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:

>>
Rice husk Based Cogeneration Plant at Pehowa, Haryana
Version -01
Date- 10/06/07

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

>>
Purpose

The purpose of the project activity is to install a combined heat and power generation (Co-generation) plant, comprising a high pressure boiler and a back pressure turbine. Rice husk would be used as fuel in the project activity. The cogeneration plant would be used to meet the steam and power requirements of the paper manufacturing unit of Sainsons Paper Industries Ltd. Currently the steam requirement is being met by 2 rice husk fired low pressure boilers .The power requirement of the paper industry currently is being met by the on site diesel generator (DG) sets. The project activity would replace the 2 low pressure rice husk fired boilers and the DG sets with a 2.72 MW rice husk based high pressure cogeneration plant.

The project details before and after the project activity is given below

Pre -project scenario

The manufacturing facility's requirement of thermal energy was met with the 2 rice husk fired low pressure boilers and the electrical demand by the on-site diesel generators (DG).

Power

The company had 3 DG sets of 1250 KVA each.

Heat

The process steam requirement was about 21 tonnes per hour (TPH), which was met by 2 low pressure rice husk fired FBC boilers of 12 tph,10.5kg./cm^2 of pressure and 16 tph,10.5 kg/cm^2 each.

Post Project Scenario - The cogeneration project displaces the DG sets and low pressure boilers thereby reducing the greenhouse gas (GHG) emissions. The fuel being used in the project activity is rice husk which is available in plenty in the region. The total heat and power output from the cogeneration project is consumed by the manufacturing facility. The usage of a carbon neutral fuel (rice husk) for combined heat and power results in GHG reduction which would have happened due to the burning of fossil fuel (diesel) in the DG sets. The post project scenario is as follows:

Power

The power requirements would be met by a 2.72 MW backpressure turbine. The DG sets would be kept as a standby.

Heat

There is no change in the process steam requirement. The steam requirement would be met by a high pressure FBC boiler of capacity 32 TPH, 65kg/cm^2 pressure, 480^0 C temperature. The low presuure boilers would be kept as a standby.

Project Activity's Contribution to Sustainable Development[1]

The contributions of the project activity towards sustainable development are as follows:

Social well being – The project activity will result in generation of employment, both during the time of construction of the project activity and the operational phase wherein people, would be employed for running the cogeneration facility once it gets commissioned. The project activity will also generate employment opportunities for transporters who will be engaged in transporting rice husk from nearby collection centres to the project site.

Economic well being – The project activity would require rice husk which would be procured from the nearby areas. This would lead to additional income generation for the local farmers who would be able to sell the rice husk for effective utilization in the project activity.

Environmental well being – The project activity will result in reduction in GHG emissions by replacing the fossil fuel based power generation system (DG) with rice husk based cogeneration system.

Technological well being – The technology stated for use in the project activity represents environmentally safe and sound technology for the application. The equipments, for the project activity, will be supplied by well established equipment manufacturers in the Indian market.

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[1] http://cdmindia.nic.in/host_approval_criteria.htm

Thus it is ensured that the project activity contributes positively to the stipulated sustainable development indicators.

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)
India	Sainsons Paper Industries Limited	No

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):

>>

India

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

>>

Haryana

A.4.1.3. City/Town/Community etc:

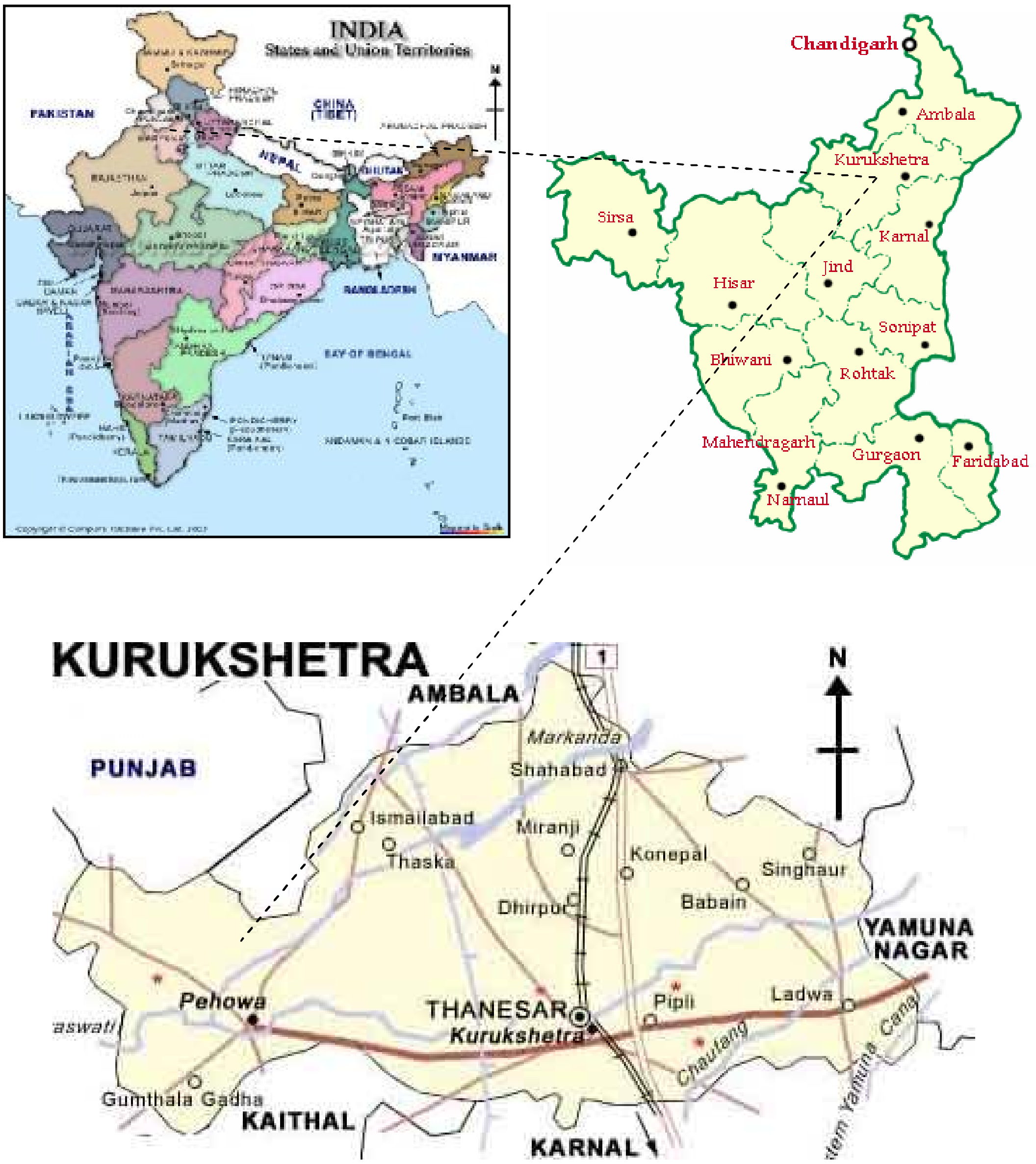
>>

Pehowa (Distt. Kurukshetra)

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

>>

The project activity is located at Sainsons Paper Industries Ltd., Village-Bakhli(Pehowa), Kurukshetra,Haryana. The geographical coordinates of Pehowa are $29^{0}59'0''$ North,76^{0} $35'0''$East. The location of the project activity on the map of India is shown below:



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

>>

Main Category:

Type I- Renewable energy projects

Sub-Category:

I.C. Thermal energy for the user with or without electricity, Version 10 , EB 31

Technology

The project activity is a rice husk based cogeneration plant wherein high-pressure boiler and a back pressure turbine configuration will be used to generate power. Fluidized Bed Combustion (FBC) technology will be used for generating steam. The project activity will also have an electrostatic precipitator to control the emissions arising due to the combustions. The specifications of the systems in the project activity are as follows:

Boiler

Type: Fluidized bed combustion boiler (FBC)

Pressure: 65 kg/cm^2

Temperature: 480° C

Capacity: 32 TPH

Fuel: Rice husk

Turbine

Type: Back pressure steam turbine

Capacity: 2.72 MW (2 X 1.36MW)

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

>>

Years	Estimation of annual emission reductions in tonnes of CO_2 e
2007-2008	**11,503**
2008-2009	**11,503**
2009-2010	**11,503**
2010-2011	**11,503**
2011-2012	**11,503**
2012-2013	**11,503**
2013-2014	**11,503**
2014-2015	**11,503**
2015-2016	**11,503**
2016-2017	**11,503**
Total estimated reductions (tonnes of CO_2 e)	**115,030**
Total number of crediting years	**10**

Annual average of the estimated reductions over the crediting period (tCO_2 e)	**11,503**

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

>>

No public funding from parties included in Annex-I, to the UNFCCC is involved in the project activity.

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

According to Appendix C, paragraph 2 of Simplified Modalities & Procedures for small scale CDM project activities, a proposed small-scale project activity shall be deemed to be 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:

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

The project activity qualifies for the use of simplified modalities and procedures for small-scale CDM project activities as there is no small scale project within the distance of 1 Km of the project boundary by SPIL.

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:

>>

Main Category: Type 1-Renewable energy projects

Sub Category: IC Thermal energy for the user with or without electricity

Reference: Appendix B of the simplified modalities and procedures for small-scale CDM project activities (Version 10 –EB 31).

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

>>

The project uses the methodology AMS-IC (Version 10,EB 31)

The criteria for a project activity to fall under the category "**Type I: Renewable energy projects**" is that the maximum output of the project activity should not exceed 15 MW.

The project activity is a biomass (renewable energy) based cogeneration plant of capacity 2.72 MW and thus falls under the category Type I.

The project activity applies the methodology AMS I.C. which has the following applicability conditions:

Condition 1 This category comprises renewable energy technologies that supply individual households or users with thermal energy that displaces fossil fuels. Biomass-based co-generating systems that produce heat and electricity are included in this category.

The project activity is a rice husk (renewable energy) based cogeneration plant of capacity 2.72 MW that displaces the thermal energy based on fossil fuels.

Condition 2 As per paragraph 3 of the methodology the cogeneration projects that displace/ avoid fossil fuel consumption in the production of thermal energy (e.g. Steam or process heat) and/ or electricity shall use this methodology. The capacity of the project in this case shall be thermal energy production capacity i.e 45 MW_{th}.

The project activity is a rice husk (renewable energy) based cogeneration plant of capacity 2.72 MW to meet the heat, steam and electricity requirement for on-site use. The energy output calculation is as under:

Boiler Capacity = 32 TPH
8.89 Kg/s [= (32*1000)/3600]

Energy of steam = 3369.5 kJ/kg (At 65 kg/cm^2 and 480°C temperature)
= 3.3695 MJ/kg

Energy of water (at 100°C) = 423.54 KJ/kg

= 0.42354 MJ/kg

Boiler rating = 8.89*(3.3695 – 0.42354)
= **26.19 $MW_{Thermal}$**

Condition 3 In the case of project activities that involve the addition of renewable energy units at an existing renewable energy facility, the total capacity of the units added by the project should be lower than 45 MWth and should be physically distinct from the existing unit.

This condition is not applicable as there were existing renewable nenegy facilities.

Thus the project clearly qualifies in the category I.C. since project activity is a cogeneration project and rating of the boiler is less than the stipulated limit of 45 $MW_{thermal}$.

B.3. Description of the project boundary:

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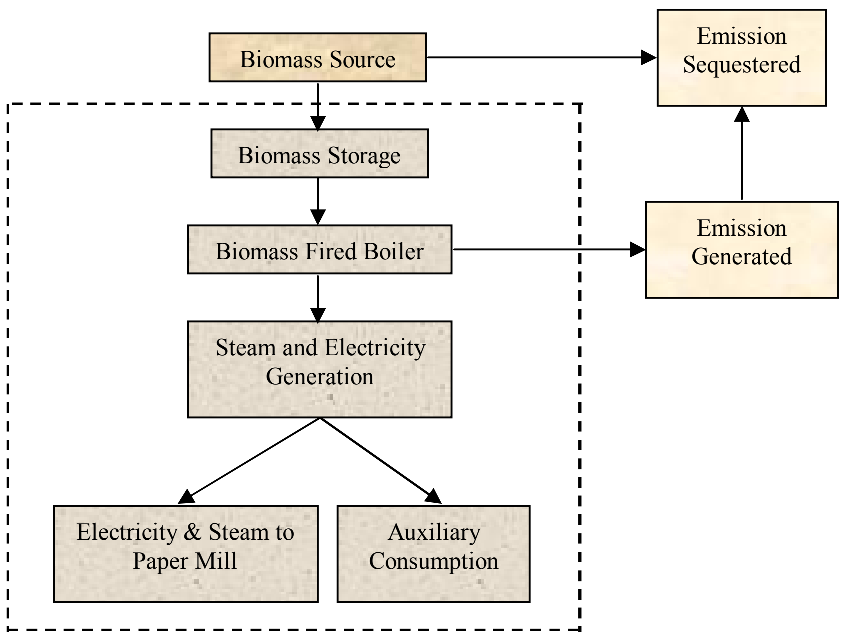
As per the guidelines provided in the paragraph 5 of approved methodology (Type I.C, version 10). The project boundary encompasses the physical, geographical site of the renewable generation source.

For the proposed project activity the project boundary is from the point of fuel storage to the point of power supply to the paper mill. Thus the project boundary includes biomass storage, biomass fired boiler, turbine for steam generation, auxiliary consumption and electricity supplied to the paper mill. The project boundary is illustrated in the diagram below.



B.4. Description of baseline and its development:

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The baseline for the proposed project activity has been arrived at, using the methodology specified in the applicable project category for small-scale CDM project activities contained in Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories. Para 8 and para 13 of category I.C. (version 10 EB 31) are applicable to the project activity as per the baseline conditions

Para 8 of the methodology states that:

Baseline emissions for electricity produced in captive plants shall be calculated as the amount of electricity produced with the renewable technology (GWh) multiplied by the CO_2 emission factor per unit of energy of the fuel that would have been used in the baseline plant in (tCO2 / TJ)[2] divided by the efficiency of the captive plant.

Para 13 of the methodology describe the method of determining the efficiency of the baseline units as one of the following:

(a) Highest measured efficiency of a unit with similar specifications,
(b) Highest of the efficiency values provided by two or more manufacturers for units with similar specifications,
(c) Maximum efficiency of 100%.

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:

The implementation of the project activity is a voluntary step undertaken by Sainsons Paper Industries Ltd.with no direct or indirect mandate by law. The project proponent was aware of the various barriers associated to the project implementation. However it was felt that availability of carbon financing against a sale consideration of carbon credits generated due to project activity would help to overcome these barriers. The barriers faced by the project activity are discussed below:

[2] This involves the use of a conversion factor of 3.6 to convert the electricity generated (GWh) in units of TJ

Prevailing practice Barrier

The proposed project activity envisages installation of a high pressure boiler to meet the process heat as well as the captive electricity requirements. The current practice in paper manufacturing units in the region is the use of low pressure boilers for meeting the steam requirements and power supply from grid or DG for meeting the electricity requirements. The SPIL project activity of putting up a high pressure configuration cogeneration system is fully based on rice husk and is not the prevailing practice in the region. SPIL is the first paper manufacturing unit to take up a high pressure cogeneration plant based completely on Biomass Residue (rice husk) as fuel.

The project activity carried out by SPIL is a voluntary initiative to reduce the GHG emissions.

Technological Barrier

There are mainly two types of combustion technologies for biomass combustion i.e. Grate firing and Fluidised bed combustion.SPIL has opted for more advanced fluidised bed combustion technology for high pressure boiler of the project activity. The traditional grate fuel firing systems have got limitations and are techno-economically unviable to meet the challenges of future. Fluidised bed combustion has emerged as a viable alternative and has significant advantages over conventional firing system and offers multiple benefits – compact boiler design, fuel flexibility, higher combustion efficiency and reduced emission of noxious pollutants such as SO_x and NO_x. The fuels burnt in these boilers include coal, washery rejects, rice husk, bagasse and other agricultural wastes.

Rice husk contain high percentage of silica .Due to this high content of silica and the shape of the rice husk there is a rapid corrosion of equipments. The equipments which are most likely to be effected due to corrosion are ID fans, top portion of stack and cone portion of air pre-heater which leads to high maintenance cost, frequent breakdown and increased downtime. For overcoming the problem of corrosion an Electrostatic precipitator (ESP) has been installed although the air pollution norms could have been met by installing Mechanical Dust collectors (MDC), which is much cheaper. Further in rice husk fired boilers escape of fluidized media along with flue gas is a common problem. To compensate this fluidizing media is required to be added at regular intervals, this also leads to variations in air requirement. Hence operation and control of biomass fired boiler requires skilled boiler operators.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

>>

Project emissions (PE_y)- There will be no project emissions due to the implementation of the project activity since the fuel used (rice husk) is a carbon neutral fuel, hence there will be no GHG emissions associated with it.

Baseline emissions- The baseline emissions are calculated as per the formula given below

$$BE_y = EF_y * EG_y$$

Where

BE_y – Baseline emissions due to displacement of electricity during the year y in tons of CO_2.

EG_y – Net quantity of electricity generated by the project activity during the year y in GWH.

EF_y - CO_2 baseline emission factor for the electricity displaced due to the project activity in tons CO_2/GWh

Leakage emissions($Leakage_y$) - As per Paragraph 12 of the methodology AMS I.D (Version 10), leakages is to be considered if the energy generating equipment is transferred from another activity or if the existing equipment is transferred to another activity.

There is no transfer of energy generating equipment or existing equipment to another activity.

Emission Reductions (ER_y)-The emission reduction by the project activity is calculated as the difference between the baseline emission and the sum of the project emissions and the leakage.

$$ER_y = BE_y - (PE_y + Leakage_y)$$

ER_y = Emission reduction in the year "y" (**tCO_2e**).

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

>>

Data / Parameter:	η_{DG}
Data unit:	--
Description:	Efficiency of the DG set used
Source of data used:	DG Manufacturers' Manual
Value applied:	0.35
Justification of the	As specified in the methodology para 13 I.C. (version 10, EB 31) option

choice of data or description of measurement methods and procedures actually applied :	(b) has been used to determine the highest of the efficiency as provided by two or more manufacturer for similar specifications
Any comment:	

Data / Parameter:	EFfuel
Data unit:	t CO2 / TJ
Description:	Emission factor of the fuel used in the baseline units
Source of data used:	2006 Revised IPCC Guidelines, Volume 1 Table 1.4 page 23
Value applied:	74.1
Justification of the choice of data or description of measurement methods and procedures actually applied :	
Any comment:	

B.6.3 Ex-ante calculation of emission reductions:

>>

Baseline Emissions

BE_y	=	3.6	*	EG_y	*	EF_{fuel}	/	η_{DG}
tCO2 / year		--		GWh / year		t CO_2 / TJ		--
11,503	=	**3.6**	*	**15.09**	*	**74.1**	/	**0.35**

Project Emissions- There would be no GHG emissions due to the project activity within the project boundary because the fuel being used is rice husk. The GHG emission due to the burning of rice husk is negated by the sequestration done during the growth of rice, thereby making it a carbon neutral fuel. Thus there are no anthropogenic emissions due to the project activity within the project boundary.

Leakages- This does not apply to the project activity. However the only sources of considerable GHG emissions are due to transportation of rice husk from collection centres to project site. The same has been estimated below.

Emissions due to transportation of rice husk		
Total biomass required	50000	tonnes/year
Biomass transported by truck	50000	tonnes/year

Biomass load per truck	8	Tonnes
Total no. of trips	6250	
Max.ditance between project site and collection centres	50	Km
Consumption of diesel per trip (to and fro) (@ 4 km/lit)	25	Litres
Total diesel consumption	156250	Litres
Density of diesel	0.83	tonnes/1000ltr
Mass of diesel used	129.688	Tonnes
Calorific value of diesel	0.0418	TJ/tonne
Emission factor for diesel	74.10	tCO_2/TJ
Emission due to transportation of biomass	**tCO_2/year**	**401**

This is not attributed to project activity as it is less than 10% of the project emissions reduction.

Emission reductions:

$$ER_y = BE_y - (PE_y + Leakage_y)$$

ER_y	=	**BE_y**	—	**(PE_y**	+	**$Leakage_y$)**
tCO_2		tCO_2		tCO_2		tCO_2
11,503		11,503		0		0

The project activity will therefore result in a total reduction of **11,503** per year over the 10 year crediting period.

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

>>

Year	Project activity emissions (tCO_2e)	Baseline emissions (tCO_2e)	Leakage (tCO_2e)	Emission reductions (tCO_2e)
2007-08	0	11,503	0	11,503
2008-09	0	11,503	0	11,503
2009-10	0	11,503	0	11,503
2010-11	0	11,503	0	11,503
2011-12	0	11,503	0	11,503
2012-13	0	11,503	0	11,503
2013-14	0	11,503	0	11,503
2014-15	0	11,503	0	11,503
2015-16	0	11,503	0	11,503
2016-17	0	11,503	0	11,503
Total (tCO_2e)	**0**	115,030	**0**	115,030

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

B.7.1 Data and parameters monitored:

>>

Data / Parameter:	EG_{GEN}
Data unit:	GWh
Description:	Total electricity generated by the project activity
Source of data to be used:	Onsite instrument
Value of data	17.76[3] (for ex-ante calculation) this will be monitored ex-post
Description of measurement methods and procedures to be applied:	Monitoring location: meters at plant will measure the data. The data will be recorded in the factory log books by the supervisor (electrical)
QA/QC procedures to be applied:	The data recorded can be cross-checked with the individual consumption of the different load centres. The calibrated equipment can be checked by the verifier. The calibration of the equipment for the measurement of power will be done once a year
Any comment:	Manager In-charge would be responsible for regular calibration of the meter, which would be carried out annually.

Data / Parameter:	EG_{AUX}
Data unit:	GWh
Description:	Auxiliary Electricity
Source of data to be used:	Onsite instrument
Value of data	2.67[4] (for ex-ante calculation), this will be monitored ex-post
Description of measurement methods and procedures to be applied:	Monitoring location: meters at plant will measure the data. The data will be recorded in the factory log books by the supervisor (electrical)
QA/QC procedures to be applied:	This data will be used for the calculation of project net electricity generation
Any comment:	Manager In-charge would be responsible for regular calibration of the

[3] The value of EG_{GEN} has been calculated based on the following assumptions:

Number of days of operation in a year=340 days, Plant capacity=2.72 MW, Plant Load factor=80%, Number of hours of operation in a day=24 hrs

[4]The value of EG_{AUX} has been calculated based on the following assumption:

Auxiliary Consumption= 15% of EG_{GEN}

	meter, which would be carried out annually.

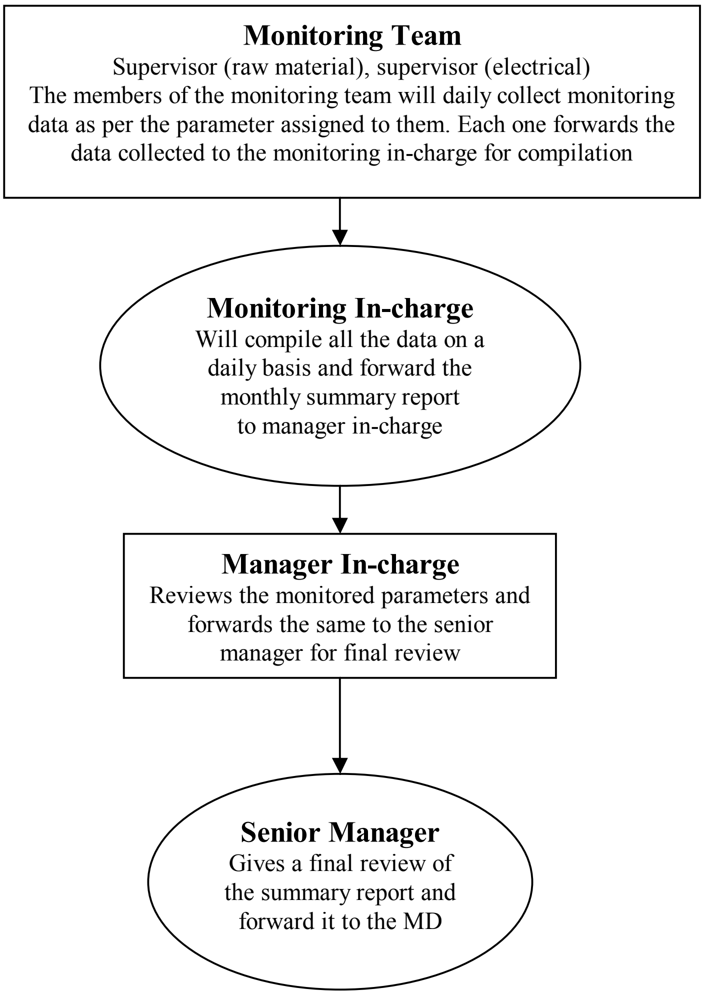
Data / Parameter:	**Q_y**
Data unit:	Tonnes/year
Description:	Quantity of Rice husk used
Source of data to be used:	Plant records and log books
Value of data	48960(for ex-ante calculation), this will be monitored ex-post
Description of measurement methods and procedures to be applied:	The quantity of Rice husk used be measured using a weigh bridge and recorded in the factory log books by the supervisor (raw material)
QA/QC procedures to be applied:	The amount of Rice husks used can be cross checked by the purchase orders and stock inventory for rice husk.
Any comment:	

Data / Parameter:	NCV of Rice husk
Data unit:	Kcal/kg
Description:	NCV
Source of data to be used:	Test reports
Value of data	3200
Description of measurement methods and procedures to be applied:	Sample testing
QA/QC procedures to be applied:	The calorific value of the rice husk is fairly constant and thus no QA/QC procedures are required.
Any comment:	.

B.7.2 Description of the monitoring plan:

>>

The monitoring team at the floor level consisting of monitoring supervisors would be assigned the responsibility of monitoring and recording of parameters for their corresponding shifts .At the end of each day the recorded data would be compiled by the monitoring in charge .In case of any irregularity observed, necessary action would be taken immediately. On the monthly basis , the reports would be prepared and forwarded to the management. The following organisation would be present to operate the project activity.



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

>>
9/04/2007

Sainsons Paper Industries Limited

The entity is also a project participant listed in Annex 1 of this document.

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:

>>
25/04/06

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

>>
20 years

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

>>
The project will use a fixed crediting period of 10 years

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:

>>
10y-0m

C.2.2.1. Starting date:

>>
1/08/07, Start date of crediting period shall be after the registration of the project activity.

C.2.2.2. Length:

>>
10y-0m

SECTION D. Environmental impacts

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

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As per Environment Impact Assessment Notification S.O.60 (e) [1], dated 27/01/1994 by ministry of environment and forests, India. The following project is not categorized to conduct EIA.[5]

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

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There are no significant adverse environmental impacts due to the project activity.

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

SECTION E. Stakeholders' comments

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

>>

SPIL gave invitation to their employees, rice husk suppliers, rice mill owners, adjoining village heads (Pradhans)-who are directly or indirectly related to the project activity. They were invited for a meeting held on 04/10/2005 at the manufacturing facility premises. The objective of the meeting was to brief them about the proposed project activity; social and environmental impacts associated with the proposed activity and discuss their concern regarding the project activity.

On the day of meeting SPIL representatives presented the salient features of the project activity to the participants and requested their suggestions/objections. The concerns expressed by them were recorded and subsequently answered satisfactorily.

E.2. Summary of the comments received:

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The employees were very positive about the coming up of the project activity as it would enhance the profitability of SPIL. Further the project activity will also mitigate the adverse effects due to DG sets like fossil fuel consumption, air and noise pollution which adversely affect the health of local people.

The local people also appreciated the project activity as it resulted in generation of additional employment. It has also provided them with a source of revenue through the sale of rice husk for the project activity which they usually burnt in the open fields.

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

>>

No adverse comments were received for the project activity. In view of various direct and indirect benefits (social, economical, and environmental), no adverse concerns were raised during the consultation with stakeholders.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Sainsons Paper Industries LTD.
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Building:	--
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Postfix/ZIP:	134 109
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FAX:	0172-2590649
E-Mail:	info@sainsons.net
URL:	www.sainsons.net
Represented by:	--
Title:	--
Salutation:	Mr.
Last Name:	Saini
Middle Name:	Kumar
First Name:	Pardeep
Department:	--
Mobile:	94160-39140
Direct FAX:	0172-2590649
Direct tel:	93153-39140
Personal E-Mail:	--

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No public funding from parties included in Annex-I to the UNFCCC is involved in the project activity

Annex 3

BASELINE INFORMATION

As per section B.4

Annex 4

MONITORING INFORMATION

As per section B.7.2