

MONITORING REPORT FORM (CDM-MR) *
Version 01 - in effect as of: 28/09/2010

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* as contained within the document entitled "Guidelines for completing the monitoring report form (CDM-MR)" (EB 54 meeting report, annex 34).

MONITORING REPORT
Version No. 01 Date 26/04/2012
Rice Husk Based Power Project
Reference No. 0186
Monitoring Period: 7th Monitoring Period
(01/04/2011-31/03/2012)- (first and last days included)

SECTION A. General description of the project activity

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

Purpose of the project activity and Greenhouse Gas (GHG) abatement measures taken:

The project activity is a rice husk based power generation project with provisions to co-fire coal with rice husk, set up by Vandana Vidhyut Limited at Sirgitti Industrial Area, Bilaspur, Chhattisgarh. Entire power generated from the project activity is exported to the Chhattisgarh State Electricity Board (CSEB) Grid after meeting the auxiliary consumption of the power plant equipment. In absence of the project activity, equivalent quantum of electrical energy to that in the project activity would have been generated by fossil-fuel fired thermal power plants connected to the state grid. Thus the project activity is reducing corresponding GHG emission by replacing GHG intensive grid power.

Brief description of installed technology and equipments:

The total capacity of the power plant is 7.7MW. The power plant will have one condensing steam turbo generator unit with a matching boiler of travelling grate type design capable of firing multi-fuel with rice husk as the primary fuel along with coal being co-fired with rice husk. There is one 35 tph, 66 kg/cm², 500⁰C high pressure boiler and a single bleed cum condensing steam turbine generator (STG) of 7.7 MW capacity.

Relevant dates for the project activity:

Start date of commercial operation: 1st December 2001.

(As per the certificate of “Commencement of Commercial Operation” from Government of Chhattisgarh).

The plant was on a complete shutdown mode for maintenance related purpose from 1st November 2011 to 9th December 2011.

Monitoring Period:

The monitoring period is chosen from 01/04/2011 to 31/03/2012 (both days included).

Emission reductions achieved in the monitoring period – 26,248 t CO₂

A.2. Project Participants

Vandana Vidhyut Limited, Bilaspur, Raipur, Chhattisgarh, India - Project Promoter

Contact: Mr Pankaj Baldua, Vandana Vidhyut Limited
Vandana Bhawan, M.G. Road,
Raipur – 492001,
Chattisgarh,
India

A.3. Location of the project activity:

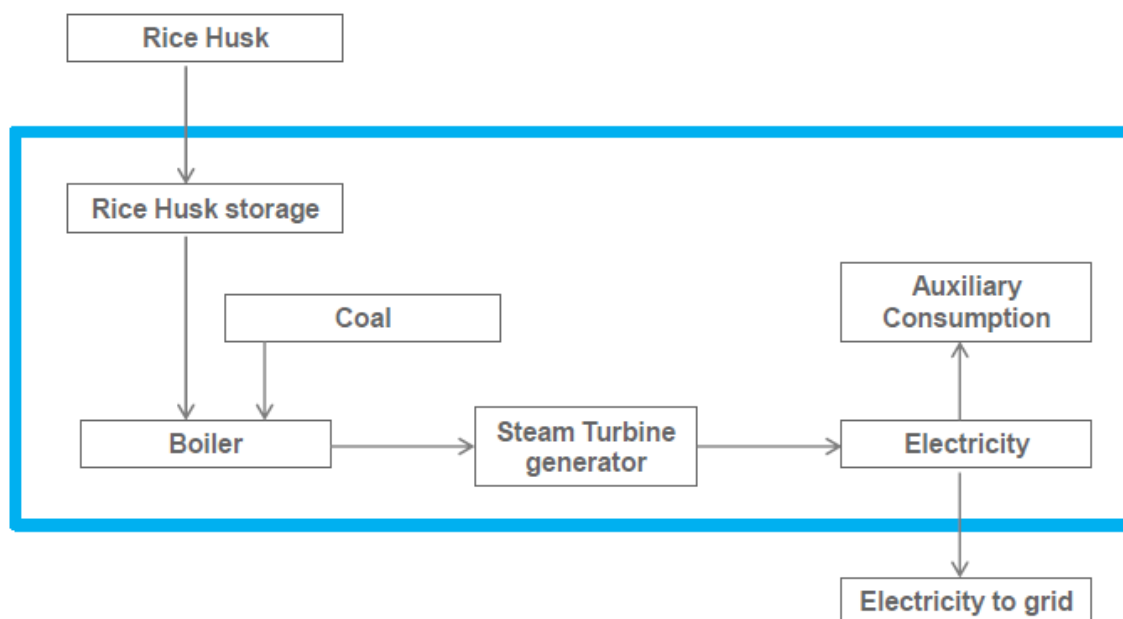
The project location is at Sirgitti Industrial Area of Bilaspur District, Chattisgarh State, India.
Latitude: - 21⁰47' N to 23⁰08' N
Longitude: - 81⁰14'E to 83⁰15' E

A.4. Technical description of the project
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The 7.7 MW power plant is based on Rankine Cycle. Rice husk is used as the primary fuel with provisions of co-firing coal. The steam generator is designed to operate on any combination of rice husk and coal to ensure consistent plant efficiency even in times of rice husk deficiency, if any. The power plant has one condensing steam turbo generator unit with a matching boiler of travelling grate type design capable of firing multi-fuel with rice husk as the primary fuel.

There is one 35 tph, 66 kg/cm², 500⁰C high pressure boiler and a single bleed cum condensing steam turbine generator (STG) of 7.7 MW capacity. The 35 tph of steam from boiler is fed into the 7.7 MW bleed cum condensing turbine. The boiler is of Fluidized Bed Combustion type and has the advantages of high thermal and combustion efficiency reducing quantity of husk needed, to a minimum, automatic operation for consistent high efficiencies and reduced need for manpower.

Steam Turbine of fully condensing mode with suitable alternator generator is installed for generating electricity. The turbines are of the single cylinder, single exhaust fully condensing type, designed for high operating efficiencies and maximum reliability. Following is the set up of the project activity:-



Represents the project boundary

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

Title: - Renewable Electricity Generation for a Grid

Reference: - AMS- I.D version 07 dated 28th November, 2005

A.6. Registration date of the project activity:

9th of February, 2006

A.7. Crediting period of the project activity and related information (start date and choice of crediting period):

Crediting Period: 10 Years

Choice of crediting period: Fixed Crediting period

Start date of the Crediting Period: 1st April, 2002

Last date of the Crediting Period: 31st march, 2012

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

Contact Person - Mr. Pankaj Baldual

Address - M/s Vandana Vidhyut Limited,

Vandana Bhawan,

M.G. Road,

¹ The name of Mr Pankaj Baldual has been changed from Mr. G.P. Agarwal. The same has been notified to the UNFCCC by changing the necessary Modalities of Communication

Raipur- 492001

State- Chattishgarh,

India

Tel: + 91 771-2535440/4207777

Fax: + 91 771- 4265491

E-mail: agmfinance@vandanaglobal.com

SECTION B. Implementation of the project activity

B.1. Implementation status of the project activity

1. The start date of commercial operation was on 1st December 2001 (As per the certificate of “Commencement of Commercial Operation” from Government of Chhattisgarh). This is a single site project activity and so multiple start dates are not possible.
2. The project is continuing operation except some rare instances when the plant had to face shutdown. However, the plant was on a complete shutdown mode for maintenance related purposes from 1st November 2011 to 9th December 2011. Apart from this date, the shut down of the plant has been rare and was stopped only in case of any emergency. The details (hourly gross electricity generation readings) have been submitted to the DOE. No exchange of equipment within the project boundary is reported during the Monitoring period.
3. No change in configuration has taken place during the Monitoring period. Also, no event has taken place during the Monitoring period which might affect the applicability of the methodology and the registered monitoring plan.

B.2. Revision of the monitoring plan

Not Applicable

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

Not Applicable.

B.4. Notification or request of approval of changes

There has been no change in the in the project activity with reference to the registered PDD.

SECTION C. Description of the monitoring system

The instrumentation and control system for the project activity is designed with adequate instruments to control and monitor the various operating parameters for safe and efficient operation of the plant. VVL has employed Distributed Control System (DCS). The data is inserted into the plant log books and they are checked and verified with DCS. All meters are calibrated and marked at regular intervals so that the

accuracy of measurement can be ensured all the time. The aim is to enable this project have a clear, credible, and accurate set of monitoring, evaluation and verification procedures. The purpose of these procedures is to direct and support continuous monitoring of project performance/key project indicators to determine project outcomes, greenhouse gas (GHG) emission reductions.

The project activity measures the gross energy generation, and the auxiliary consumption of electricity through dedicated energy meters located at the site of the plant. Inside the premises of the plant, the Chhattisgarh State Electricity Board has also installed an in-house export meter on the plant site itself.

The Power Plant, after meeting its auxiliary requirements, sends the net electricity to the CSEB Grid. The Grid has a net meter and a check meter. The readings of the net meter are the basis of generation of carbon credits for this project activity.

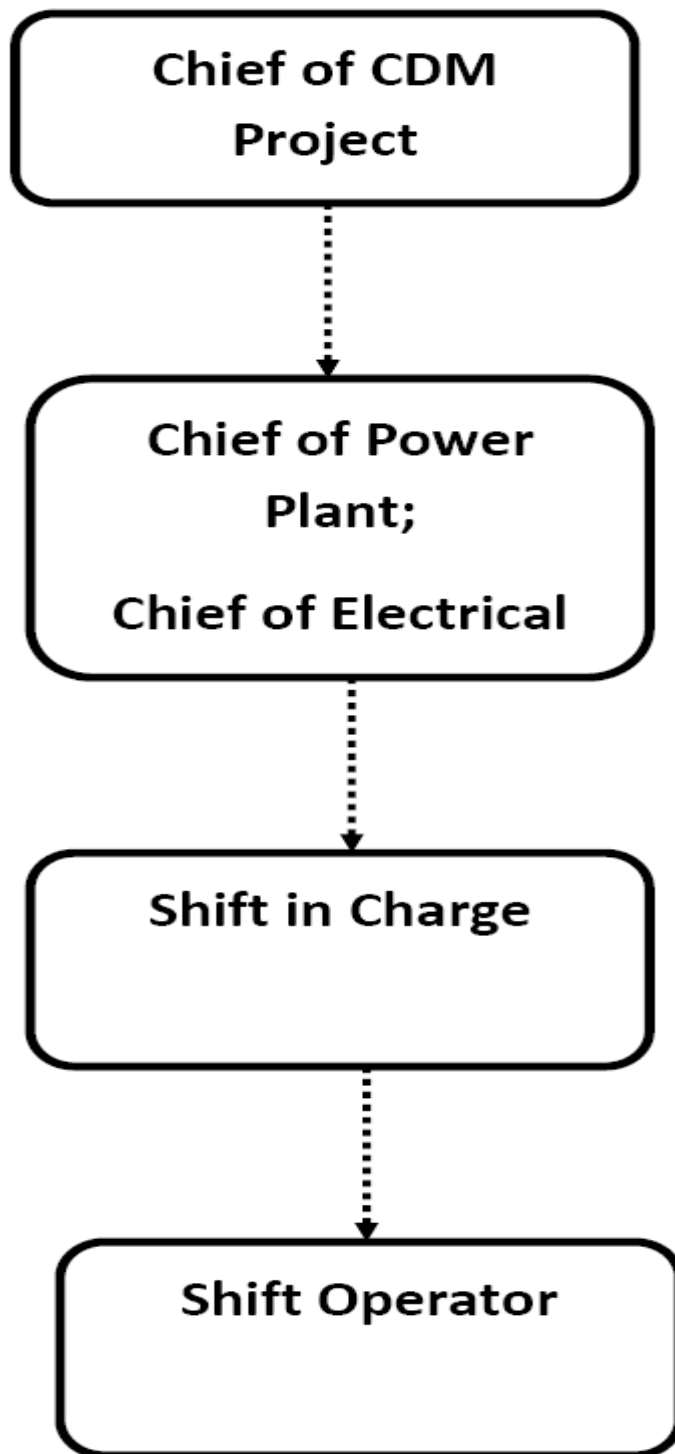
The project revenue is based on the units exported as measured by power meters at plant and main meter and check meters at the high-tension substation of the CSEB. The monitoring and verification system mainly comprises of these meters as far as power export is concerned. The rice husk and coal input quantities are also monitored. The export of electricity is done through invoices to CSEB. The readings are noted from the respective meters in the plant log book from where daily sheets are generated.

Emergency Procedures:

1. In case of any data discrepancy being identified at the review stage, the same is corrected with immediate effect with reference to any back up data as available.
2. In case of failure of a Energy meter recording data for a parameter, provisions are there for putting up an alternate energy meter (calibrated) in its place.

Organizational Structure:

1. The organizational structure including the various roles and responsibilities is as given below:



Chief of CDM project:

He is responsible for carrying out all compliance related activities related as per the Monitoring activities of the Registered PDD. He is also responsible for error reporting, internal CDM audit, and drafting of the Monitoring report as per the Monitoring Plan of the Registered PDD.

Chief of Power Plant; Chief of Electrical:

He is responsible for data collating, cross checking, presenting the same to the top management for review and data archiving. He is also responsible for calibration of the equipments (as per the Monitoring Plan), addressing the audit findings.

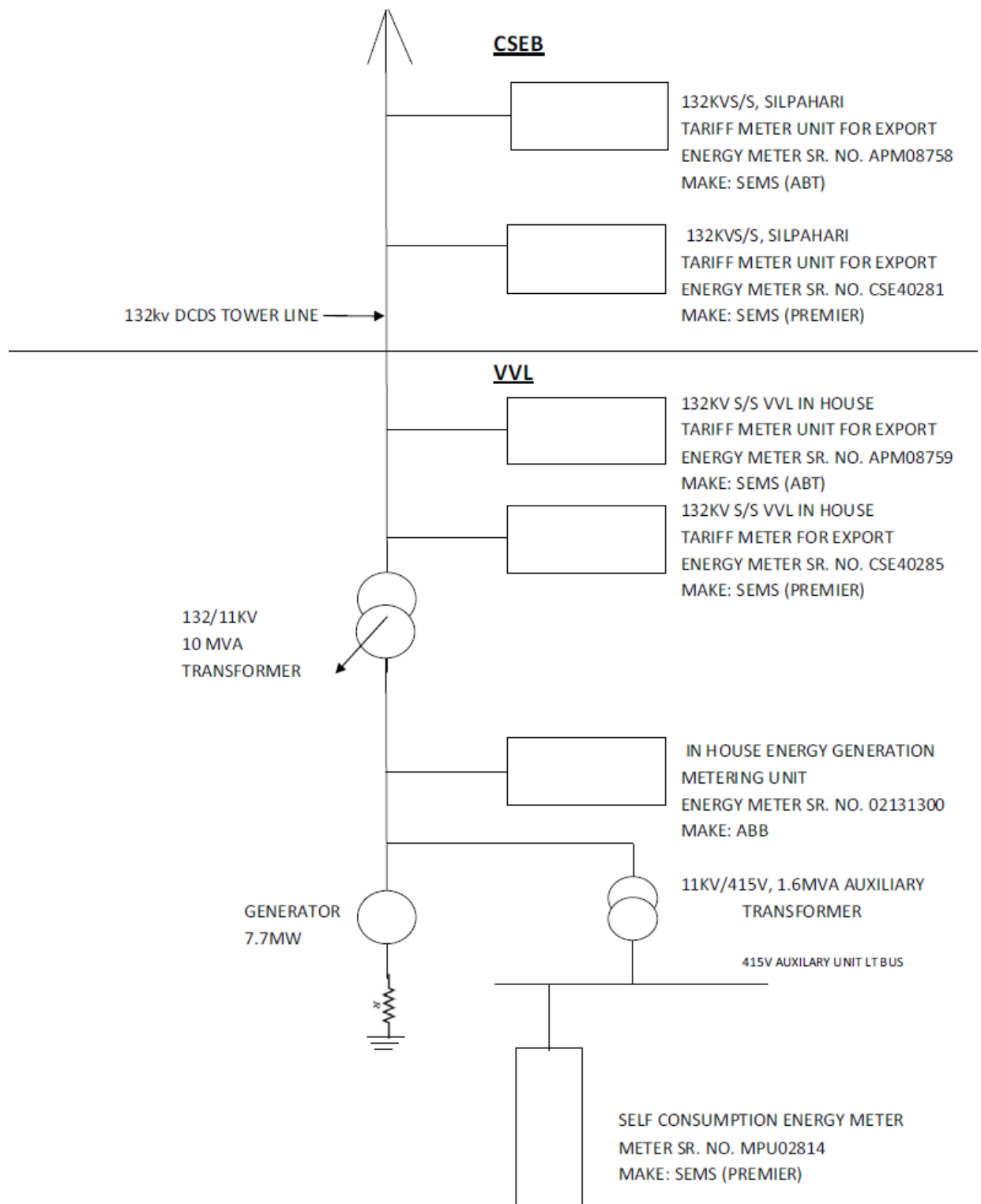
Shift-in-charge:

He is responsible for data collection and data recording and cross check.

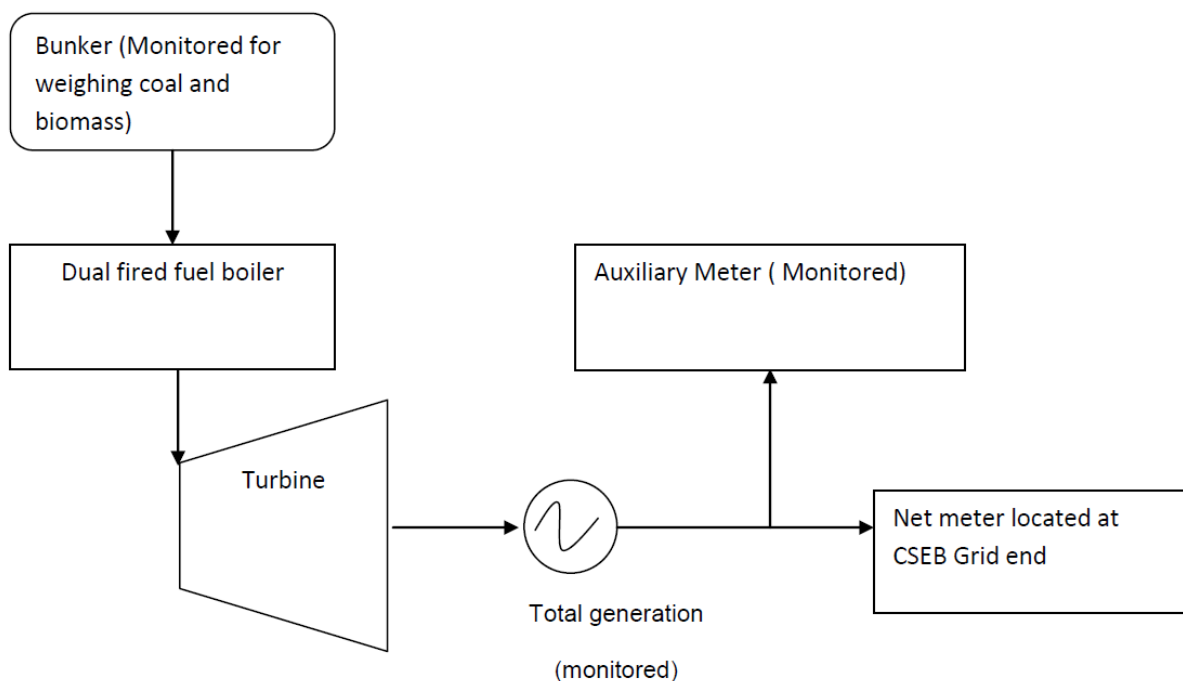
Shift-Operator:

He is responsible for data collection and data reporting.

The Single Line diagram of the project activity plant is as follows:



The diagram showing the monitoring points is as shown in the diagram below:



The internal audit is performed in each quarter. For the period 1st April 2011-31st March 2012, internal audit was performed on four occasions. The respective dates are mentioned below.

1. 07/07/2011 (Ref No. : CDM/VVL/VF07/001)
2. 06/10/2011 (Ref No. : CDM/VVL/VF07/002)
3. 09/01/2012 (Ref No. : CDM/VVL/VF07/003)
4. 04/04/2012 (Ref No. : CDM/VVL/VF07/004)

SECTION D. Data and parameters

The Monitoring Protocol requires the following parameters to be monitored for the computation of emission reductions:

- Power export
- Carbon content in coal

Apart from the above parameters, the project proponent also monitors the following supplementary parameters to check the operational performance of the power plant:

- Total electricity generated
- Auxiliary consumption
- Type of fuel used (Coal, Biomass)
- Total quantity of fuel consumption (Coal, Biomass)
- Calorific value of fuels used (Coal, Biomass)
- Plant heat rate
- Efficiency of power generation activity

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

Data / Parameter:	CO₂ emission factor of the grid (EF_g)
Data unit:	Kg CO₂/KWh
Description:	The same has been calculated ex-ante in the PDD (page 32 of the registered PDD) and has been kept as constant throughout the crediting period.
Source of data used:	Calculated as per the data published by CEA and other publicly available sources
Value(s) :	0.820
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculation
Additional comment:	The same has been calculated once at the start of the crediting period and kept constant for the entire crediting period.

D.2. Data and parameters monitored

Data / Parameter:	Total electricity generated
Data unit:	kWh
Description:	Gross electricity generation (In house Generation meter)
Measured /Calculated /Default:	Measured
Source of data:	Plant Log Sheets further cross checked with DCS logs
Value(s) of monitored parameter:	55,507,800
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)	Type: ABB P+ Accuracy class : +/- 0.5% SI No. -02131300 Calibration frequency : Once in a year Date of last calibration: 21/11/2011 by Yenkey Instruments and Controls Pvt. Ltd. Validity upto : 20/11/2012 Calibration was also done on 27/01/2011 by Yenkey Instruments and Controls Pvt. Ltd. Calibration covers the entire Monitoring Period.
Measuring/ Reading/ Recording frequency:	Measured continuously and recorded shift-wise
Calculation method (if applicable):	Not Applicable.
QA/QC procedures applied:	There is a defined procedure which ensures that proper corrective actions are undertaken immediately if any discrepancies are identified in the gross generation figures (like inconsistencies in reported parameters). These discrepancies are identified and rectified if such an instance occurs.

Data / Parameter:	Power Export				
Data unit:	kWh				
Description:	Power Export as per the meter readings of Chhattisgarh State Electricity Board (CSEB)				
Measured /Calculated /Default:	Measured				
Source of data:	Monthly HT Meter Reading Statements of Chhattisgarh State Power Distribution Company Ltd. and Chhattisgarh State Power Transmission Company Ltd				
Value(s) of monitored parameter:	49,611,386.25				
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline Emission calculation				
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	<p>The details of the main meter and the check meter up to 8th October is as follows:</p> <p>Main Meter details: Type: Energy meter Make: SEMS SI No.: CSE 40281 Accuracy class: 0.5 S</p> <p>Check meter details: Type: Energy Meter Make: SEMS (ABT) SI No.: APM 08758 Accuracy class: 0.2 S</p> <p>From 9th October onwards details of the main meter and the check meter are as follows:</p> <p>Main Meter details: Type: Energy Meter Make: SEMS (ABT) SI No.: APM 08758 Accuracy class: 0.2 S</p> <p>Check meter details: Type: Energy meter Make: SEMS SI No.: CSE 40281 Accuracy class: 0.5 S</p> <p>The meter is maintained and sealed and calibrated by CSEB. The PP has no control over the calibration of the meter. CSEB sends the monthly readings to Vandana Vidhyut Limited .</p> <p>The dates on which the readings were received from CSEB are as follows:</p> <table border="1"> <tr> <th>Months</th><th>Date</th></tr> <tr> <td>April 2011</td><td>09/04/2011 and</td></tr> </table>	Months	Date	April 2011	09/04/2011 and
Months	Date				
April 2011	09/04/2011 and				

		30/04/2011	
	May 2011	31/05/2011	
	June 2011	01/07/2011	
	July 2011	01/08/2011	
	August 2011	01/09/2011	
	September 2011	01/10/2011	
	October 2011	08/10/2011, 19/10/2011, 28/10/2011 02/11/2011 and 09/11/2011	
	November 2011	-	
	December 2011	11/01/2012	
	January 2012	01/02/2012	
	February 2012	12/03/2012	
	March 2012	04/04/2012	
	.		
Measuring/ Reading/ Recording frequency:	Measured continuously and recorded on monthly basis. The CSEB officials note the meter reading and send to M/s Vandana Vidhyut Limited.		
Calculation method (if applicable):	Not Applicable.		
QA/QC procedures applied:	Since the meter is calibrated and sealed by CSEB, Government of Chhattisgarh, hence the accuracy of the meter is ensured. Vandana Vidhyut Limited (Project Proponent) has no control over the meter.		

Data / Parameter:	Auxiliary Consumption
Data unit:	kWh
Description:	Auxiliary Consumption of electricity for the project activity
Measured /Calculated /Default:	Measured
Source of data:	Monthly Performance Report
Value(s) of monitored parameter:	5,996,090
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)	Type: Energy Meter Make : SEMS Serial number: MPU 02814 Accuracy class: +/- 0.5 % Calibration frequency : Once in a year Date of last calibration: 14/11/2011 Validity upto: 13/11/2012 Calibration was also done on 16/11/2010.
Measuring/ Reading/ Recording frequency:	Measured continuously and recorded on daily basis.
Calculation method (if applicable):	Not Applicable.
QA/QC procedures applied:	There is a defined procedure which ensures that proper corrective actions are undertaken immediately if any discrepancies are identified

	in the Auxiliary Consumption figures (like inconsistencies in reported parameters). These discrepancies are identified and rectified if such an instance occurs.
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Data / Parameter:	Type of fuel used- Biomass
Data unit:	Tonnes
Description:	Total quantity of rice husk consumption
Measured /Calculated /Default:	Measured
Source of data:	Rice Husk Stock Register
Value(s) of monitored parameter:	54,992.516
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)	<p>The quantity of rice husk consumed is monitored by scaling of husk bunker (i.e. by measuring the difference in levels of rice husk in the bunker before feeding rice husk and after discharging the same into the feeding hoppers of the FBC boiler). A standardized scaling chart for the bunker is used to calculate the fuel fed from the bunker to the FBC boiler.</p> <p>The scaling of bunker was carried out by VVL which was certified by Power Tech Engineers (Consulting Engineers).</p> <p>Bunker certificate details:</p> <p>Calibration done by: Power Tech Engineers (Consulting Engineers)</p> <p>Date of last Calibration: 19/01/2012</p> <p>Validity: 18/01/2013</p> <p>Certificate Ref No. : PT/12/467</p> <p>Accuracy class: N/A</p> <p>Calibration was also done on 06/02/2011.</p>
Measuring/ Reading/ Recording frequency:	Recorded on a daily basis.
Calculation method (if applicable):	Not Applicable.
QA/QC procedures applied:	<p>The annual rice husk consumption figure can be checked from the audited (by a third party statutory auditor) Balance Sheet of VVL.</p> <p>There is a defined procedure which ensures that proper corrective actions are undertaken immediately if any discrepancies are identified in the rice husk consumption data.</p> <p>These discrepancies are identified and rectified if such an instance occurs.</p>

Data / Parameter:	Type of fuel used- Coal
Data unit:	Tonnes
Description:	Total quantity of coal consumption
Measured /Calculated /Default:	Measured
Source of data:	Coal Stock Register
Value(s) of monitored	13,909.892

parameter:	
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project Emission calculations.
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	<p>The quantity of coal consumed is monitored by scaling of coal bunker (i.e. by measuring the difference in levels of coal in the bunker before feeding coal and after discharging the same into the feeding hoppers of the FBC boiler). A standardized scaling chart for the bunker is used to calculate the fuel fed from the bunker to the FBC boiler.</p> <p>The scaling of bunker was carried out by VVL which was certified by Power Tech Engineers (Consulting Engineers).</p> <p>Bunker certificate details: Calibration done by: Power Tech Engineers (Consulting Engineers) Date of last Calibration: 19/01/2012 Validity: 18/01/2013 Certificate No. : PT/12/467 Accuracy class: N/A Calibration was also done on 06/02/2011.</p>
Measuring/ Reading/ Recording frequency:	Recorded on a daily basis.
Calculation method (if applicable):	Not Applicable.
QA/QC procedures applied:	<p>The annual coal consumption figure can also be checked from the audited (by a third party statutory auditor) Balance Sheet of VVL.</p> <p>There is a defined procedure which ensures that proper corrective actions are undertaken immediately if any discrepancies are identified in the coal consumption data.</p> <p>These discrepancies are identified and rectified if such an instance occurs.</p>

Data / Parameter:	Carbon Content in Coal																					
Data unit:	%																					
Description:	Carbon Content in Coal																					
Measured /Calculated /Default:	Actual sample testing																					
Source of data:	Coal Analysis Reports of National Accredited Laboratory																					
Value(s) of monitored parameter:	<table><tr><th>Relevant dates for which the values are applicable</th><th>Carbon %</th></tr><tr><td>01/04/11 to 30/04/11</td><td>28.45</td></tr><tr><td>01/05/11 to 31/05/11</td><td>20.21</td></tr><tr><td>01/06/11 to 30/06/11</td><td>26.20</td></tr><tr><td>01/07/11 to 31/07/11</td><td>34.10</td></tr><tr><td>01/08/11 to 31/08/11</td><td>28.70</td></tr><tr><td>01/09/11 to 30/09/11</td><td>29.21</td></tr><tr><td>01/10/11 to 31/10/11</td><td>26.00</td></tr><tr><td>01/11/11 to 30/11/11</td><td>-</td></tr><tr><td>01/12/11 to 31/12/11</td><td>31.00</td></tr></table>		Relevant dates for which the values are applicable	Carbon %	01/04/11 to 30/04/11	28.45	01/05/11 to 31/05/11	20.21	01/06/11 to 30/06/11	26.20	01/07/11 to 31/07/11	34.10	01/08/11 to 31/08/11	28.70	01/09/11 to 30/09/11	29.21	01/10/11 to 31/10/11	26.00	01/11/11 to 30/11/11	-	01/12/11 to 31/12/11	31.00
Relevant dates for which the values are applicable	Carbon %																					
01/04/11 to 30/04/11	28.45																					
01/05/11 to 31/05/11	20.21																					
01/06/11 to 30/06/11	26.20																					
01/07/11 to 31/07/11	34.10																					
01/08/11 to 31/08/11	28.70																					
01/09/11 to 30/09/11	29.21																					
01/10/11 to 31/10/11	26.00																					
01/11/11 to 30/11/11	-																					
01/12/11 to 31/12/11	31.00																					

	01/01/12 to 31/01/12	33.20	
	01/02/12 to 28/02/12	28.20	
	01/03/12 to 31/03/12	28.20	
	The Plant was in a shut down mode during the entire period of November, hence no data for November is available.		
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project Emissions calculations.		
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Not Applicable.		
Measuring/ Reading/ Recording frequency:	Recorded on a monthly basis.		
Calculation method (if applicable):	Not Applicable.		
QA/QC procedures applied:	The carbon content of the coal used is analyzed by a National Accredited Laboratory – “Central Institute of Mining and Fuel Research, Bilaspur Unit” following the standard testing procedure which will ensure lower uncertainty level of the parameter.		

Data / Parameter:	Calorific value of fuel used- coal																											
Data unit:	kcal/kg																											
Description:	Calorific value of coal used																											
Measured /Calculated /Default:	Actual sample testing																											
Source of data:	Reports of National Accredited Laboratory																											
Value(s) of monitored parameter:	<table><tr><th>Relevant dates for which the values are applicable</th><th>Calorific value of coal</th></tr><tr><td>01/04/11 to 30/04/11</td><td>2,725</td></tr><tr><td>01/05/11 to 31/05/11</td><td>1,895</td></tr><tr><td>01/06/11 to 30/06/11</td><td>2,370</td></tr><tr><td>01/07/11 to 31/07/11</td><td>3,310</td></tr><tr><td>01/08/11 to 31/08/11</td><td>2,495</td></tr><tr><td>01/09/11 to 30/09/11</td><td>2,565</td></tr><tr><td>01/10/11 to 31/10/11</td><td>2,277</td></tr><tr><td>01/11/11 to 30/11/11</td><td>-</td></tr><tr><td>01/12/11 to 31/12/11</td><td>2,835</td></tr><tr><td>01/01/12 to 31/01/12</td><td>3,170</td></tr><tr><td>01/02/12 to 28/02/12</td><td>2,610</td></tr><tr><td>01/03/12 to 31/03/12</td><td>2,594</td></tr></table> <p>The Plant was in a shut down mode during the entire period of November, hence no data for November is available.</p>		Relevant dates for which the values are applicable	Calorific value of coal	01/04/11 to 30/04/11	2,725	01/05/11 to 31/05/11	1,895	01/06/11 to 30/06/11	2,370	01/07/11 to 31/07/11	3,310	01/08/11 to 31/08/11	2,495	01/09/11 to 30/09/11	2,565	01/10/11 to 31/10/11	2,277	01/11/11 to 30/11/11	-	01/12/11 to 31/12/11	2,835	01/01/12 to 31/01/12	3,170	01/02/12 to 28/02/12	2,610	01/03/12 to 31/03/12	2,594
Relevant dates for which the values are applicable	Calorific value of coal																											
01/04/11 to 30/04/11	2,725																											
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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)	Not Applicable.
Measuring/ Reading/ Recording frequency:	Recorded on a monthly basis.
Calculation method (if applicable):	Not Applicable.
QA/QC procedures applied:	The calorific value of coal is tested by an external Laboratory, which is a National Accredited Laboratory (Central Fuel Research Institute, Bilaspur Unit).

Data / Parameter:	Calorific value of fuel used- biomass																											
Data unit:	kcal/kg																											
Description:	Calorific value of rice husk used																											
Measured /Calculated /Default:	Actual sample testing																											
Source of data:	Lab Analysis Report																											
Value(s) of monitored parameter:	<table><tr><th>Relevant dates for which the values are applicable</th><th>Calorific value of rice husk</th></tr><tr><td>01/04/11 to 30/04/11</td><td>3,276</td></tr><tr><td>01/05/11 to 31/05/11</td><td>3,254</td></tr><tr><td>01/06/11 to 30/06/11</td><td>3,305</td></tr><tr><td>01/07/11 to 31/07/11</td><td>3,297</td></tr><tr><td>01/08/11 to 31/08/11</td><td>3,225</td></tr><tr><td>01/09/11 to 30/09/11</td><td>3,105</td></tr><tr><td>01/10/11 to 31/10/11</td><td>3,280</td></tr><tr><td>01/11/11 to 30/11/11</td><td>0</td></tr><tr><td>01/12/11 to 31/12/11</td><td>3,272</td></tr><tr><td>01/01/12 to 31/01/12</td><td>3,286</td></tr><tr><td>01/02/12 to 28/02/12</td><td>3,292</td></tr><tr><td>01/03/12 to 31/03/12</td><td>3,312</td></tr></table> <p>The Plant was in a shut down mode during the entire period of November, hence no data for November is available.</p>		Relevant dates for which the values are applicable	Calorific value of rice husk	01/04/11 to 30/04/11	3,276	01/05/11 to 31/05/11	3,254	01/06/11 to 30/06/11	3,305	01/07/11 to 31/07/11	3,297	01/08/11 to 31/08/11	3,225	01/09/11 to 30/09/11	3,105	01/10/11 to 31/10/11	3,280	01/11/11 to 30/11/11	0	01/12/11 to 31/12/11	3,272	01/01/12 to 31/01/12	3,286	01/02/12 to 28/02/12	3,292	01/03/12 to 31/03/12	3,312
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Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	-																											
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last	Bomb Calorimeter Type: Advance Research Instrument Corporation, New Delhi Model: BCM/21018 Date of last calibration: 05/05/2011																											

calibration, validity)	Calibration frequency: Once in a year Validity upto: 04/05/2012 The calorific value of the rice husk is determined in the in-house laboratory of VVL as per the standard national practices by taking samples at random. Calibration was also done on 20/05/2010
Measuring/ Reading/ Recording frequency:	Recorded on a monthly basis.
Calculation method (if applicable):	Not Applicable.
QA/QC procedures applied:	There is a defined procedure which ensures that proper corrective actions are undertaken immediately if any discrepancies are identified in the calorific value of rice husk. These discrepancies are identified and rectified if such an instance occurs.

Data / Parameter:	Efficiency of power generation activity																										
Data unit:	%																										
Description:	Efficiency of power generation activity																										
Measured /Calculated /Default:	Calculated																										
Source of data:	Emission Reduction calculation sheet provided to DOE.																										
Value(s) of monitored parameter:	<table border="1"> <thead> <tr> <th>Relevant dates for which the values are applicable</th><th>Efficiency of power generation</th></tr> </thead> <tbody> <tr><td>01/04/11 to 30/04/11</td><td>19.67</td></tr> <tr><td>01/05/11 to 31/05/11</td><td>21.72</td></tr> <tr><td>01/06/11 to 30/06/11</td><td>20.51</td></tr> <tr><td>01/07/11 to 31/07/11</td><td>20.06</td></tr> <tr><td>01/08/11 to 31/08/11</td><td>21.40</td></tr> <tr><td>01/09/11 to 30/09/11</td><td>23.25</td></tr> <tr><td>01/10/11 to 31/10/11</td><td>23.41</td></tr> <tr><td>01/11/11 to 30/11/11</td><td>-</td></tr> <tr><td>01/12/11 to 31/12/11</td><td>20.75</td></tr> <tr><td>01/01/12 to 31/01/12</td><td>22.75</td></tr> <tr><td>01/02/12 to 28/02/12</td><td>25.52</td></tr> <tr><td>01/03/12 to 31/03/12</td><td>24.90</td></tr> </tbody> </table>	Relevant dates for which the values are applicable	Efficiency of power generation	01/04/11 to 30/04/11	19.67	01/05/11 to 31/05/11	21.72	01/06/11 to 30/06/11	20.51	01/07/11 to 31/07/11	20.06	01/08/11 to 31/08/11	21.40	01/09/11 to 30/09/11	23.25	01/10/11 to 31/10/11	23.41	01/11/11 to 30/11/11	-	01/12/11 to 31/12/11	20.75	01/01/12 to 31/01/12	22.75	01/02/12 to 28/02/12	25.52	01/03/12 to 31/03/12	24.90
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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)	Not Applicable.																										
Measuring/ Reading/ Recording frequency:	It is a calculated parameter. However, the same is recorded continuously (on a per hour basis).																										

Calculation method (if applicable):	The parameters are computed following the standard methods of calculation. Efficiency = $860 / (\text{plant heat rate})\%$
QA/QC procedures applied:	There is a defined procedure which ensures that proper corrective actions are undertaken immediately if any discrepancies are identified in the efficiency of power generation (like inconsistencies in computed parameters) are identified. These discrepancies are identified and rectified if such an instance occurs.

Data / Parameter:	Plant Heat Rate																											
Data unit:	kcal/kWh																											
Description:	Plant Heat Rate																											
Measured /Calculated /Default:	Calculated																											
Source of data:	Emission Reduction calculation sheet provided to DOE.																											
Value(s) of monitored parameter:	<table><tr><th>Relevant dates for which the values are applicable</th><th>Plant heat rate</th></tr><tr><td>01/04/11 to 30/04/11</td><td>4,373.15</td></tr><tr><td>01/05/11 to 31/05/11</td><td>3,958.63</td></tr><tr><td>01/06/11 to 30/06/11</td><td>4,193.13</td></tr><tr><td>01/07/11 to 31/07/11</td><td>4,286.87</td></tr><tr><td>01/08/11 to 31/08/11</td><td>4,019.08</td></tr><tr><td>01/09/11 to 30/09/11</td><td>3,699.29</td></tr><tr><td>01/10/11 to 31/10/11</td><td>3,672.86</td></tr><tr><td>01/11/11 to 30/11/11</td><td>-</td></tr><tr><td>01/12/11 to 31/12/11</td><td>4,144.89</td></tr><tr><td>01/01/12 to 31/01/12</td><td>3,780.99</td></tr><tr><td>01/02/12 to 28/02/12</td><td>3,370.29</td></tr><tr><td>01/03/12 to 31/03/12</td><td>3,453.44</td></tr></table>		Relevant dates for which the values are applicable	Plant heat rate	01/04/11 to 30/04/11	4,373.15	01/05/11 to 31/05/11	3,958.63	01/06/11 to 30/06/11	4,193.13	01/07/11 to 31/07/11	4,286.87	01/08/11 to 31/08/11	4,019.08	01/09/11 to 30/09/11	3,699.29	01/10/11 to 31/10/11	3,672.86	01/11/11 to 30/11/11	-	01/12/11 to 31/12/11	4,144.89	01/01/12 to 31/01/12	3,780.99	01/02/12 to 28/02/12	3,370.29	01/03/12 to 31/03/12	3,453.44
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Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Not Applicable.																											
Measuring/ Reading/ Recording frequency:	It is a calculated parameter. However, the same is recorded continuously (on a per hour basis).																											
Calculation method (if applicable):	The parameter is computed following the standard methods of calculation. [(Quantity of rice husk × GCV of rice husk) +(Quantity of coal × GCV																											

	of coal)]/ Gross generation
QA/QC procedures applied:	<p>There is a defined procedure which ensures that proper corrective actions are undertaken immediately if any discrepancies are identified in the plant heat rate (like inconsistencies in computed parameters) are identified.</p> <p>These discrepancies are identified and rectified if such an instance occurs.</p>

SECTION E. Emission reductions calculation

E.1. Baseline emissions calculation

Baseline Emissions = (Net Export to CSEB Grid * Grid emission Factor) tCO₂

The grid emission factor is calculated ex-ante and is fixed for the entire crediting period. The value of the grid emission factor was calculated in the Registered PDD based on figures provided by the Central Electricity Authority, Government of India and other government agencies of India (mentioned in the Registered PDD).

Parameters Months	Baseline Emissions		
	Net Export to CSEB Grid	Grid Emission Factor	Baseline Emissions
	(kWh)	(Kg CO ₂ /KWh)	(tCO ₂)
01/04/11 to 30/04/11	4,401,360.00	0.820	3,609
01/05/11 to 31/05/11	5,018,880.00	0.820	4,115
01/06/11 to 30/06/11	4,995,840.00	0.820	4,097
01/07/11 to 31/07/11	4,944,480.00	0.820	4,054
01/08/11 to 31/08/11	4,776,000.00	0.820	3,916
01/09/11 to 30/09/11	4,734,240.00	0.820	3,882
01/10/11 to 31/10/11	4,494,266.25	0.820	3,685
01/11/11 to 30/11/11	0.00	0.820	0
01/12/11 to 31/12/11	1,421,520.00	0.820	1,166
01/01/12 to 31/01/12	4,986,240.00	0.820	4,089
01/02/12 to 29/02/12	4,813,200.00	0.820	3,947
01/03/12 to 31/03/12	5,025,360.00	0.820	4,121
Total	49,611,386.25	0.820	40,681

The baseline emissions in this case comes out to be 40681 tonnes of CO₂ for the current monitoring period.

E.2. Project emissions calculation

Project Emissions = [(44/12) * Quantity of Coal consumed * Carbon content of coal] tCO₂

Parameters Months	Project Emissions		
	Coal Consumption	Total Carbon in Coal	Project Emissions
	(tonnes)	(%)	(tCO ₂)
01/04/11 to 30/04/11	1,248.655	28.45	1,303
01/05/11 to 31/05/11	1,523.105	20.21	1,129
01/06/11 to 30/06/11	1,349.281	26.20	1,296
01/07/11 to 31/07/11	1,360.845	34.10	1,702
01/08/11 to 31/08/11	1,306.211	28.70	1,375
01/09/11 to 30/09/11	1,235.894	29.21	1,324
01/10/11 to 31/10/11	1,128.353	26.00	1,076
01/11/11 to 30/11/11	0.000	0.00	0
01/12/11 to 31/12/11	408.460	31.00	464
01/01/12 to 31/01/12	1,467.158	33.20	1,786
01/02/12 to 29/02/12	1,377.470	28.20	1,424
01/03/12 to 31/03/12	1,504.460	28.20	1,556
Total	13,909.892	28.50	14,433

The project emissions works out to be 14,433 tonnes of CO₂ for the current monitoring period.

E.3. Leakage calculation

Not Applicable

E.4. Emission reductions calculation / table

Emission Reductions = (Baseline Emissions – Project Emissions) tCO₂

Parameters Months	Baseline Emissions			Project Emissions			Emission Reductions
	Net Export to CSEB Grid	Grid Emission Factor	Baseline Emissions	Coal Consumption	Total Carbon in Coal	Project Emissions	
	(kWh)	(Kg CO ₂ /KWh)	(tCO ₂)	(tonnes)	(%)	(tCO ₂)	(tCO ₂)
01/04/11 to 30/04/11	4401360.00	0.820	3609	1248.655	28.45	1303	2307
01/05/11 to 31/05/11	5018880.00	0.820	4115	1523.105	20.21	1129	2987
01/06/11 to 30/06/11	4995840.00	0.820	4097	1349.281	26.20	1296	2800
01/07/11 to 31/07/11	4944480.00	0.820	4054	1360.845	34.10	1702	2353
01/08/11 to 31/08/11	4776000.00	0.820	3916	1306.211	28.70	1375	2542
01/09/11 to 30/09/11	4734240.00	0.820	3882	1235.894	29.21	1324	2558
01/10/11 to 31/10/11	4494266.25	0.820	3685	1128.353	26.00	1076	2610
01/11/11 to 30/11/11	0.00	0.820	0	0.000	0.00	0	0
01/12/11 to 31/12/11	1421520.00	0.820	1166	408.460	31.00	464	701
01/01/12 to 31/01/12	4986240.00	0.820	4089	1467.158	33.20	1786	2303
01/02/12 to 29/02/12	4813200.00	0.820	3947	1377.470	28.20	1424	2523
01/03/12 to 31/03/12	5025360.00	0.820	4121	1504.460	28.20	1556	2565
Total	49611386.25	0.820	40681	13909.892	28.50	14433	26248

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

Item	Values applied in ex-ante calculation of the registered CDM-PDD	Actual values reached during the monitoring period
Emission reductions (tCO₂e)	21076	26248

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

In the registered PDD, the emission reductions for the entire crediting period were projected based on

- Baseline emissions corresponding to a net exportable electricity of 45.41 GWh to Chattisgarh State Electricity Board (CSEB) grid for the year 2002-2003 and
- Project emissions resulting from co-firing of 9784.9 tonnes of coal with rice husk in 2002-2003 and a total carbon content of 45% in coal.

In line with the registered monitoring plan, the emission reductions for the period 2011-2012 are calculated based on

- Baseline emissions corresponding to a net exported electricity of 49.61 GWh to CSEB grid for the year 2011-2012. The main reason for it was the increase in gross generation due to an increased quantity of rice husk and coal fired in comparison to the quantity fired in the year 2002-03 during the initial phase of the project. Further, the generation of 49.61 GWh is within the capacity of generation of 7.7 MW, i.e. with nearly 330 days of operation during the year 2011-2012, the plant has generated within the rated capacity and there has been a change in the gross generation as compared to the projected generation reported in 2002-03.
- Project emissions resulting from co-firing of 13909.892 tonnes of coal with rice husk in 2011-2012 and a total carbon content of coal (measured monthly) ranging between 20.21% to 34.10%

The above explanation signifies:

(i) an increase in baseline emissions of 3,459.84 tonnes CO₂ in 2011-2012 with respect to that in 2002-2003 (as provided in the registered PDD) which is attributed to an increase in net exported electricity to CSEB grid,

(ii) a decrease in project emissions by 1,712 tonnes CO₂ in 2011-2012 with respect to that in 2002-2003 (as provided in the registered PDD) which is attributed to a corresponding reduction in total carbon content of coal used.

This justifies an increase in emission reductions for the period 2011-2012 by 5,172 tonnes of CO₂ with respect to that projected in the registered PDD.

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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		