval Application/letter	Consent on the project has been obtained
Chattisgarh State Renewable Energy Development Agency (CREDA)	Approval Application/letter	Consent on the project has been obtained

Local Community:

Letters were sent to following stakeholders to inform about proposed power project and to invite comments on the same.

1. Letter written to District Magistrate office- Date 16/06/2005
2. Letters written to village panchayat- Date 28/06.2005

To ensure transparency project promoters have engaged an NGO (Manav Astha Kendra) to conduct stakeholder consultation about the proposed project. The NGO has conducted meetings with local community on 1st, 2nd, 4th, 5th July 2005. These meetings were attended by diverse background people from local community. Meetings were held with local panchayat to discuss about project, impact on the local community and environment. Farmers have expressed happiness over this project as it will generate additional employment for local community, income from biomass sale as well as reduced local power shortage.

On 29th June 2005 an advertisement seeking comments/suggestion about power project was published in local newspaper. This was to seek feedback from stakeholder not been contacted through regular feedback collection program.

Others:

Meetings with suppliers were held to estimate potential biomass availability in the region. Letter declaring potential biomass that can be procured from these suppliers have been obtained.

G.2. Summary of the comments received:

- There is a surplus biomass available in the region but has no commercial use. Normally it is left in fields for rotting, and in a few cases it is also burnt. There is no proper channel for collection of this biomass.

- The use of biomass shall provide an additional source of income to this mainly agriculture dependent community. Setting up of collection and delivery channel will generate employment for the local community.

- The employment generated in the plant will provide them more money than they usually get in the farms. (Rs 100/day as against Rs 30-35/day in farming)

- The socio economic environment shall have minor impact due to the increase in population. Moderate long-term negative impact due to increase in traffic is also anticipated that should be reduced by plantation and maintenance of the roads.

Impact on local economy:

As proposed power plant shall procure biomass from local community, it will be an additional source of income for mainly agriculture dependent community.

Employment-

Direct

In the operating power plant: 1428 Man Months/annum

During construction of power plant: 1600 Man Months

Indirect

There will also be indirect employment generation mainly in biomass collection & delivery network.

The company proposes to launch large-scale biomass fuel resource development program that will employ significant numbers in the activity. This program will be developed using revenue from sale of carbon credits of the project.

Addition to Local Economy-

Rs 81 Mn per annum due to biomass procurement for the power plant

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

As there are no adverse comments received for the proposed project activity no corrective action is required.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Shivalik Power & Steel (P) Ltd.
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Represented by:	
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First Name:	Giriraj
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Direct tel:	
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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No Public Funding for this project.

Annex 3:
Grid Emission factor calculation

STEP 1: Grid Selection

As per the guidelines provided by Meth Panel during 18th meeting, Western Region Grid is selected for grid emission factor estimation. **Data about all these plants have been considered while calculating grid emission factor**. Western Region Electricity Board (WREB) annual reports and Central Electricity Authority (CEA) data is used for this purpose.

STEP 2: Calculation of the Operating Margin emission factor (EF_{OM})

The "approximate operating margin" is the weighted average emissions (in kg CO2equ/kWh) of all generating sources serving the system, excluding hydro, geothermal, wind, low-cost biomass, nuclear and solar generation;

Opearting Margin Estimation for Western Grid 2004-05	
OM, 2004-05	0.927

STEP 3: Calculation of the Build Margin emission factor (EF_{BM})

The "build margin" is the weighted average emissions (in kg CO2equ/kWh) of recent capacity additions to the system, which capacity additions are defined as the greater (in MWh) of most recent 20% of existing plants or the 5 most recent plants. The sample group m consists of the power plants capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently (This sample group is larger than group consisting of the five power plants that have been built most recently).

Build Margin Estimation for Western Grid 2004-05	
Build Margin	**0.733**

STEP 4: Calculate the Grid Emission Factor (*EF)*

Grid Emission factor is the average of the "approximate operating margin" and the "build margin",

Combined Margin Estimation for Western Grid 2004-05	
OM, 2004-05	0.927
BM	0.733
Combined Margin, CM	**0.830**

Annex 4

REFERENCES

UNFCCC CDM website- cdm.unfccc.int
Ministry of Environment & Forest CDM website- envfor.nic.in
TERI Energy Data Directory & Yearbook 2003/04
Central Electricity Authority- cea.nic.in
Detailed Project Report for the project prepared by technical consultants (Private document)
Indian Oil Corporation Limited website
Operational norms for power projects- Central Electricity Authority, cea.nic.in
Thermal power projects, performance review (Heat rates), cea.nic.in
Western region electricity board, annual reports
Ministry of Power: Indian Electricity Scenario_Western

Annex 5:
Glossary of Terms

%	Percentage
BM	Build Margin
CDM	Clean Development Mechanism
CEA	Central Electricity Authority
CER	Carbon Emission Reduction
CM	Combined Margin
CO_2	Carbon Di Oxide
CSEB	Chattisgarh state electricity board
DNA	Designated National Authority
DOE	Designated Operational Entity
EIA	Environmental Impact Assessment
GHG	Green House Gases
GWh	Giga Watt Hour
IPCC	Intergovernmental Panel on Climate Change
IRR	Internal Rate of Return
kWh	Kilo Watt Hour
MoEF	Ministry of Environment and Forests
MW	Mega Watt
OM	Operating Margin
Rs.	Indian Rupees
SPSL	Shivalik Power and Steel Lmited
T & D	Transmission and Distribution
UNFCCC	United Nations Framework Convention on Climate Change
WACC	Weighted average cost of capital
WREB	Western Regional Electricity Board

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