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

CONTENTS

Annexes

Revision history of this document

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

SECTION A. General description of small-scale project activity

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

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Biomass based steam generation project at Raichur, India
Version 5.0
24/03/2010

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

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Established in 1987, Shilpa Medicare Limited produces and exports consistently high-quality active pharmaceutical ingredients, fine chemicals, intermediates, herbal products and specialty chemical products using sophisticated technology, meticulously following international specifications.

Shilpa Medicare Limited (hereafter referred to as SML) has planned to invest in a pharmaceutical manufacturing unit which will be in creation of modern state of art facility expansion in Raichur district, one of the important districts in Karnataka. In this green field unit SML is going to install a biomass based steam generation facility of a combined capacity of 16.0 TPH to meet the process energy requirements of the thermal energy intensive pharmaceuticals manufacturing processes.

Purpose of the project activity:

The proposed project activity involves installation of rice husk based boilers having combined capacity of 16TPH, which will provide thermal energy to meet the energy requirement of SML, Raichur. This project activity will result in avoidance of GHG emissions associated with generation of equivalent amount of steam in any carbon intensive fossil fuel (i.e. coal) based boiler unit which is the common practice in other similar industries by using approx 29959MT of rice husk annually.

Technology used:

Technology employed provides controlled biomass based combustion facility to generate steam which will in turn be utilized in the process plant. The technology is clean as compared to the conventional fossil fuel based system and environmentally sustainable. For further details please refer to section A.4.2.

Contribution of the project activity to sustainable development:

The project contributes to the general well being of the region and is in line with the sustainable development policies of the host country:

Social well being:

- Generation of employment for the deprived segment of the society at the rural level (which is a major concern in India) for collection and supply of the biomass (Rice husk).
- Creation of jobs for operating the plant as well for transportation of biomass material to the project plant from sources.

Economic well being:

- Employment generation for the local population which results in economic well being.

- Employment generation in transport sector and also help in economic well being of the biomass suppliers.

Environmental well being:

- Better handling of Rice Husk thus improvement of the locality by way of proper disposal of waste biomass (Rice husk).
- Avoidance of GHG emissions as an additional benefit for improving the environment.

Technological well being:

- The project activity promotes the use of renewable fuels for meeting the process heating requirements of pharmaceutical industry. With CDM revenues the project activity has potential to encourage other industries to adopt this cleaner technology for meeting the process heating requirements in pharmaceutical sector.

A.3. Project participants:

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Name of Party involved (*) (host) indicates a host Party	Private and/ or public entity(ies) project participants (*) (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/ No)
Govt. of India, Ministry of Environment and Forests (MOEF)	• Private Entity: Shilpa Medicare Limited	No
(*) In accordance with the CDM modalities and procedures, at the time of making the CDM-PDD public at the stage of validation, a Party involved may or may not have provided its approval. At the time of requesting the registration, the approval by the Party (ies) involved is required.		

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

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

>>

A.4.1.1. Host Party(ies):

>>

Country: India

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

>>

State: Karnataka

A.4.1.3. City/Town/Community etc:

>>

Village: Chicksugur, District. Raichur

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

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The project site is located 2.5 Km away from Chicksugur railway station which is the nearest railhead from project site. The co-ordinates of the project activity presented here below for its unique identification.

Latitude:	–	16^0 12' N
Longitude:	–	77^0 20' E

The postal address of the plant is:

Shilpa Medicare Ltd.
Plot No. 33,33A and 40 to 47,
Raichur Growth Centre,
Chicksugur Village-584134,
Raichur Taluk and District.


KARNATAKA
District Map
MAHARASHTRA
BIDAR
GULBARGA
BIJAPUR
BAGALKOT
RAICHUR
BELGAUM
GOA
DHARWAR
KOPPAL
GADAG
BELLARY
ANDHRA PRADESH
UTTAR KANNAD
HAVERI
DAVANGERE
SHIMOGA
CHITRADURGA
UDUPI
CHIKMAGALUR
TUMKUR
KOLAR
BANGALORE
DAKSHIN KANNAD
HASSAN
BANGALORE (URBAN)
BANGALORE (RURAL)
MANDYA
ARABIAN SEA
KODAGU
MYSORE
TAMIL NADU
KERALA
CHAMRAJNAGAR
Map not to Scale
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India
International Boundary
State or Union Territory Boundary
Road
River
National Capital
State or Union Territory Capital
City or Town
© 2007 Geology.com
AFGHANISTAN
PAKISTAN
CHINA
NEPAL
BHUTAN
BANGLADESH
BURMA
INDIA
SRI LANKA
MALDIVES
INDONESIA
Arabian Sea
Bay of Bengal
Indian Ocean
New Delhi
Kathmandu
Thimphu
Dhaka
Colombo
Islamabad
Kabul
Rangoon
Mumbai (Bombay)
Kolkata (Calcutta)
Chennai (Madras)
Bangalore
Hyderabad
RAICHUR
Road Map
Gulbarga
Bijapur
Bagalkot
Koppal
Bellary
ANDHRA PRADESH
Koppar
Salkyapur
Devadurga
Yergudda
Miyanpur
Budinhal
Yedlapur
Bassapur
Ramdurg
Gabbur
Gontagola
Mallapur
Potgal
Bandegudd
Marharpur
RAICHUR
Hira
Gudadanhal
Lingsugur
Malat
Udamgal
Ankanhal
Sanhosur
Dinni
Advibhavi
Balatgi
Kanedoddi
Aroli
Bellihal
Halapur
Neeranvi
Dugnoor
Tirthbhavi
Maski
Bhogawati
Nagalapur
Jawalgeri
Yediwal
Tidgol
Turvihal
Sindhnur
Kalmangi
Mavinmadu
LEGEND
State Boundary
District Boundary
Major Road
District Headquarter
Major Town
Other Town
Map not to Scale
Copyright © 2007 Compare Infobase Limited

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

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Type and Category of the project:

Referring to the UNFCCC CDM website, as per Appendix B to the simplified modalities and procedures (M&P) for small-scale CDM project activities, type and category applicable to the project activity are:

Type: Type I: ***Renewable Energy Projects***
Category: I.C.: ***Thermal energy production with or without electricity***

Description of environmentally safe and sound technology applied:
Technology employed provides controlled combustion facility that will use the calorific value of biomass to generate steam and to utilize it in the process plant.

In terms of the safe and sound technology, the technology provider is experienced in this field. The boiler has been checked by the boiler inspector insuring that its operation is safe. Furthermore, consents from the PCB also shows that the factory adheres to environmental guidelines and thus any activity undertaken is environmentally safe.

Under the project activity SML is going to install two biomass based boiler having capacity of 6.0 TPH and 10.0 TPH each which will generate steam at 10.54 kg/ cm² (g). Steam generated from the biomass fired boiler will be supplied to the bulk drug manufacturing process. Thus it will result in avoidance of GHG emissions associated with combustion of fossil fuel for steam generation in fossil fuel fired boiler plant of equivalent capacity.

Technology Details:

In this project activity, both boilers are rice husk fired having horizontal multi-tubular shell. These multi-tubes are smoke tube type with water wall furnace. These boilers have capacity to produce 6 TPH and 10 TPH steam @ 10.54 kg/ cm² (g). The steam is sent for use in the process.

Steam Generation Unit:

The boiler is supplied by Thermax Limited., India. The whole unit has been designed indigenously.

The technical details of the boiler system are provided here below.

Brief Technical specifications of boilers[1]:

Type of boiler	Horizontal multi-tubular shell type smoke tube with water wall furnace
Model	CPFD-60
Number of boilers	One
Boiler capacity	6.0 TPH
Boiler steam outlet pressure	10.54 kg/cm²(g)

[1] Boiler manufacturers' specification (Thermax).

Boiler thermal efficiency on GCV as per B.S. 845	
Rice Husk	80 ± 2% for 10 % moisture (3100 kcal /kg GCV)
Design Code	IBR 1950 with latest amendments
Mode of firing	Over bed firing
Ash removal mode	Manual

Type of boiler	Horizontal multitubular shell type smoke tube with water wall furnace
Model	CPFD-100
Number of boilers	One
Boiler capacity	10.0 TPH
Boiler steam outlet pressure	10.54 kg/cm²(g)
Boiler thermal efficiency on GCV as per B.S. 845	
Rice Husk	80 ± 2% for 10 % moisture (3100 kcal /kg GCV)
Design Code	IBR 1950 with latest amendments
Mode of firing	Over bed firing
Ash removal mode	Manual

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

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The chosen crediting period is 10 years which is a fixed crediting period. Estimated amount of emission reductions over these 10 years is as follows:

Years	**Annual estimation of emission reductions in tonnes of CO_2 e**
Jan, 2011-Dec,2011	35,188
Jan, 2012-Dec,2012	35,188
Jan, 2013-Dec,2013	35,188
Jan, 2014-Dec,2014	35,188
Jan, 2015-Dec,2015	35,188
Jan, 2016-Dec,2016	35,188
Jan, 2017-Dec,2017	35,188
Jan, 2018-Dec,2018	35,188
Jan, 2019-Dec,2019	35,188
Jan, 2020-Dec,2020	35,188
Total estimated reductions (Tonnes of CO_2 e)	351,880
Total number of crediting years	10
Annual average over the crediting period of estimated reductions (tonnes of CO_2 e)	35,188

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

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No public funding has been involved in this project.

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

Debundling is defined as the fragmentation of a large project into smaller parts. A small-scale project activity that is part of a large project activity is not eligible to use the simplified modalities and procedures for small-scale project activities. According to paragraph 2 of Appendix C to the Simplified Modalities and Procedures for Small-Scale CDM project activities (FCCC/KP/CMP/2005/8/Add.1), a proposed small-scale activity can be deemed a debundled component of a large project activity if there is a registered small-scale CDM project activity or an application to register another small-scale CDM project activity:

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

The project activity is not a debundled component of a large project activity as the project proponent have not registered or applied for registration any other small scale project activity which meets any of the above mentioned conditions. This can be verified from the UNFCCC website[2].

[2] http://cdm.unfccc.int/Projects/index.html

SECTION B. Application of a baseline and monitoring methodology

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

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Referring to the UNFCCC CDM website, the approved baseline and monitoring methodology applied to the small-scale project activity is:

AMS- I. C. *Thermal energy for the user with or without electricity*
(Version 16: Valid from 18 December 2009 onwards).

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

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Applicability conditions, as per the methodology AMS-I.C. "*Thermal energy for the user with or without electricity*" (Version 16: Valid from 18 December 2009 onwards), are:

1. This category comprises renewable energy technologies that supply users with thermal energy that displaces fossil fuel use. These units include technologies such as solar thermal water heaters and dryers, solar cookers, energy derived from renewable biomass and other technologies that provide thermal energy that displaces fossil fuel.

Justification: The project involves Biomass-based steam generating systems that produce thermal energy which displaces equivalent energy generation by a fossil fuel based boiler system which would have been used in the baseline scenario. Therefore the project satisfies the above mentioned condition.

2. Not applicable as the project activity is not a cogeneration plant as there is no generation of electricity.

3. The total installed/rated thermal energy generation capacity of the project equipment is equal to or less than 45 MW thermal.

Justification: This project activity qualifies in this category since the net thermal energy output from the project activity is approx. 12.35 MW thermal (< 45 MW thermal) as calculated below:

Boiler capacity:	16 TPH Steam at 10.54 kg/cm^2(g)
Enthalpy of Steam:	664.0 kcal/kg
Boiler Rating:	16 x 664/ 860 kW
	= 12.35 MW_{th}

4. For co-fired systems, the total installed thermal energy generation capacity of the project equipment, when using both fossil and renewable fuel shall not exceed 45 MW thermal.

Justification: The thermal generation capacity of the project is 12.35 MW_{th} (as per calculation given above), which is less than the stipulated maximum limit i.e. 45 MW_{th}. Further, project activity is not a co-fired system.

5. Not applicable as the project activity is not a cogeneration unit.

6. In case electricity and/or steam/heat produced by the project activity is delivered to another facility or facilities within the project boundary, a contract between the supplier and consumer(s) of the energy will have to be entered into specifying that only the facility generating the energy can claim emission reductions from the energy displaced.

Justification: The only output from the project is steam. Steam is not supplied to any other facility but for the process requirement of the factory where the project is implemented. Therefore the producer and the user of steam is a single entity.

7. Project activity is not a retrofit or modification of an existing facility.

8. The project activity is not the addition to existing renewable energy facility but installation of a new facility.

9. The project activity is not using charcoal but biomass as the source of energy.

Thus, the project activity meets all the relevant applicability criteria of the methodology AMS I.C. and the application of the methodology is thus justified.

B.3. Description of the project boundary:

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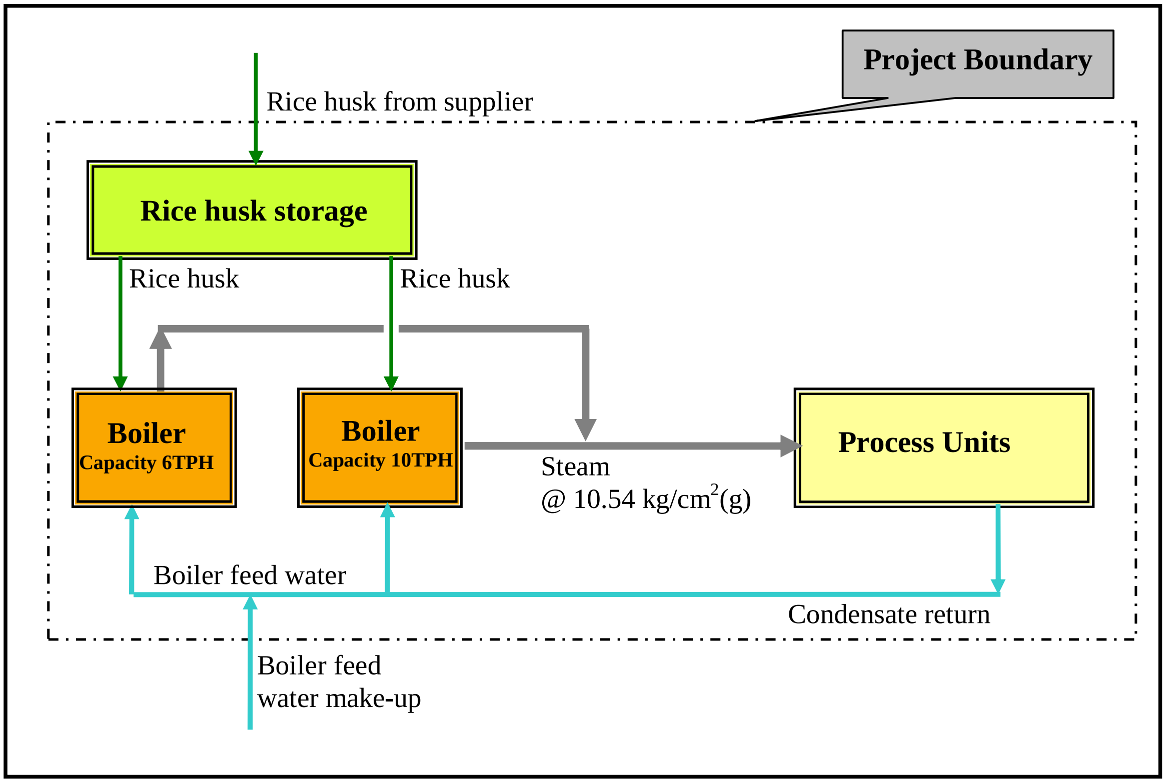
As per paragraph 10 of "Type AMS-I.C. *Thermal energy for the user with or without electricity*" of Appendix B of the simplified Modalities & Procedure for small-scale CDM project activities (Version 16: Valid from 18 December 2009 onwards), project boundary consideration is:

"The physical, geographical site of the project equipment producing the renewable energy delineates the project boundary. The boundary also extends to the industrial, commercial or residential facility, or facilities, consuming energy generated by the system and the processes or equipment that is affected by the project activity."

As the project activity involved thermal energy generation using renewable biomass, therefore the project boundary consists of renewable energy generation area. The boundary includes the facility at SML consuming steam generated by the project activity.

The project boundary will consist of the biomass handling facility and biomass fired boiler system, steam piping to the process units. Pictorial presentation of the project boundary has been provided below:



B.4. Description of baseline and its development:

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In line with the baseline selection, paragraph 11, of the applied baseline methodology AMS-I.C. version-16, the simplified baseline is the fuel consumption of the technologies that would have been used in the absence of the project activity times an emission factor for the fossil fuel displaced.

In line with the methodology the assessment was made for the baseline fuel that would have been used to generate equivalent amount of energy. The following options represent possible fuels which can be used to generate steam in the absence of project activity:

- Coal based thermal energy generation system
- The project undertaken without CDM assistance

Among the two options coal based thermal energy generation system is having comparable advantages regarding supply, operability, technology and common practice. Where as rice husk based system normally faces a number of disadvantages or barriers (elaborated in Section B.5.). The analysis of cost of steam generation for the both the fuel is shown in section B.5 and coal is obviously a more attractive fuel option. Therefore, coal has been selected as the baseline fuel option and emissions associated with the combustion of coal for steam generation account for the baseline emissions.

Moreover they had got clearance from Karnataka State Pollution Control Board (KSPCB)[3] for coal fired boiler, which clearly indicates that SML had the plan to fire coal. Later on in view of saving the environment they decided to go for a biomass fired boiler.

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

According to the **Attachment A to Appendix B of the simplified modalities and procedures for small-scale CDM project activities:**

"Project participants shall provide an explanation to show that the project activity would not have occurred anyway due to at least one of the following barriers:

- *(a)* ***Investment barrier****: a financially more viable alternative to the project activity would have led to higher emissions*
- *(b)* ***Technological barrier:*** *a less technologically advanced alternative to the project activity involves lower risks due to the performance uncertainty or low market share of the new technology adopted for the project activity and so would have led to higher emissions*
- *(c)* ***Barrier due to prevailing practice****: prevailing practice or existing regulatory or policy requirements would have led to implementation of a technology with higher emissions*
- *(d)* ***Other barriers:*** *without the project activity, for another specific reason identified by the project participant, such as institutional barriers or limited information, managerial resources, organizational capacity, financial resources, or capacity to absorb new technologies, emissions would have been higher.."*

In the following sections, the project proponent has chosen investment barrier for the demonstration of additionality by comparing the cost of steam generation between coal and rice husk.

The investment barrier as: *"Best practice examples include but are not limited to, the application of investment comparison analysis using a relevant financial indicator, application of a benchmark analysis or a simple cost analysis (where CDM is the only revenue stream such as end-use energy efficiency). It is recommended to use national or global accounting practices and standards for such an analysis."*[4]

The investment barrier is demonstrated using investment comparison analysis. As mentioned earlier the only other alternative for the project proponent was to install a coal based steam generation unit. Therefore, in line with the guidance on investment analysis[5], the demonstration that the project activity is less financially attractive than the baseline scenario is done by investment comparison analysis. The chosen financial indicator is unit cost of generation of steam[6]. The unit cost of generation of steam from

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[3] Consent for Establishment under water and air act, dated 31st Oct, 2006 from KSPCB, Annexure II

[4] http://cdm.unfccc.int/Reference/Guidclarif/ssc/methSSC_guid15_v01.pdf

[5] Guidance on the Assessment of Investment Analysis: EB51, Annex 58, paragraph 16.

[6] The choice of financial indicator is based on the options given in Sub-step 2b: Option III: "**Tool for the demonstration and assessment of additionality**", EB 39, Annex 10. The indicator chosen is unit cost of service, which in the case of project activity is the unit cost of steam generation (INR/ton of steam).

coal and rice husk has been compared. The following table illustrates the data that has been used and the algorithm used to determine the unit cost of steam generation:

Particular	Unit	Coal (Baseline)	Biomass (Project)	Justification
Total capacity of the boilers	tonnes/hr	16	16	Name plate capacity
No. of days of operation	days	330	330	Assumed
Hours of operation per day	hrs	24	24	Assumed
Plant load factor	%	87.5	87.5	Assuming 14TPH of steam will be consumed
Total amount of steam to be generated	tonnes/yr	110,880	110,880	Calculated
Enthalpy of saturated steam @ 10.54 kg/cm2 (g) at boiler out let	kcal/tonne	664,000	664,000	Steam Table
Enthalpy of feed water @ 20 kg/cm^2 (g), 120^0C at boiler inlet	kcal/tonne	120,000	120,000	Steam Table
Efficiency of Boiler	%	80	82	**Coservative value i.e. minimum value for coal based system and maximum value for biomass based system.**(supplied by boiler supplier at the time of decision making and same value can be found in the techno commercial offer of Thermax Limited, Mirco Dynamics Pvt. Ltd. and Zenith Thermal Equipment Pvt. Ltd.)
Energy input required at boiler inlet, available from fuel firing	kcal/year	75,398,400,000	73,559,414,634	Calculated
NCV of Fuel used	Kcal /Kg	3,500	3,000	Value for coal and biomass taken from supplier of the same.
Quantity of fuel required per 16 tonnes of steam	Tonnes of biomass	21542.400	24519.805	Calculated
Unit cost of fuel	INR/tonne	1200	1140	Taken from supplier's data of coal and biomass supplier
Total Cost of fuel	INR/yr	25850880.00	27952577.56	Calculated
Investment Cost	INR	506800	6418000	Value supplied by boiler supplier at the

for 10TPH boiler		0		time of decision making and same value can be verified in the techno commercial offer of Thermax Limited and Zenith Thermal Equipment Pvt. Ltd.
Investment Cost for 6TPH boiler	INR	3395000	3949000	
Operation and maintenance cost	INR/yr	423150	518350	5% of the total investment cost
Total Cost of steam generation	INR/yr	34737030.00	38837927.56	Calculated
Total Cost per tonne of steam generation	INR/tonne of steam	313.28	350.27	Calculated
Cost difference for two different fuel type per tonne of steam generated	INR/tonne of steam	36.99		Calculated
Cost difference for two different fuel type per year	**INR/year**	**2929213**		**Calculated**

The above analysis demonstrates that, coal would have been the cheapest fuel option for steam generation, which works out to be financially most viable alternative. Steam generation cost with coal is INR 313.28 per tonne of steam as compared to that with biomass, which is INR 350.27 per tonne of steam. And this lead to a difference in an annual cost of steam generation by INR 29.29 Lakhs. Generating steam with coal would have certainly led to higher GHG emissions as compared to biomass.

In the light of above the project proponent have decided to go for a costlier fuel option keeping in mind the potential benefits related to reduction in the greenhouse gas emissions ad global warming. Therefore, revenues from CDM will provide necessary incentives to the project proponent to undertake the project activity.

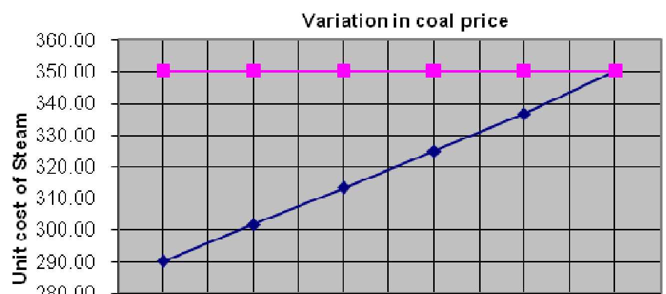
Sensitivity analysis:
A sensitivity analysis was conducted considering the variation in the cost of fuel.

Choice of parameter for variation:
As per guideline provided by EB in meeting no. 51 annex 58 in paragraph 17, the criteria for choosing the sensitivity analysis parameter is:
16. ***Guidance:*** *Only variables, including the initial investment cost, that constitute more than 20% of either total project costs or total project revenues should be subjected to reasonable variation (all parameters varied need not necessarily be subjected to both negative and positive variations of the same magnitude), and the results of this variation should be presented in the PDD and be reproducible in the associated spreadsheets.*

The total cost of fuel required in the project activity during the year and the investment cost for the boiler unit are two significant costs and have been chosen as variable parameters for sensitivity analysis. Operation and maintenance cost has not been considered as a variable parameter as it has very less impact (1.2 to 1.3%) on the total cost of steam generation.

Range of variation of chosen parameters:

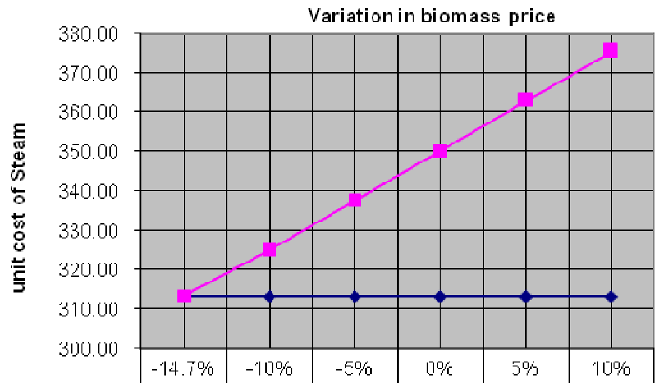
The sensitivity analysis was carried out following the guideline provided by EB in meeting no. 51 annex 58 paragraph 18 by varying the fuel price and investment cost separately by +/- 10%, both for baseline as well as project activity and finding out the corresponding changes in unit cost of energy generation.. The results are presented below in graphical form:



	-10%	-5%	0%	5%	10%	15.87%
Unit cost of coal based Steam-generation (INR/tonne)	289.97	301.63	313.28	324.94	336.60	350.27
Unit cost of biomass based Steam-generation (INR/tonne)	350.27	350.27	350.27	350.27	350.27	350.27

It is shown through the above analysis that ± 10% change in coal price, the unit cost of steam generation using coal is always cheaper than using biomass.

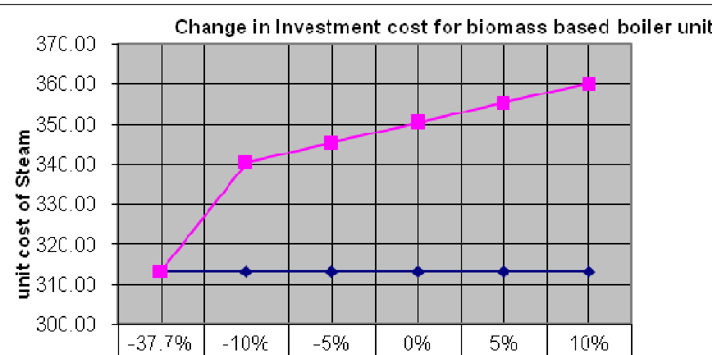
The sensitivity analysis is also done, on unit cost of steam generation varying the cost of biomass by ± 10% keeping the cost of coal fixed following the guideline provided by EB in meeting no. 51 annex 58. The results are presented below:



	-14.7%	-10%	-5%	0%	5%	10%
Unit cost of Coal based Steam-generation (INR/tonne)	313.28	313.28	313.28	313.28	313.28	313.28
Unit cost of Biomass based Steam-generation (INR/tonne)	313.28	325.06	337.67	350.27	362.87	375.48

The above analysis shows that ± 10% change in biomass price, the unit cost of steam generation using biomass is always higher than using coal at its present price level.

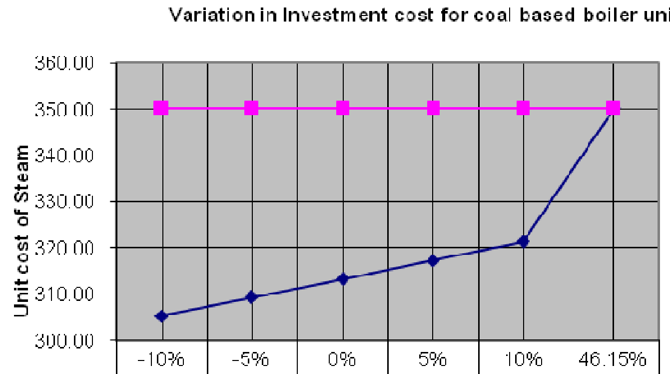
The sensitivity analysis is also done, on unit cost of steam generation varying the Investment cost for biomass based boiler unit by ± 10%. The results are presented below:



	-37.7%	-10%	-5%	0%	5%	10%
Unit cost of Coal based Steam-generation (INR/tonne)	313.28	313.28	313.28	313.28	313.28	313.28
Unit cost of Biomass based Steam generation (INR/tonne)	313.28	340.45	345.36	350.27	355.18	360.09

It is shown through the above analysis that ± 10% change in investment cost for biomass based unit, the unit cost of steam generation using coal is always cheaper than using biomass.

The sensitivity analysis is also done, on unit cost of steam generation varying the Investment cost for coal based boiler unit by ± 10%. The results are presented below:



	-10%	-5%	0%	5%	10%	46.15%
Unit cost of coal based Steam-generation (INR/tonne)	305.27	309.28	313.28	317.29	321.30	350.27
Unit cost of biomass based Steam-generation (INR/tonne)	350.27	350.27	350.27	350.27	350.27	350.27

It is evident from the above analysis that ± 10% change in investment cost for coal based unit, the unit cost of steam generation using coal is always cheaper than using biomass.

On extrapolation it is observed that only corresponding to an increase in coal price @ 15.87% or a decrease in biomass price @14.7% will make the unit cost of steam generation same from both coal and biomass provided the cost of second fuel (biomass and coal respectively) would remain unchanged.

But the biomass quotation received at the time of decision making and actual invoices in August 2009 shows an increase of biomass price by 70.17%. Where as coal price in this time span increased only by 10%[7]. Thus it can't be a likely scenario that in future biomass based steam generation will become a more economical option.

On the other hand quoted total cost was INR 84.63 Lac and INR 103.67 Lac for coal based and biomass fired boilers respectively and if the extrapolation is carried out for investment cost variation it shows that an increase by 46.15% in investment cost for coal based boiler unit or a decrease by 37.7% in investment for biomass based boiler unit will make the unit cost of steam generation same from both coal and biomass provided the investment cost of the second unit (biomass and coal respectively) would remain unchanged. It is very unlikely that any one of the unit will cost more or less, because if due to any reason (like cost of material, tax etc.) manufacturing cost increases it will affect equally the coal based and biomass based boiler unit. In fact the final cost[8] (INR 100.0 Lac) of the biomass based boilers was only 3.54% less than the quoted cost (INR 103.67 Lac) and at this actual cost also, steam generation cost with biomass (INR 346.79 / tone of steam) remains as a costlier option than with coal (INR 313.28/ tone of steam).

From the above analysis it can be concluded it is always favourable to generate steam with coal than with biomass. So, from this analysis it can be stated that SML would have invested the money to generate steam from coal rather than generating from biomass.

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[7] *http://business.rediff.com/report/2009/aug/25/coal-india-may-up-prices-by-up-to-rs-175-per-ton.htm*
http://www.business-standard.com/india/news/coal-india-may-be-allowed-to-raise-prices-by-march/371145/

[8] Ref: Revised Purchase Order of the 10TPH and 6 TPH boilers, dated 27th August, 2007

Therefore, the investment comparison analysis provides clear evidence that the project faces investment barrier due to high cost of steam generation and registration and approval of the project as a CDM project activity will help the project proponent in overcoming the investment barrier.

CDM Consideration:

The benefits from CDM were seriously considered by the Board of Directors of Shilpa Medicare Limited (SML) at its meeting held on 26th April, 2007.

In line the VVM version-02 following is the matrix that demonstrates that continued action was being taken up to secure CDM mandate alongside implementation of the project at site.

Sr. No.	Date	CDM related activity
1	12-April-07	Head project proposed board regarding CDM potential of biomass based boiler
2	26-Apr-07	Resolution passed by board on CDM consideration
3	27-Aug-07	Purchase order placed for the boiler (Start date of project activity)
4	27-Sep-07	Telephonic discussions and Email enquiry to technology supplier on CDM consultants
5	9-Oct-07	Reply from technology supplier
6	Nov-07	Telephonic discussions with consultant and request for quote
7	7-Mar-08	Email enquiry from SML to CDM consultant requesting estimate on carbon credits.
8	13-Mar-2008	Environmental clearance from MOEF
9	24-Mar-08	Reply from CDM consultant on carbon credit Potential
10	23-Apr-08	SML request CDM consultant to send the offer and plan a site visit
11	24-Jul-08	Offer sent by CDM consultant to SML
12	4-Aug-08	Agreement signed with CDM consultant for CDM project consultation
13	10-11Oct2008	Site visit by consultant to SML
14	15th Oct 2008	Amendment to LOU dated 04th August, 2008
15	21-Nov-2008	Consent to Operate obtained
16	26-Nov-08	Boiler commissioned
17	12-Dec-08	CDM consultant sent PCN to SML
17	7-Feb-2009	IBR certification
19	16-Mar-09	Consultant submitted PDD to SML
20	March-May2009	DOE selection
21	10-May-09	SML PDD web hosted

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

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The coal fired steam generation unit is the most plausible baseline scenario as explained in section B.5. The following section details the method for the calculation of emission reductions.

Baseline emissions: $BE_{thermal,CO2,y}$

According to the paragraph 15 of AMS-I.C., version: 14 the baseline emissions for a fossil fuel based steam generation unit are calculated as follows:

$$BE_{thermal,CO_2,y} = \left(EG_{thermal,y} / \eta_{BL,thermal}\right) * EF_{FF,CO_2}$$

Where:

$BE_{thermal,CO2,y}$	Baseline emission during the year y, tCO_2e
$EG_{thermal,y}$	Net quantity of steam/heat supplied by the project activity during the year y,TJ.
$EF_{FF,CO2}$	CO_2 emission factor per unit of energy of the fuel (i.e. non-coking coal) that would have been used in the baseline plant in (tCO_2e /TJ).
$\eta_{BL,thermal}$	Efficiency of the plant using fossil fuel that would have been used in the absence of the project activity.

In line with **paragraph 18 of AMS-I.C. version 16**

“*Efficiency of the baseline units shall be determined by adopting one of the following criteria (in a preferential order):*

(a) Highest measured operational efficiency over the full range of operating conditions of a unit with similar specifications, using baseline fuel. The efficiency tests shall be conducted following the guidance provided in relevant national / international standards;

(b) Highest of the efficiency values provided by two or more manufacturers for units with similar specifications, using the baseline fuel;

(c) Default efficiency of 100%.”

In absence of data required for option (a), option (b) has been adopted to determine the baseline efficiency $\eta_{BL,thermal}$ of the thermal energy generation system and a conservative value[9] of 84% has been used fixed *ex ante*.

Project Emission

As per paragraph 24 of AMS-I.C., version 16

“Project emissions include:

- *CO_2 emissions from collection/processing/transportation of biomass residues to the project site;*
- *CO_2 emissions from on-site consumption of fossil fuels due to the project activity shall be calculated using the latest version of “Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion”;*
- *CO_2 emissions from electricity consumption by the project activity using the latest*

[9] Highest of the operational efficiency of similar specification as mentioned in the offer letter of two boiler manufacturer.

version of "Tool to calculate baseline, project and/or leakage emissions from electricity consumption";

- *Any other significant emissions associated with project activity within the project boundary;"*

For the specific case of project activity:

There is no on site CO_2 emissions from collection/processing/transportation of biomass residues within the project boundary.
In the case of exigency coal may be used in the boilers and in this case CO_2 emissions from on-site consumption of fossil fuels due to the project activity will be calculated using the latest version of "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion".
CO2 emissions from electricity consumption by the project activity will not be considered as same auxiliary drives can be used in the baseline case as well as in the project activity and will consume same amount of electricity.
No other significant emission is associated with the project activity within the project boundary.

CO_2 emissions from fossil fuel combustion in process are calculated based on the quantity of fuels combusted and the CO_2 emission coefficient of those fuels, as follows:

$$PE_{FC,y} = FC_{Coal,y} \times COEF_{Coal}$$

Where:

$PE_{FC,y}$ CO_2 emissions from fossil fuel combustion during the year *y* (tCO_2 / yr);

$FC_{Coal,y}$ Quantity of fossil fuel combusted during the year y (mass or volume unit/yr);

$COEF_{Coal}$ CO_2 emission coefficient of coal (tCO_2 / mass or volume unit);

The CO_2 emission coefficient $COEF_{Coal,}$ can be calculated following two procedures, depending on the available data on Coal, as follows:

Option A:

The CO_2 emission coefficient $COEF_{Coal}$ is calculated based on the chemical composition of Coal, using the following approach:

If $FC_{Coal,y}$ is measured in a mass unit:

$$COEF_{Coal} = w_{Coal} \times \frac{44}{12}$$

If $FC_{i,y}$ is measured in a volume unit:

$$COEF_{Coal} = w_{Coal} \times \rho_{Coal} \times \frac{44}{12}$$

Where:

$COEF_{Coal}$	CO_2 emission coefficient of Coal (tCO2 / mass or volume unit);
w_{Coal}	Weighted average mass fraction of carbon in Coal (tC / mass unit of Coal);
ρ_{Coal}	Weighted average density of Coal (mass unit / volume unit of Coal);

<u>Option B:</u>

The CO2 emission coefficient $COEF_{Coal}$ is calculated based on net calorific value and CO_2 emission factor of *iCoal*, as follows:

$$COEF_{Coal} = NCV_{Coal} \times EF_{CO_2,Coal}$$

Where:

$COEF_{Coal}$	CO_2 emission coefficient of Coal (tCO_2 / mass or volume unit);
NCV_{Coal}	Weighted average net calorific value of Coal (GJ/mass or volume unit);
$EF_{CO_2,Coal}$	Weighted average CO_2 emission factor of Coal (tCO_2/GJ);

As per "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion" Option A should be the preferred approach, if the necessary data is available. But there is no data source available to estimate weighted average mass fraction of carbon in fuel type i in year y. So option B has been chosen for $COEF_{Coal}$ calculation.

- # GHG emission due to the project activity will not be in excess to the baseline case as equipments installed within the project boundary would anyway have been installed in the baseline coal based steam generation unit. Thus project emission has not been considered due to the electricity consumption by the project activity.
- # There are no other significant emissions associated with project activity within the project boundary.

So, the project emission can be calculated as follows:

$$PE_{FC,y} = FC_{Coal,y} \times NCV_{Coal} \times EF_{CO_2,Coal}$$

<u>Leakage: LE</u> $_y$

As per paragraph 28 of AMS-I.C. *"If the energy generating equipment currently being utilised is transferred from boundary to the project activity, leakage is to be considered."*. For this project activity there is no transfer of equipment and therefore leakage has been assumed to be zero.

As per paragraph 18 of **Attachment C to Appendix B version 2 "*General guidance on leakage in biomass project activities*" -** *The project participant shall evaluate ex ante if there is a surplus of the*

biomass in the region of the project activity, which is not utilised. If it is demonstrated (e.g., using publishedliterature, official reports, surveys etc.) at the beginning of each crediting period that the quantity of available biomass in the region (e.g., 50 km radius), is at least 25% larger than the quantity of biomass that is utilised including the project activity, then this source of leakage can be neglected otherwise this leakage shall be estimated and deducted from the emission reductions.

In line with this guidance on leakage associated with the use of biomass material for project activities, it is demonstrated through survey/biomass availability study[10] that the quantity of biomass in the region is 33.33% larger than the quantity of biomass that is utilized including the project activity. The assessment has been conducted by Bhagwat Technologies and Energy Conservation Pvt. Ltd. in April, 2009, within a distance of max. 50 km radius around the project site. The districts which have been covered are given below along with the surplus availability of rice husk.

District	Rice husk production (kT)	Rice Husk consumption (kT)	Surplus quantity of rice husk available (kT)
Raichur	83.93	87.1[11]	38.53
Bellary	33.21	28.5	
Gulbarga	36.99	0	
Total	154.13	115.6	

However in case the biomass is procured, during the crediting period, outside the surveyed 50KM radius, there will be a probability of diversion of biomass. Thus, in case, the biomass is procured outside the 50 KM radius, reassessment of biomass availability will be done.

The other source of Leakage is emissions associated with the transportation of biomass material to the project plant.

As per paragraph 29 of AMS-I.C. *"In case collection/processing/transportation of biomass residues is outside the project boundary, CO_2 emissions from collection/processing/transportation of biomass residues to the project site should be considered"*. SML purchase rice husk from outside of the project boundary. So, the leakage applicable for this project activity will be due to transportation of biomass residues to project site. Now as per footnote 11 of AMS-I.C. *"If biomass residues are transported over a distance of more than 200 kilometers due to the implementation of the project activity then this leakage source attributed to transportation shall be considered, otherwise it can be neglected."* For *ex ante* estimation, leakage emission would be considered zero, based on the biomass surplus availability report, which proves biomass is available in plenty within a distance of 200 Km radius around the project site. However, for *ex post* calculation, emission due to biomass transportation would be monitored and neglected, only if the average distance for biomass transportation is lower than 200 Km. If the average distance for biomass transportation is calculated to be more than 200 km, leakage emission due to .biomass transportation would be estimated using equation given below:

$$LE_y = N_{truck,y} \times AVD_y \times EF_{CO2,truck}$$

[10] Ref: "Biomass Assessment Report for Shilpa Medicare Limited – A Feasibility Study" prepared by Bhagwat Technologies and Energy Conservation Pvt. Ltd. in April, 2009

LE_y = Leakage emission due to transportation of biomass residues to project site in year y, tCO_2/yr

$N_{truck,y}$ = Number of truck trips from the biomass source to the project plant in year y

AVD_y = **Average** roundtrip distance per trip for transporting rice husk during the year y Km

$EF_{CO2,\ truck}$ = CO_2 emission factor of truck used for transportation (tCO_2e/Km)

The emission reductions can therefore be given as:

Emission Reduction: ER_y

The emission reduction due to project activity in the year y is the difference between the baseline emissions (**$BE_{thermal,CO2,y}$**), project emission (**$PE_{FC,y}$**) & leakage (**$LE_{trans,\ y}$**), thus

$$ER_{thermal,CO_2,y} = BE_{thermal,CO_2,y} - PE_{FC,y} - LE_y$$

Where

$ER_{thermal,CO_2,y}$	Emission reduction during the year y, tCO_2e
$BE_{thermal,CO_2,y}$	Base line emission during the year y, tCO_2e
$PE_{FC,y}$	Project emission during the year y, tCO_2e
LE_y	Leakage emission due to transportation of biomass residues to project site in year y, tCO_2e

In line with the arguments given in baseline emission, project emission and leakage emission sections, the emission reductions due to the project activity can be estimated as follows:

$$ER_{thermal,CO_2,y} = \left(EG_{thermal,y} / \eta_{BL,thermal}\right) * EF_{FF,CO_2} - \left\{FC_{Coal,y} \times \left(NCV_{Coal} \times EF_{CO_2,Coal}\right)\right\} - \left(N_{truck,y} \times AVD_y \times EF_{CO2,truck}\right)$$

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

Data / Parameter:	**$EF_{FF,CO2}$**
Data unit:	tCO_2e / TJ
Description:	CO_2 emission factor per unit of energy of the fuel that would have been used in the baseline plant
Source of data used:	http://www.natcomindia.org/pdfs/chapter2.pdf. - National Communication of India.
Value applied:	95.81 (Non-coking Indian coal has been considered as the baseline fuel).
Justification of the	The data source selected is an official and authentic source.

[11] Including 30KT (approx) consumption by the project activity.

choice of data or description of measurement methods and procedures actually applied :	
Any comment:	Value will be updated as per any revisions made in natcom value during the crediting period.

Data / Parameter:	$\eta_{BL,thermal}$
Data unit:	%
Description:	Efficiency of plant using fossil fuel that would have been used in the absence of the project activity.
Source of data used:	Tool to determine the baseline efficiency of thermal or electric energy generation systems
Value applied:	84% **-** (Highest of the operational efficiency of similar specification as mentioned in the offer letter of two boiler manufacturer.)
Justification of the choice of data or description of measurement methods and procedures actually applied :	Not applicable
Any comment:	

Data / Parameter:	**$EF_{CO2,truck}$**
Data unit:	tCO_2e/Km
Description:	CO_2 emission factor of truck used for transportation (tCO_2e/Km)
Source of data used:	This is a derived value
Value applied:	0.00054
Justification of the choice of data or description of measurement methods and procedures actually applied :	This data is derived from standard values, taken from authentic sources. The values used are: • Mileage of diesel trucks: 5 Km/Lt (Taken from IPCC 2006, Vol 2, Ch 3) • NCV of diesel: 43.0 TJ/KT(Taken from IPCC 2006, Vol 2 Ch1) • CO2 emission factor of diesel: 74.1 tCO_2e/TJ (Taken from IPCC 2006,Vol 2 Ch1) • Density of diesel: 0.84 kg/Lt (Taken from IOCL, a Government of India, company)
Any comment:	

Data / Parameter:	Biomass surplus availability
Data unit:	%

Description:	Surplus biomass (type/s used in the project activity) availability in the region
Source of data used:	Based on report from Bhagwat Technologies and Energy Conservation Pvt. Ltd.
Value applied:	58.0
Justification of the choice of data or description of measurement methods and procedures actually applied :	The data is used from third party assessment report.
Any comment:	

Data / Parameter:	**SEC_{ff}**
Data unit:	TJ /MWh
Description:	Specific energy consumption of boiler when fired with coal
Source of data used:	Calculated from boiler efficiency with sub-bituminous coal, energy generated by the boilers and NCV of the fossil fuel from the supplier, enthalpy of saturated steam at boiler outlet pressure.
Value applied:	Coal - 0.004286 (fixed *ex-ante*)
Justification of the choice of data or description of measurement methods and procedures actually applied :	The above value is calculated based on the boiler default efficiency; the output enthalpy is taken from the steam tables for saturated steam at the boiler operating pressure and the NCV value is the IPCC default value at the upper limit of the uncertainty at 95% confidence interval as provided in table 1.2 of Chapter 1 of Vol 2 of 2006 IPCC Guidelines on National GHG Inventories .
Any comment:	Specific energy consumption of coal is fixed *ex-ante.*

Data / Parameter:	**$SEC_{biomass}$**
Data unit:	TJ /MWh
Description:	Specific energy consumption of boiler when fired with biomass (rice husk)
Source of data used:	Calculated from manufacturer supplied boiler efficiency with rice husk, energy generated by the boilers and NCV of the rice husk from the supplier, enthalpy of saturated steam at boiler outlet pressure.
Value applied:	Rice husk - 0.004390 (fixed *ex-ante*)
Justification of the choice of data or description of measurement methods and procedures actually applied :	The above value is calculated based on the boiler efficiency (highest value) as supplied by the boiler manufacturer; the output enthalpy is taken from the steam tables for saturated steam at the boiler operating pressure and the NCV value is taken from supplier quotation.
Any comment:	Specific energy consumption of rice husk is fixed *ex-ante*.

B.6.3 Ex-ante calculation of emission reductions:

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Baseline emissions: $BE_{thermal,CO2,y}$

$$BE_{thermal,CO_2,y} = \left(EG_{thermal,y} / \eta_{BL,thermal}\right) * EF_{FF,CO_2}$$

Where:

$BE_{thermal,CO2,y}$	Baseline emission during the year y, tCO_2e
$EG_{thermal,y}$	Net quantity of steam/heat supplied by the project activity during the year y,TJ = Enthalpy of steam x Total steam/heat supplied by the project activity during the year = 2782.36 kJ/kg X (14 X 330 X 24) tonne/annum =2782.36 kJ/kg X 110880 tonne/annum = 308.508TJ
$EF_{FF,CO2}$	CO_2 emission factor per unit of energy of the fuel (i.e. non-coking coal) that would have been used in the baseline plant in (tCO_2e /TJ) =95.81 tCO_2e /TJ
$\eta_{BL,thermal}$	Efficiency of the plant using fossil fuel that would have been used in the absence of the project activity = 84%

Therefore,

$$BE_{thermal,CO_2,y} = \frac{308.508TJ}{84\%} \times 95.81 tCO_2 e / TJ = 35{,}188 tCO_2 e$$

Project Emission: $PE_{FC,y}$

$$PE_{FC,y} = FC_{Coal,y} \times NCV_{Coal} \times EF_{CO_2,Coal}$$

Where:

$PE_{FC,y}$	CO_2 emissions from fossil fuel combustion during the year *y* (tCO2 / yr);
$FC_{Coal,y}$	Quantity of Coal combusted during the year y (tonnes);
NCV_{Coal}	Weighted average net calorific value of Coal (GJ/mass or volume unit);
$EF_{CO_2,Coal}$	Weighted average CO_2 emission factor of Coal (tCO_2/GJ);

Since no fossil fuel is envisaged initially, the project emissions are considered zero.
So,

$$PE_{FC,y} = 0$$

Leakage: LE_y

$$LE_y = N_{truck,y} \times AVD_y \times EF_{CO2,truck}$$

LE_y = Leakage emission due to transportation of biomass residues to project site in year y, tCO_2/yr

$N_{truck,y}$ = Number of truck trips from the biomass source to the project plant in year y

= 4993 (Considering 29959 tonnes of annual husk consumption and 6tonne per truck load).

AVD_y **= Average** roundtrip distance per trip for transporting rice husk during the year y, Km

= 100 km (as per assessment conducted by Bhagwat Technologies and Energy Conservation Pvt. Ltd. in April, 2009, within a distance of max. 50 km radius around the project site biomass availability is abundant)

$EF_{CO2,\ truck}$ = CO_2 emission factor of truck used for transportation (tCO_2e/Km)

= 0.00054 tCO_2e/Km, Derived from standard values, taken from authentic sources.
The values used are:

- Mileage of diesel trucks: 5 Km/Lt (Taken from IPCC 2006, Vol 2, Ch 3)
- NCV of diesel: 43.0 TJ/KT(Taken from IPCC 2006, Vol 2 Ch1)
- CO2 emission factor of diesel: 74.1 tCO_2e/TJ (Taken from IPCC 2006,Vol 2 Ch1)
  Density of diesel: 0.84 kg/Lt (Taken from IOCL, a Government of India, company)

So,

$$LE_y = 4993 \times 100 \times 0.00054$$

= 270 tCO2e

But as per foot note 11 of AMS-I.C. version 16 *"leakage from biomass transportation is to be considered only for cases where biomass is transported over a distance of 200 km or more."*.
So, for *ex ante* estimation, leakage emission can be considered zero, based on the biomass surplus availability report, which proves biomass is available in plenty within a distance of 50 Km radius around the project site.

So,
LE_y = 0.0 tCO_2e

<u>Emission Reduction: *ER_y*</u>

$$ER_{thermal,CO_2,y} = BE_{thermal,CO_2,y} - PE_{FC,y} - LE_y$$

Where

$ER_{thermal,CO_2,y}$ Emission reduction during the year y, tCO_2e

$BE_{thermal,CO_2,y}$ Base line emission during the year y, tCO_2e
= 35,188 tCO_2e

$PE_{FC,y}$ Project emission during the year y, tCO_2e
= 0 tCO_2e

LE_y Leakage, during the year y, tCO_2e
= 0 tCO_2e

So,

$$ER_{thermal,CO_2,y} = (35188 - 0 - 0)tCO_2e = 35188tCO_2e$$

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

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Year	**Estimation of project activity emissions (tCO_2 e)**	**Estimation of baseline emissions (tCO_2 e)**	**Estimation of leakage (tCO_2 e)**	**Estimation of overall emission reductions (tCO_2 e)**
Jan, 2011-Dec,2011	0.0	35,188	0	35,188
Jan, 2012-Dec,2012	0.0	35,188	0	35,188
Jan, 2013-Dec,2013	0.0	35,188	0	35,188
Jan, 2014-Dec,2014	0.0	35,188	0	35,188
Jan, 2015-Dec,2015	0.0	35,188	0	35,188
Jan, 2016-Dec,2016	0.0	35,188	0	35,188
Jan, 2017-Dec,2017	0.0	35,188	0	35,188
Jan, 2018-Dec,2018	0.0	35,188	0	35,188
Jan, 2019-Dec,2019	0.0	35,188	0	35,188
Jan, 2020-Dec,2020	0.0	35,188	0	35,188
Total (tonnes of CO2 e)	**0.0**	351,880	**0**	351,880

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

B.7.1 Data and parameters monitored:

Data / Parameter:	**$EG_{thermal,y}$**

Data unit:	TJ
Description:	Net quantity of steam/heat (thermal energy) supplied by the project activity during the year y
Source of data to be used:	In house plant record.
Value of data	308.508 TJ (*Ex-ante* estimation assuming both boilers in operation for 330 days of operation in a year and @ 14TPH generation).
Description of measurement methods and procedures to be applied:	The thermal energy will be calculated from total steam ($\mathbf{Q_{steam,y}}$) supplied by the boiler to the process multiplied by the enthalpy of the steam. The enthalpy of the steam generated will be taken based on saturated steam condition and its corresponding pressure.
QA/QC procedures to be applied:	The necessary QA/QC will be ensured by annual calibration of steam flow meters, pressure sensors.
Any comment:	Data will be maintained both in hardcopy and soft copy format for the crediting period + 2 years.

Data / Parameter:	$\mathbf{EF_{CO2,Coal}}$
Data unit:	tCO_2e / GJ
Description:	Weighted average CO2 emission factor of Coal
Source of data to be used:	IPCC default value at the upper limit of the uncertainty at 95% confidence interval
Value of data	0.100 (Value for Sub-bituminous coal, as provided in table 1.4 of Chapter 1 of Vol 2 of 2006 IPCC Guidelines on National GHG Inventories)
Description of measurement methods and procedures to be applied:	The data source selected is an official and authentic source. This is selected as per the guidance given in “Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion” for the calculation of project emission.
QA/QC procedures to be applied:	Any future revision of the IPCC Guidelines will be taken into account
Any comment:	Sub-bituminous coal may be fired during emergencies only.

Data / Parameter:	$\mathbf{NCV_{Coal}}$
Data unit:	GJ/ton
Description:	Weighted average net calorific value of Coal
Source of data to be used:	IPCC default value at the upper limit of the uncertainty at 95% confidence interval
Value of data	26.0 (Value for Sub-bituminous coal, as provided in table 1.2 of Chapter 1 of Vol 2 of 2006 IPCC Guidelines on National GHG Inventories)
Description of measurement methods and procedures to be applied:	The data source selected is an official and authentic source. This is selected as per the guidance given in “Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion”
QA/QC procedures to be applied:	Any future revision of the IPCC Guidelines will be taken into account
Any comment:	Sub-bituminous coal may be fired during emergencies only.

Data / Parameter:	**$Q_{steam,y}$**
Data unit:	Tonnes
Description:	Total quantity of steam produced in the project activity during the year y
Source of data to be used:	In house plant record.
Value of data	110880 tonnes (*Ex-ante* estimation assuming both boilers in operation for 330 days of operation in a year and 14TPH generation).
Description of measurement methods and procedures to be applied:	Steam flow meter will be installed to monitor the parameter continuously. Data is directly sent to data acquisition system called EffiMax. Data is recorded continuously and hourly records will be collated into daily steam generation figure. Daily figures will be collated into monthly data and monthly data will be used for the calculation of emission reductions.
QA/QC procedures to be applied:	The meter used for measurement is under the purview of the SML and necessary QA/QC will be ensured by periodic calibration (accuracy +/- 1.5%), carried out with respect to national standards and would be recalibrated at appropriate intervals as per manufacturer's specifications but at least once in a year.
Any comment:	Data will be maintained both in hardcopy and soft copy format for the crediting period + 2 years.

Data / Parameter:	**$P_{steam,y}$**
Data unit:	kg/cm^2g
Description:	Average pressure of steam at the boiler outlet during the year y.
Source of data to be used:	In house plant record.
Value of data	10.54 (as per boiler specification)
Description of measurement methods and procedures to be applied:	The data is measured using electronic pressure sensor installed at boiler outlet steam header. Data is directly sent to data acquisition system called EffiMax. The data is recorded continuously. Average daily steam pressure is then collated into monthly data which is used for the determination of steam enthalpy.
QA/QC procedures to be applied:	The meter used for measurement is under the purview of the SML and necessary QA/QC will be ensured by periodic calibration(accuracy +/- 1%) at appropriate intervals as per manufacturer's specifications but at least once in a year.
Any comment:	Data will be maintained both in hardcopy and soft copy format for the crediting period + 2 years.

Data / Parameter:	**$FC_{biomassy}$**
Data unit:	Tonnes
Description:	Amount of biomass used in the boiler in year y
Source of data to be used:	Plant records
Value of data	Rice husk - 29,959 – *ex-ante* estimation
Description of	The amount of biomass consumed will be measured using Solid Fuel Metering

measurement methods and procedures to be applied:	System. The data will be monitored continuously. This is integrated in the EffiMax system for data acquisition. The data will be monitored daily and the same will be collated into monthly biomass consumption.
QA/QC procedures to be applied:	The necessary QA/QC will be ensured by annual calibration of the metering system. The same data can be verified from the biomass procurement record.
Any comment:	Data will be maintained both in hardcopy and soft copy format for the crediting period + 2 years.

Data / Parameter:	**$FC_{coal,y}$**
Data unit:	Tonnes
Description:	Amount of coal used in the boiler in year y
Source of data to be used:	Plant records
Value of data	0.0 – *ex-ante* estimation
Description of measurement methods and procedures to be applied:	The amount of coal consumed will be measured using Solid Fuel Metering System. The data will be monitored continuously. This is integrated in the EffiMax system for data acquisition. The data will be monitored daily and the same will be collated into monthly biomass consumption.
QA/QC procedures to be applied:	The necessary QA/QC will be ensured by annual calibration of the metering system. The same data can be verified from the coal procurement record.
Any comment:	Data will be maintained both in hardcopy and soft copy format for the crediting period + 2 years.

Data / Parameter:	**AVD_y**
Data unit:	Km
Description:	Average roundtrip distance per trip for transporting rice husk during the year y
Source of data to be used:	Weigh bridge records
Value of data	100 (As rice husk is available in plenty within 50km radius around the project activity)
Description of measurement methods and procedures to be applied:	The location of each biomass source will be noted at each delivery. The distance of the source will then be taken based on aerial distance between the plant and the source of biomass. The data will be collated and average will be taken at the end of the year.
QA/QC procedures to be applied:	-
Any comment:	Data will be maintained both in hardcopy and soft copy format for the crediting period + 2 years.

Data / Parameter:	**N_y**
Data unit:	No. of trips/yr
Description:	Number of truck trips required to transport rice husk to the project site, during the year y
Source of data to be	Weigh bridge records

used:	
Value of data	4993 (Considering 29959 tonnes of annual husk consumption and 6tonne per truck load).
Description of measurement methods and procedures to be applied:	The number of trips would be recorded at each delivery of rice husk.
QA/QC procedures to be applied:	Fuel purchase invoices can be used to cross check the value.
Any comment:	All data will be archived for a period of 2 years after the end of crediting period.

B.7.2 Description of the monitoring plan:

>>

The data monitoring involves:

1. Metering the steam generation in the project activity
2. Monitoring of biomass consumption
3. Monitoring of fossil fuel consumption
4. Monitoring of temperature and pressure of the steam at the boiler outlet
5. Monitoring of data related to transportation.

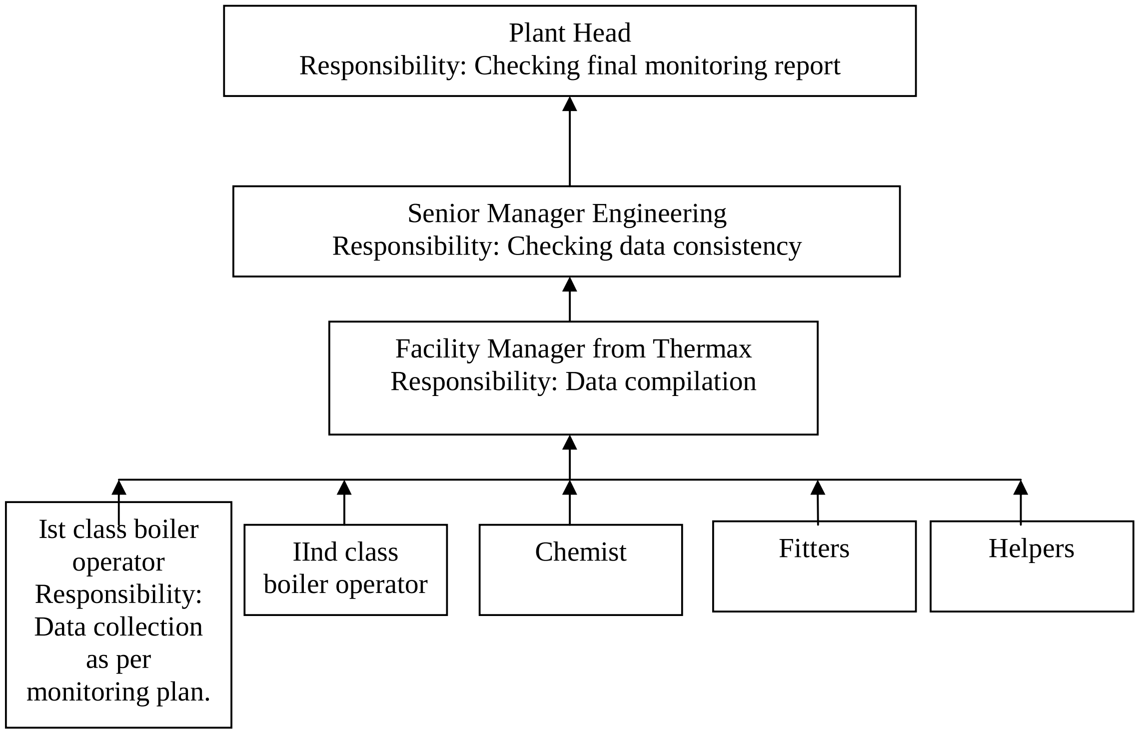
The data will be monitored as mentioned in section B.7.1. SML has a very robust data management system called EffiMax 300 supplied by Forbes Marshall Pvt. Ltd. Data related to steam generation, steam pressure and temperature will be monitored by EffiMax. The data from EffiMax will be stored in soft copy format in the plant computers. All the meters will be calibrated at least once a year to ensure proper functioning and calibration reports will be made available during verification. Internal audits will be conducted once every six months to check for any discrepancies and necessary corrective action will be taken if necessary. Monthly reports pertaining to CDM monitoring data will be kept in plant records both in soft and hard copy format. Data will be kept for the entire crediting period and for two years after it.

SML is in the process of implementation of environment management system (ISO 14001) which also ensures the preparedness for emergencies like fire in storage area which may cause unintended emission.

The project proponent has given the operation and maintenance contract for the boiler to Thermax. This will ensure that the staff operating the boiler is properly trained. Emergencies related to fire will be minimized by the environmental management system which is under implementation at plant.

Operational & Management Structure:

The operational and management structure of the team who are directly related to the project is basically consists of four levels as follows:



Specific responsibilities of the above said team are as follows:

- # Maintaining Logs for amount of steam generated in the boiler plant.
- # Maintaining Logs for temperature and pressure of steam generated in the boiler plant.
- # Calibration of measuring instruments once in a year
- # Keep a track of any changes in the meters.
- # Prepare the monthly monitoring report.
- # Reviewing the monthly monitoring report.
- # Internal audit for CDM project in every six months

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

>>

27/01/2009

Name of person/entity determining the baseline:

First Climate (India) Pvt. Ltd.
3C, Camac Street,
Camac Tower, 9th floor,
Kolkata – 700 016, India.

First Climate (India) Pvt. Ltd. is not a project participant.

SECTION C. Duration of the project activity / crediting period

C.1 Duration of the project activity:

C.1.1. Starting date of the project activity:

>>

27/08/2007 - Date of Purchase Order (No. SML/100%EOU/TB/PO/06/07-08/Amnd) placed for boiler.

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

>>

25 years & 0 months.

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

Fixed crediting period is selected.

C.2.1. Renewable crediting period

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:

>>

01/01/2011 or on the date of Registration to UNFCCC whichever is later.

C.2.2.2. Length:

>>

10 years & 0 months

SECTION D. Environmental impacts

>>

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

>>

As the project activity is not enlisted in the "list of projects or activities requiring prior environmental clearance" [12], published by Ministry of Environment and Forest in their "Environmental Impact Assessment Notification-2006", so it does not fall under the purview of the Environmental Impact Assessment (EIA).

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

>>

There is no significant negative impact of the project activity on the environment.

[12] provided in page no. 10-18 "list of projects or activities requiring prior environmental clearance"(http://envfor.nic.in/legis/eia/so1533.pdf)

SECTION E. Stakeholders' comments

>>

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

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The Environmental Regulations do not prescribe public hearing/ stake holder consultations for projects of the size and scale of the project activity. As a part of requirement under CDM, SML undertook a stakeholder consultation process for the project activity. Following stake holders have been identified:

- Local pollution control board
- Employees
- Local Community

SML did one to one correspondences to inform the interested stakeholders on the environmental and social impacts of the project activity and discuss their concerns if any, regarding the project activity. SML representatives presented the salient features of the company and the project activity to the stakeholders and requested their suggestions/objections. The opinions expressed by them were recorded and are available on request.

E.2. Summary of the comments received:

>>

In between the period 12/01/2009 to 12/02/2009 comments were received from the above mentioned stakeholders. The local Gram Panchayat and local people expressed satisfaction due to the project activity since the project activity has created / will create local employment opportunities, lead to increase in land values for the nearby villagers that will positively help in improving standard of life as well as socio-economic conditions of the villages.

The project proponent has received comments from the industrial units in its neighbourhood, who have communicated their appreciation for such an effort on SML's part. They have no objection to the installation of the proposed biomass based steam generation plant. The copies of the comments received from the stakeholders are available for validation.

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

>>

In view of various direct and indirect benefits (social, economical, and environmental), no concerns were raised during the consultation with stakeholders, and hence no specific actions have been necessary in respect of their comments.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Shilpa Medicare Ltd.
Street/P.O.Box:	10/80, Rajendra Gunj
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E-Mail:	info@vbshilpa.com
URL:	www.vpshilpa.com
Represented by:	
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Salutation:	Mr.
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First Name:	B
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Direct tel:	+91-8532-236960
Personal E-Mail:	vishnu@vbshilpa.com

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No public funding from countries included in Annex I is available to the project activity.

Annex 3

BASELINE INFORMATION

Included in the PDD, please refer to B.6.

Annex 4

MONITORING INFORMATION

As Provided In Section B.7.2 of the PDD.

Annex 5

Revision History of PDD.

Version number	Date of revision	Reason for revision/ edits
1	06th December 2008	Initial draft version for review
2	24th April 2009	Modified according to AMS-I.C. ,Version: 14
3	21st August 2009	Modified according to the issues raised in DVR
4	08th February, 2010	Modified to address issues related to leakage emission.
5	24th March, 2010	Revised according to the latest version of the SSC Methodology AMS-I.C., Version:16

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