

**MONITORING REPORT FORM (CDM-MR)**
Version 1.1; 17/06/2010**CONTENTS**

- A. General description of the project activity
 - A.1. Brief description of the project activity
 - A.2. Project participants
 - A.3. Location of the project activity
 - A.4. Technical description of the project
 - A.5. Title, reference and version of the baseline and monitoring methodology applied to the project activity
 - A.6. Registration date of the project activity
 - A.7. Crediting period of the project activity and related information
 - A.8. Name of responsible person(s)/entity(ies)
- B. Implementation of the project activity
 - B.1. Implementation status of the project activity
 - B.2. Revision of the monitoring plan
 - B.3. Request for deviation applied to this monitoring period
 - B.4. Notification or request of approval of changes
- C. Description of the monitoring system
- D. Data and parameters monitored
 - D.1. Data and parameters used to calculate baseline emissions
 - D.2. Data and parameters used to calculate project emissions
 - D.3. Data and parameters used to calculate leakage emissions
 - D.4. Other relevant data and parameters
- E. Emission reductions calculation
 - E.1. Baseline emissions calculation
 - E.2. Project emissions calculation
 - E.3. Leakage calculation
 - E.4. Emission reductions calculation
 - E.5. Comparison of actual emission reductions with estimates in the registered CDM-PDD
 - E.6. Remarks on difference from estimated value



MONITORING REPORT
Version 1.0; 28/06/2010
8.5 MW Biomass based Power Project
Reference number: 0369
Monitoring period number: 4
Monitoring dates: 15th August 2008 – 14th March 2009 ((Inclusive of both the days))

SECTION A. General description of the project activity

A.1. Brief description of the project activity: >>

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The purpose of the project activity essentially is to utilize the available biomass fuels in the region effectively for generation of clean power. Since, Chhattisgarh State has a major shortage of power, promoters have setup 8.5 MW grid interfaced power plant at Village Belsonda, Mahasamund District in Chhattisgarh State. To achieve lower carbon emission, biomass (rice husk) is being used as a fuel for power generation. By using biomass (rice husk), the project activity also prevents ways of inefficient burning or rotting of biomass in open fields.

The project uses the conventional combustion and steam-power cycle. The boiler is of fluidised bed combustion type (FBC) producing 40TPH steam. The pressure and temperature of the boiler were chosen at 67 Kg/ Sq. cm. and 480 Deg. C respectively. The turbine used was of condensing type turbo generator capable of producing 8.5MW power.

The project was commissioned on 23rd December 2006.

The total emission reductions for the monitoring period accounts to 24,270 tCO₂e.

A.2. Project Participants

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

A.3. Location of the project activity:

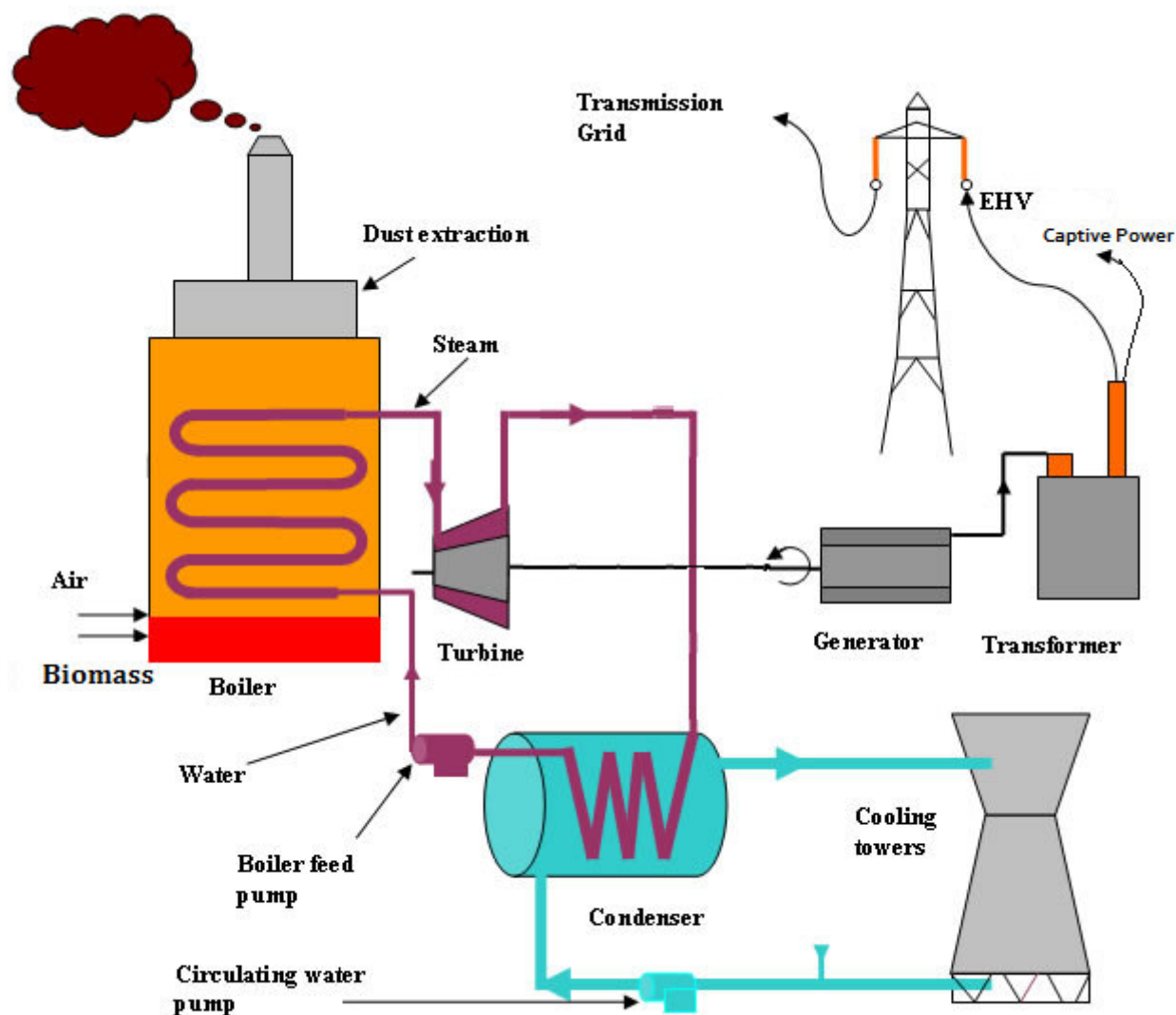
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Village : Belsonda
Block : Mahasamund
Tehsil & District : Mahasamund
State : Chhattisgarh
Country : India
GPS coordinates : 21° 10' 19'' N and 82° 01' 32'' E

A.4. Technical description of the project

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The project is designed to generate electricity using rice husk. The project uses Rankine cycle technology, where direct combustion of biomass takes place through biomass fired boiler to generate high pressure and high temperature steam, which drives an impulse turbine generator set to generate power.



Technical parameters

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



Capacity	8.5 MW
Turbo Generator Type	Condensing

A.5. Title, reference and version of the baseline and monitoring methodology applied to the project activity:

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Category ID: *Grid Connected Renewable Electricity Generation***Version:** Version 07, 28 November 2005**Reference:** Appendix B of the simplified modalities & procedures for small-scale CDM-project Activities**A.6. Registration date of the project activity:**

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5th June 2006**A.7. Crediting period of the project activity and related information (start date and choice of crediting period):**

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The crediting period of the project activity is a renewable type of 7 years from 23 Dec 06 - 22 Dec 13.

Start date of the crediting period was changed from 01 Jun 06 - 31 Mar 13.

A.8. Name of responsible person(s)/entity(ies):

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Organization:	Shivalik Power & Steel (P) Ltd.
Street/P.O.Box:	C-33, 3rd floor, Ashoka Millennium
Building:	Ring Road No.1, Rajender Nagar Chowk
City:	Raipur
State/Region:	Chhattisgarh
Postcode/ZIP:	492 001
Country:	India
Telephone:	+91-771-5081041, 5081140
FAX:	+91-771-5081140
E-Mail:	spsplraipur@yahoo.com
Represented by:	
Title:	Director
Salutation:	Mr.
Last Name:	Singhanian
Middle Name:	-
First Name:	Giriraj
Department:	-
Mobile:	+91-98271 22011
Personal E-Mail:	spsplraipur@yahoo.com

**SECTION B. Implementation of the project activity****B.1. Implementation status of the project activity**

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1. The starting date of operation of the project activity. 23/12/2006.
- 2.

Sl. No.	A brief description of:	Remarks
I	Events or situations that occurred during the monitoring period, which may impact the applicability of the methodology	In the previous scenario, the power generated by the plant using biomass was wheeled to other users using state grid till their own steel plant would start working. In the revised scenario, PP started supplying power from the project activity to the proposed Steel Foundry as envisaged in the registered PDD of the project proponent in the same premises in addition to the ongoing export to the regional grid.
ii	How the issues resulting from these events or situations are being addressed.	A revision in monitoring plan was proposed to EB regarding the changes in monitoring system. The revised monitoring plan was approved by EB in 16 April, 2010.

B.2. Revision of the monitoring plan

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The monitoring plan was revised and approved on 16 April, 2010¹.

B.3. Request for deviation applied to this monitoring period

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Not applicable

B.4. Notification or request of approval of changes

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Not applicable

SECTION C. Description of the monitoring system

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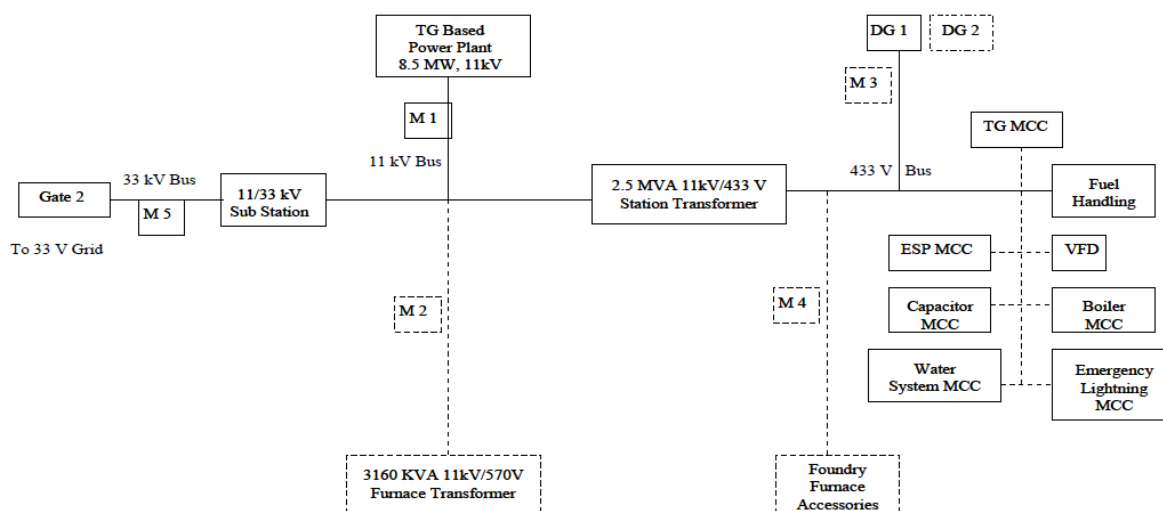
A CDM project team is constituted with participation from various departments like production, finance, purchase and quality. People are trained on monitoring plan. This team is also responsible for data collection and archiving. This team meet periodically to review CDM project activity check data collected,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

¹ <http://cdm.unfccc.int/UserManagement/FileStorage/07XYKBZVUH2FA6MQNDGPWCS5894OJL>

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

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

The entire set up for power at the project site is shown in the Figure below



M 1, M 2, M 3, M 4 and M 5 are the metering points in the line diagram.

SECTION D. Data and parameters

D.1. Data and parameters determined at registration and not monitored during the monitoring period, including default values and factors

Data / Parameter:	CM
Data unit:	tCO ₂ /MWh
Description:	Combined margin
Source of data used:	Data published by Central Electricity Authority
Value(s) :	0.83
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission
Additional comment:	This parameter was ex-ante fixed.

D.2. Data and parameters monitored



Data / Parameter:	Gross power generated		
Data unit:	MWh		
Description:	Gross power generated by the power plant.		
Measured /Calculated /Default:	Measured		
Source of data:	Directly measured by installed high accuracy meter		
Value(s) of monitored parameter:	15 Aug 08 - 14 Sep 08	3041.500	
	15 Sep 08 - 14 Oct 08	5647.500	
	15 Oct 08 - 14 Nov 08	5417.000	
	15 Nov 08 - 14 Dec 08	5729.000	
	15 Dec 08 - 14 Jan 09	5576.700	
	15 Jan 09 - 14 Feb 09	5680.300	
	15 Feb 09 - 14 Mar 09	5333.200	
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission		
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	High accuracy meter of 0.5 accuracy class. Serial No:05390967 Calibration frequency: once in a year Date of last calibration: 04/11/2008		
Measuring/ Reading/ Recording frequency:	Monthly		
Calculation method (if applicable):	-		
QA/QC procedures applied:	This parameter is directly measured at the project activity site with the help of high accuracy meter for which regular maintenance and calibration procedures are followed. Proper recording of this data regarding the parameter is done to ensure accuracy and reliability of the data. Monthly CDM report is prepared which is overlooked by the CDM Manager and the plant Vice-President.		

Data / Parameter:	Aux_y		
Data unit:	MWh		
Description:	Auxiliary power consumption in the power plant		
Measured /Calculated /Default:	Calculated		
Source of data:	Auxiliary power consumption in the power plant was calculated based on equation shown in calculation method.		
Value(s) of monitored parameter:	15 Aug 08 - 14 Sep 08	437.050	
	15 Sep 08 - 14 Oct 08	672.963	
	15 Oct 08 - 14 Nov 08	669.310	
	15 Nov 08 - 14 Dec 08	652.310	
	15 Dec 08 - 14 Jan 09	671.330	



	15 Jan 09 - 14 Feb 09	660.067	
	15 Feb 09 - 14 Mar 09	639.159	
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission		
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Not applicable		
Measuring/ Reading/ Recording frequency:	Monthly		
Calculation method (if applicable):	Auxiliary power consumption of the power plant= [Gross power supplied by the power plant + Power import from grid + Power supplied by DG – Power supplied to foundry furnace – Power to foundry accessories – Power export to grid]		
QA/QC procedures applied:	This is a calculated parameter and hence QA/QC procedure is not applicable.		

Data / Parameter:	Power export to the grid		
Data unit:	MWh		
Description:	Power export to the grid		
Measured /Calculated /Default:	Measured		
Source of data:	CSEB personnel along with plant personnel take monthly meter reading. This meter reading is known as Joint Meter Reading. JMR records are used for billing by CSEB.		
Value(s) of monitored parameter:	15 Aug 08 - 14 Sep 08	2398.800	
	15 Sep 08 - 14 Oct 08	4488.000	
	15 Oct 08 - 14 Nov 08	4198.000	
	15 Nov 08 - 14 Dec 08	4546.400	
	15 Dec 08 - 14 Jan 09	4328.800	
	15 Jan 09 - 14 Feb 09	4304.000	
	15 Feb 09 - 14 Mar 09	3996.400	
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline		
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Energy meter Serial No:CSE 19161 Calibration frequency: once in a year Date of last calibration: 09/01/2009		
Measuring/ Reading/ Recording frequency:	Monthly		



Calculation method (if applicable):	-
QA/QC procedures applied:	<p>This parameter is directly measured at the project activity site with the help of high accuracy meter for which regular maintenance and calibration procedures are followed.</p> <p>Proper recording of this data regarding the parameter is done to ensure accuracy and reliability of the data.</p> <p>Monthly CDM report is prepared which is overlooked by the CDM Manager and the plant Vice-President.</p>

Data / Parameter:	Power import from the grid		
Data unit:	MWh		
Description:	Power import from the grid		
Measured /Calculated /Default:	Measured		
Source of data:	CSEB along with plant personnel take monthly meter reading. This meter reading is known as Joint Meter Reading. JMR records are used for billing by CSEB.		
Value(s) of monitored parameter:	15 Aug 08 - 14 Sep 08	58.400	
	15 Sep 08 - 14 Oct 08	2.800	
	15 Oct 08 - 14 Nov 08	16.800	
	15 Nov 08 - 14 Dec 08	0.000	
	15 Dec 08 - 14 Jan 09	11.200	
	15 Jan 09 - 14 Feb 09	6.800	
	15 Feb 09 - 14 Mar 09	0.000	
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission		
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Energy meter Serial No:CSE 19161 Calibration frequency: once in a year Date of last calibration: 09/01/2009		
Measuring/ Reading/ Recording frequency:	Monthly		
Calculation method (if applicable):	-		
QA/QC procedures applied:	This parameter is directly measured at the project activity site with the help of high accuracy meter for which regular maintenance and calibration procedures are followed. Proper recording of this data regarding the parameter is done to ensure accuracy and reliability of the data. Monthly CDM report is prepared which is overlooked by the CDM Manager and the plant Vice-President.		



Data / Parameter:	Power supply to the Foundry Furnace		
Data unit:	MWh		
Description:	Power supply to the Foundry Furnace		
Measured /Calculated /Default:	Measured		
Source of data:	Measured by high accuracy meter for which regular maintenance and calibration is followed.		
Value(s) of monitored parameter:	15 Aug 08 - 14 Sep 08	209.500	
	15 Sep 08 - 14 Oct 08	399.400	
	15 Oct 08 - 14 Nov 08	461.400	
	15 Nov 08 - 14 Dec 08	431.900	
	15 Dec 08 - 14 Jan 09	491.200	
	15 Jan 09 - 14 Feb 09	616.100	
	15 Feb 09 - 14 Mar 09	599.200	
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission		
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	High accuracy meter of 1.0 accuracy class Serial No:07882890 Calibration frequency: Once in a year Date of last calibration: 02/01/2009		
Measuring/ Reading/ Recording frequency:	Monthly		
Calculation method (if applicable):	-		
QA/QC procedures applied:	This parameter is directly measured at the project activity site with the help of high accuracy meter for which regular maintenance and calibration procedures are followed. Proper recording of this data regarding the parameter is done to ensure accuracy and reliability of the data. Monthly CDM report is prepared which is overlooked by the CDM Manager and the plant Vice-President.		

Data / Parameter:	Power supply to the Foundry Accessories area		
Data unit:	MWh		
Description:	Power supply to the Foundry Accessories area		
Measured /Calculated /Default:	Measured		
Source of data:	Measured by high accuracy meter for which regular maintenance and calibration is followed		
Value(s) of monitored parameter:	15 Aug 08 - 14 Sep 08	56.004	
	15 Sep 08 - 14 Oct 08	89.972	
	15 Oct 08 - 14 Nov 08	105.096	
	15 Nov 08 - 14 Dec 08	98.398	



	15 Dec 08 - 14 Jan 09	96.805	
	15 Jan 09 - 14 Feb 09	107.946	
	15 Feb 09 - 14 Mar 09	98.441	
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission		
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	High accuracy meter of 1.0 accuracy class Serial No:07885954 Calibration frequency: Once in a year Date of last calibration: 29/12/2008		
Measuring/ Reading/ Recording frequency:	Monthly		
Calculation method (if applicable):	-		
QA/QC procedures applied:	This parameter is directly measured at the project activity site with the help of high accuracy meter for which regular maintenance and calibration procedures are followed. Proper recording of this data regarding the parameter is done to ensure accuracy and reliability of the data. Monthly CDM report is prepared which is overlooked by the CDM Manager and the plant Vice-President.		

Data / Parameter:	Power from DG set		
Data unit:	MWh		
Description:	Power from DG set		
Measured /Calculated /Default:	Measured		
Source of data:	Measured by high accuracy meter for which regular maintenance and calibration is followed		
Value(s) of monitored parameter:	15 Aug 08 - 14 Sep 08	1.450	
	15 Sep 08 - 14 Oct 08	0.033	
	15 Oct 08 - 14 Nov 08	0.000	
	15 Nov 08 - 14 Dec 08	0.000	
	15 Dec 08 - 14 Jan 09	0.230	
	15 Jan 09 - 14 Feb 09	1.013	
	15 Feb 09 - 14 Mar 09	0.000	
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission		
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	High accuracy meter of 1.0 accuracy class Serial No:633/0106/78196 Calibration frequency: once in a year Date of last calibration: 29/12/2008		



Measuring/ Reading/ Recording frequency:	Monthly
Calculation method (if applicable):	-
QA/QC procedures applied:	This parameter is directly measured at the project activity site with the help of high accuracy meter for which regular maintenance and calibration procedures are followed. Proper recording of this data regarding the parameter is done to ensure accuracy and reliability of the data. Monthly CDM report is prepared which is overlooked by the CDM Manager and the plant Vice-President.

Data / Parameter:	QBU _y		
Data unit:	Tonne		
Description:	Biomass consumption		
Measured /Calculated /Default:	Measured		
Source of data:	Estimated using purchase and inventory data.		
Value(s) of monitored parameter:	15 Aug 08 - 14 Sep 08	4294.080	
	15 Sep 08 - 14 Oct 08	7256.820	
	15 Oct 08 - 14 Nov 08	6300.900	
	15 Nov 08 - 14 Dec 08	6803.940	
	15 Dec 08 - 14 Jan 09	6402.000	
	15 Jan 09 - 14 Feb 09	6662.820	
	15 Feb 09 - 14 Mar 09	6304.620	
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	-		
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Weigh bridge Class III Serial No:7012 Calibration frequency: once in a year Date of last calibration: 30/12/2009		
Measuring/ Reading/ Recording frequency:	Monthly		
Calculation method (if applicable):	-		
QA/QC procedures applied:	Biomass consumption can be cross checked with the supplier's invoices and inventory records.		

Data / Parameter:	QCU _y
Data unit:	Tonne
Description:	Coal consumption
Measured /Calculated /Default:	Measured
Source of data:	Estimated using purchase and inventory data.



Value(s) of monitored parameter:	15 Aug 08 - 14 Sep 08	210.150	
	15 Sep 08 - 14 Oct 08	377.550	
	15 Oct 08 - 14 Nov 08	346.050	
	15 Nov 08 - 14 Dec 08	342.000	
	15 Dec 08 - 14 Jan 09	319.050	
	15 Jan 09 - 14 Feb 09	312.750	
	15 Feb 09 - 14 Mar 09	297.000	
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emission		
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Weigh bridge Class III Serial No:7012 Calibration frequency: once in a year Date of last calibration: 30/12/2009		
Measuring/ Reading/ Recording frequency:	Monthly		
Calculation method (if applicable):	-		
QA/QC procedures applied:	Coal consumption can be cross checked with the supplier's invoices and inventory records.		

Data / Parameter:	CCV _y
Data unit:	kcal/kg
Description:	Coal net calorific value
Measured /Calculated /Default:	Measured
Source of data:	The facility is equipped with a Bomb Calorimeter by which the calorific value of coal is estimated. Periodic sample testing has been made part of normal purchasing activity.
Value(s) of monitored parameter:	2609.0
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emission
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Bomb Calorimeter Serial number: 26031 Calibration frequency: Once in a year Date of last calibration: 12/08/2008
Measuring/ Reading/ Recording frequency:	Every delivery
Calculation method (if applicable):	-
QA/QC procedures applied:	Coal consumption can be cross checked with the supplier's invoices



	and inventory records.		
Data / Parameter:	Diesel Consumption		
Data unit:	L		
Description:	Diesel consumption		
Measured /Calculated /Default:	Measured		
Source of data:	Estimated using purchase and inventory data.		
Value(s) of monitored parameter:	15 Aug 08 - 14 Sep 08	420.000	
	15 Sep 08 - 14 Oct 08	10.000	
	15 Oct 08 - 14 Nov 08	0.000	
	15 Nov 08 - 14 Dec 08	0.000	
	15 Dec 08 - 14 Jan 09	68.000	
	15 Jan 09 - 14 Feb 09	300.000	
	15 Feb 09 - 14 Mar 09	0.000	
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission		
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	As per supplier data		
Measuring/ Reading/ Recording frequency:	Monthly		
Calculation method (if applicable):	-		
QA/QC procedures applied:	Diesel consumption can be cross checked with the supplier’s invoices and inventory records.		

SECTION E. Emission reductions calculation

E.1. Baseline emissions calculation

>>

$$BE_y = [\text{Gross power generated by the power plant} \times \text{Grid Emission Factor}] - [\text{Auxiliary power consumption of Power Plant} \times \text{MAX (Grid Emission Factor, emission factor of DG)}]$$

..... Eq (1)

Auxiliary power consumption of the power plant= [Gross power supplied by the power plant + Power import from grid + Power supplied by DG – Power supplied to foundry furnace – Power to foundry accessories – Power export to grid]..... Eq (1.1)

So,

$$BE_y = [M1 \times \text{Grid Emission Factor}] - [(M1 + M5 (\text{import}) + M3 - M2 - M4 - M5 (\text{export})) \times \text{MAX (Grid Emission Factor, emission factor of DG power)}]$$

.....Eq (1.2)



M1	= Gross power generated by the Power Plant,
M2 & M4	= Power supply meters for steel foundry (foundry furnace [M2] and foundry accessories [M4]),
M3	= DG set meter,
M5	= Export-Import Meter

Grid Emission Factor = 0.830 tCO₂/MWh (as per the registered PDD, please refer to Annex 1)

Emission Factor of Diesel, tCO₂/MWh = [(Quantity of diesel used in the DG set X Density of diesel X Net Calorific Value of Diesel X Carbon Content]/Power supplied by the DG]/1000

Power generated from DG set = kWh, from the monitored data

Density of Diesel² = kg/l (0.82 kg/l)

Net Calorific Value = TJ/Gg, 2006 IPCC Default Value (43.0 TJ/Gg)

Carbon content of diesel = kg CO₂/TJ, 2006 IPCC Default Value (74.1 kg CO₂/TJ)

Quantity of diesel used = liters, from the monitored data

E.2. Project emissions calculation

>>

Project emissions due to the project activity are calculated as follows:

- **Estimation of emissions by sources of GHGs due to the project activity within the project boundary:**

In cases where biomass is not available, coal would be used in the project plant for power generation. There will be GHG emissions due to burning of coal in the plant³.

$$PE_{y, \text{coal}} = QCU_{y, \text{coal}} * CEC_{y, \text{coal}} * EF_{\text{coal}} * OXID_{\text{coal}} * 4.187 * 10^{-6}$$

Where;

$PE_{y, \text{coal}}$ = Project emissions due to combustion of coal in boiler, tCO₂/annum

$QCU_{y, \text{coal}}$ = Total quantity of coal used, tonnes (from the monitored data)

$CEC_{y, \text{coal}}$ = Net calorific value of coal, kcal/ kg (from the monitored data)

EF_{coal} = Carbon emission factor for coal, tCO₂/TJ, IPCC default (96.1)

$OXID_{\text{coal}}$ = Oxidation factor for coal, IPCC default (1.0)

E.3. Leakage calculation

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Not applicable

² <http://www.iocl.com/Products/LightDieseloil.asp>

³ <http://cdm.unfccc.int/UserManagement/FileStorage/07XYKBZVUH2FA6MQNDGPWCS5894OJL>

**E.4. Emission reductions calculation / table**

>>

$$ER_y = BE_y - PE_{y, \text{project}}$$

Where;

ER_y = Emission reductions, tCO₂BE_y = Baseline emissions, tCO₂PE_y = Project emission, tCO₂

Monitoring periods	Emission reductions achieved in each monitoring period (tCO ₂ e)	The accumulated emission reductions achieved by the project activity (tCO ₂ e)
23 rd December 2006 – 14 th June 2007	18,377	59,658
15 th June 2007 – 14 th December 2007	14,573	
15 th December 2007 – 14 th August 2008	26,708	

E.5. Comparison of actual emission reductions with estimates in the CDM-PDD

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Item	Values applied in ex-ante calculation of the registered CDM-PDD	Actual values reached during the monitoring period
Emission reductions (tCO ₂ e)	26,890	24,270

E.6. Remarks on difference from estimated value in the PDD

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This is not applicable, since the actual emission reductions are less than (9.7%)the values applied in ex-ante calculation of the registered CDM-PDD.

History of the document

Version	Date	Nature of revision
01	EB 54, Annex 34 28 May 2010	Initial adoption.
Decision Class: Regulatory Document Type: Guideline, Form Business Function: Issuance		