

**MONITORING REPORT FORM (CDM-MR)**
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**MONITORING REPORT**
Version No. 04 Date 18/02/2011**Rice Husk Based Power Project**
Reference No. 0186
Monitoring Period: 5th Monitoring Period
(01/04/2009-31/03/2010)-(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.

The power evacuation system was changed from 11/33 KV to 11/132 KV on 15th June 2010.

Subsequently, five new energy meters were added to the Power Generation and Evacuation System on 15th June 2010. However, since June 2010 falls beyond the Monitoring period, hence this change has not been considered for the said Monitoring Period.

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 went for a shutdown on 8th March 2010 till 29/04/2010. As on 19th October, 2010 when the site verification was carried out, the plant was in operation.

Monitoring Period:

The monitoring period is chosen from 01/04/2009 to 31/03/2010 (both days included).

Emission reductions achieved in the monitoring period – 28,595 t CO₂

A.2. Project Participants

Vandana Vidhyut Limited, Bilaspur, Raipur, Chattisgarh, 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

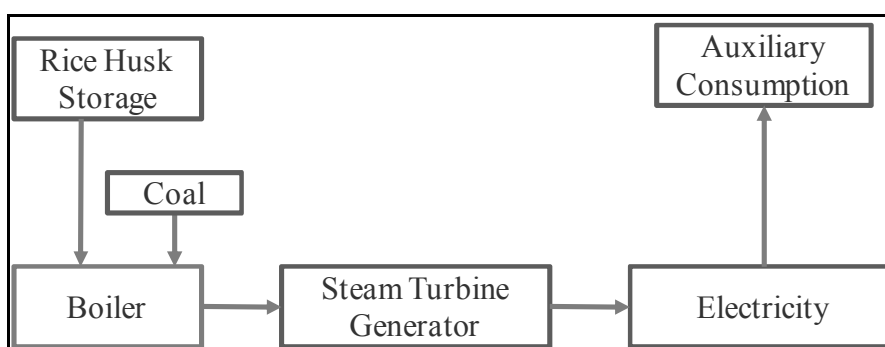
A.4. Technical description of the project
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The 7.7 MW power plant is based on Rankine Cycle. Rice husk is used as the primary fuel with provisions of co-firing coal. The steam generator is designed to operate on any combination of rice husk and coal 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:-



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 Baldua¹

Address - M/s Vandana Vidhyut Limited, Vandana Bhawan, M.G. Road, District- Raipur, PIN- 492001,
State- Chattishgarh, India

Tel: + 91 771-2535440/42077777

Fax: + 91 771- 4265491

E-mail: agm@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. 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

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



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 data recorded is presented to the higher management and if any discrepancies are found, then they are addressed immediately. The data is consolidated and a monthly report is generated. These reports are presented to the management during the review (audit meetings) and any errors are reported in the findings.

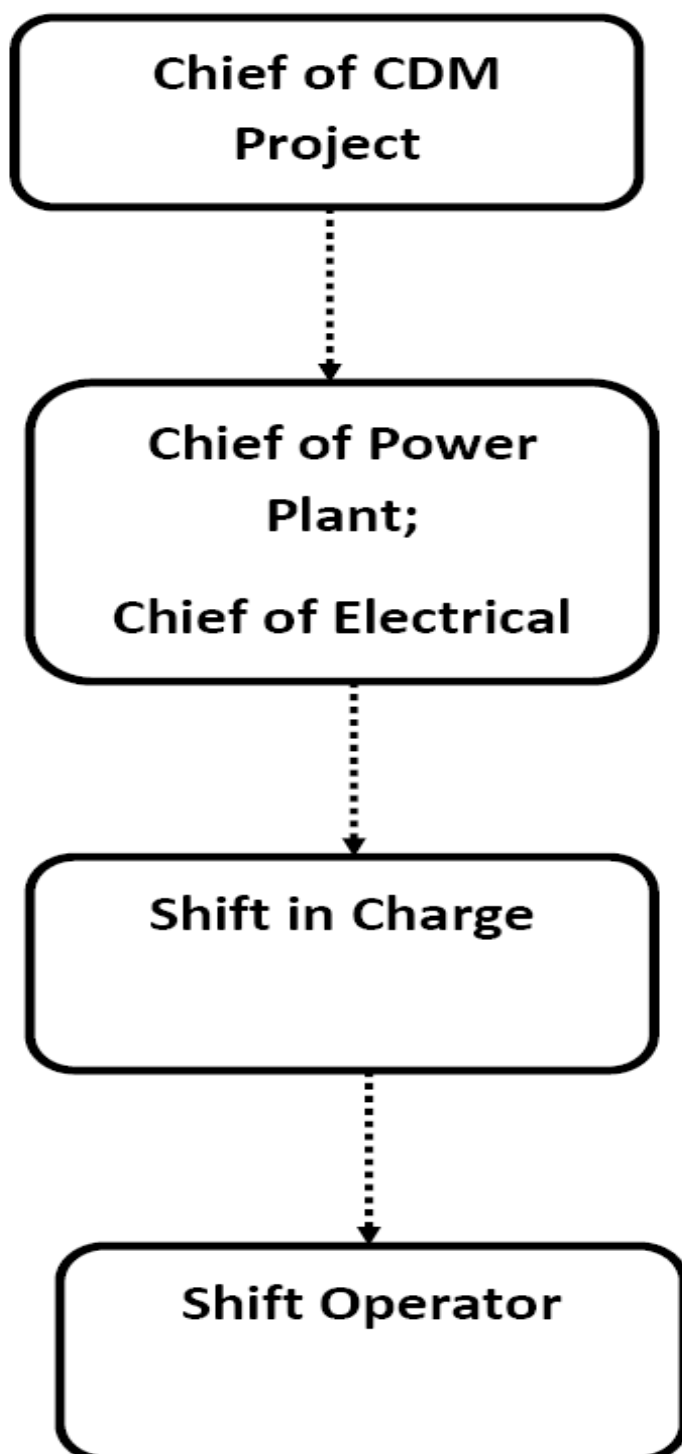
The project revenue is based on the units exported as measured by power meters at plant and main meter and check meters at the high-tension substation of the CSEB. The monitoring and verification system mainly comprises of these meters as far as power export is concerned. The rice husk and coal input 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:

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



The roles and responsibilities of each personnel is mentioned as given:

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:

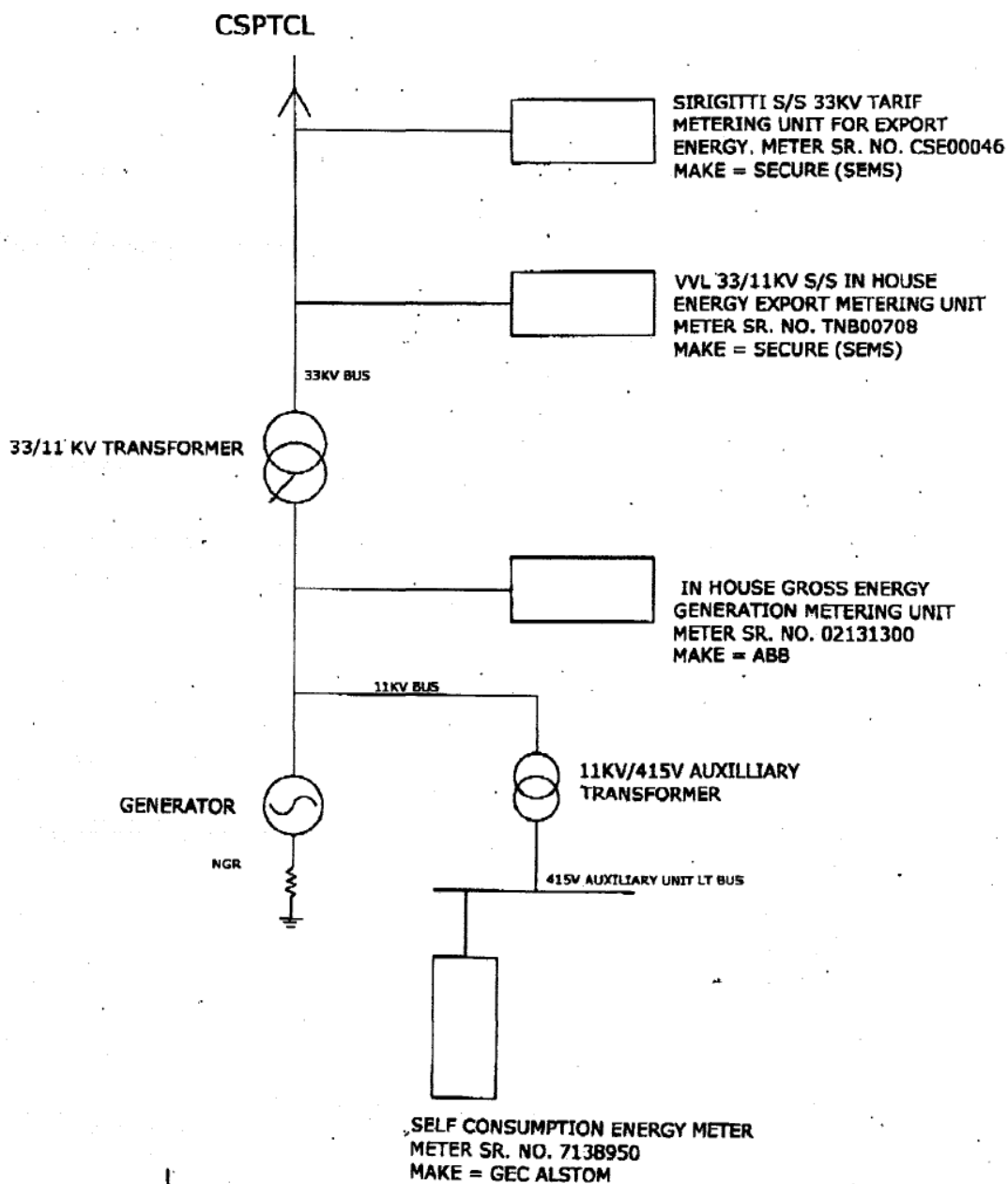
He is responsible for data collection and data reporting.

The internal audit is performed in each quarter. For the period 1st April 2009-31st March, 2010, internal audit was performed on four occasions. The respective dates are mentioned below.

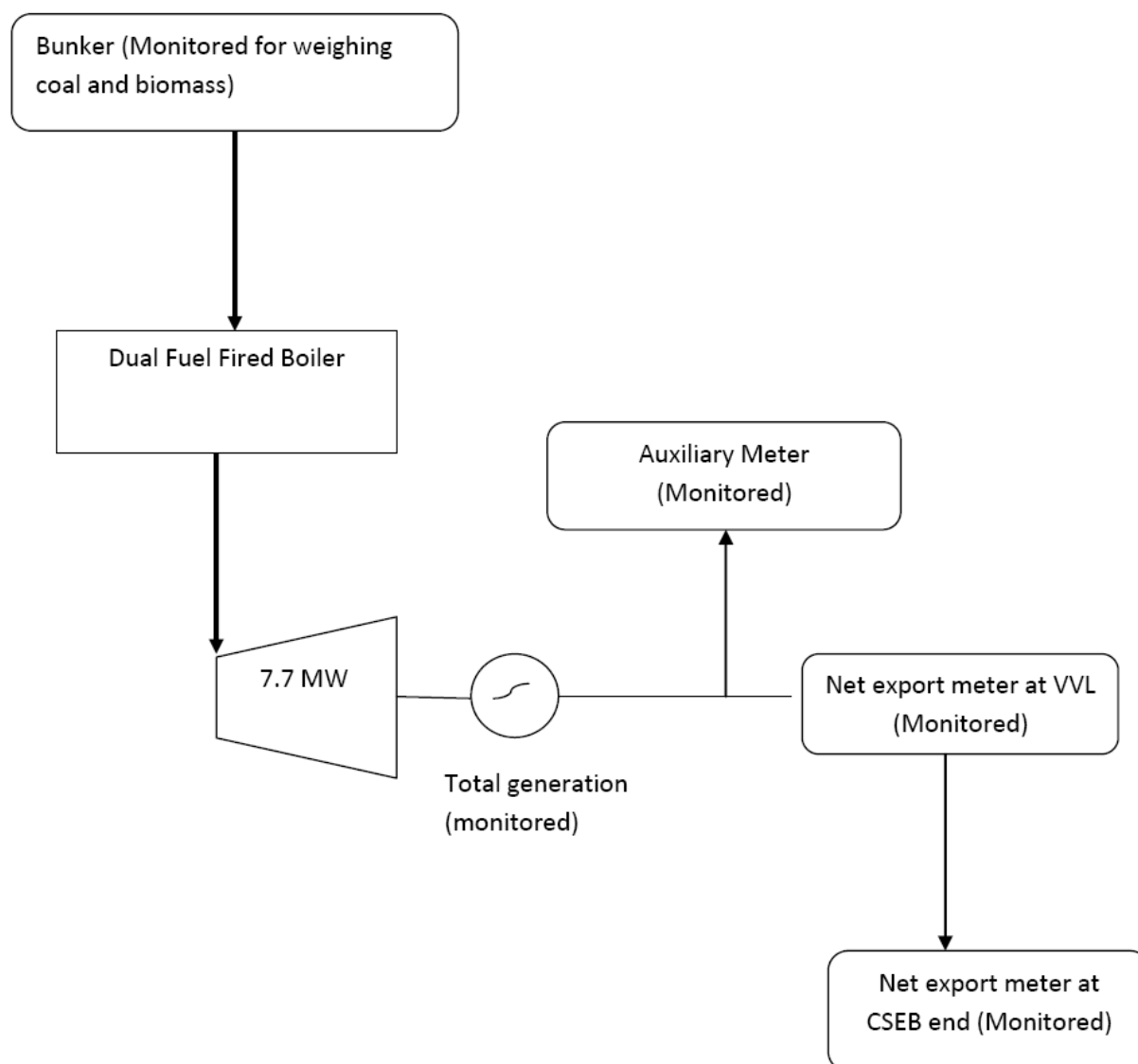
1. 10/06/2009 (Ref No. : Audit Report No. 1)
2. 08/10/2009(Ref No. : Audit Report No. 2)
3. 05/01/2010(Ref No. : Audit Report No. 3)
4. 06/04/2010 (Ref No. : Audit Report No.4)



Line Diagram of Vandana Vidhyut Limited is as shown below:



The diagram showing the entire set of monitoring points is as shown below:



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.1.1 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_v)
Data unit:	Kg CO₂/KWh
Description:	The same has been calculated as per the Guidance provided in the ACM0002 Version 02 at the start of the Crediting Period of the Project Activity.
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.2.1 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:	Please refer to emission reduction calculation sheet submitted to DOE.
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	-
Monitoring equipment (type, accuracy class, serial number, calibration)	Type: ABB P+ Accuracy class : +/- 0.5%



frequency, date of last calibration, validity)	SI No. –02131300 Calibration frequency : Once in a year Date of last calibration: 12/03/2010 by Yenkey Instruments and Controls Pvt. Ltd. Validity upto : 11/03/2011 Calibration details: Dated 24/03/2009 by Yenkey Instruments and Controls Pvt. Ltd. Dated 12/03/2010 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 on “GHG Performance Monitoring, Measurement and Reporting of Data” 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 also documented as ‘History’ in the daily report.

D.2.2 Data and parameters monitored				
Data / Parameter:	Power			
Data unit:	kWh			
Description:	Power Export as per CSEB statement			
Measured /Calculated /Default:	Measured			
Source of data:	Monthly HT Meter Reading Statements of Chhattisgarh State Power Distribution Company Ltd. (formed after reorganization of CSEB)			
Value(s) of monitored parameter:	Please refer to emission reduction calculation sheet submitted to DOE.			
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)	<div>The meter is maintained and sealed by CSPDCL. The calibration is done on a regular basis. The calibration dates are as follows. It can be verified from the Chhattisgarh State Power distribution Company Limited Monthly Meter reading Statements.</div> <table><tr><td>31/03/2009</td></tr><tr><td>30/04/2009</td></tr><tr><td>30/05/2009</td></tr></table>	31/03/2009	30/04/2009	30/05/2009
31/03/2009				
30/04/2009				
30/05/2009				



	30/06/2009	
	30/07/2009	
	31/08/2009	
	30/09/2009	
	31/10/2009	
	30/11/2009	
	31/12/2009	
	30/01/2010	
	27/02/2010	
	31/03/2010	
	Meter Serial No.: CSE 00046 Make: SEMS (Secure)	
Measuring/ Reading/ Recording frequency:	Measured continuously and recorded on monthly basis.	
Calculation method (if applicable):	Not Applicable.	
QA/QC procedures applied:	Since the meter is calibrated and sealed by CSPDCL, Government of Chhattisgarh, hence the accuracy of the meter is ensured. Vandana Vidhyut Limited (Project Proponent) has no control over the meter.	

D.2.3 Data and parameters monitored	
Data / Parameter:	Power
Data unit:	kWh
Description:	Auxiliary Consumption
Measured /Calculated /Default:	Measured
Source of data:	Monthly Performance Report
Value(s) of monitored parameter:	Please refer to emission reduction calculation sheet submitted to DOE.
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: GEC ALSTOM Accuracy class : +/- 1% Serial number : 7138950 Calibration frequency : Once in a year Date of last calibration: 23/03/2010 by Yenkey Instruments and Controls Pvt. Ltd. Validity upto: 22/03/2011 Calibration details: Dated 24/03/2009 by Yenkey Instruments and Controls Pvt. Ltd. Dated 23/03/2010 by Yenkey Instruments and Controls Pvt. Ltd. Calibration covers the entire Monitoring period.



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 on “GHG Performance Monitoring, Measurement and Reporting of Data” 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 also documented as ‘History’ in the daily report.

D.2.4 Data and parameters monitored	
Data / Parameter:	Power export
Data unit:	kWh
Description:	Power exported to grid (In House Export Meter)
Measured /Calculated /Default:	Measured
Source of data:	Plant Log Sheets
Value(s) of monitored parameter:	Please refer to emission reduction calculation sheet submitted to DOE.
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: SEMS Accuracy class : +/- 0.5% SI No. –TNB00708 Calibration frequency : Once in a year Date of last calibration: 23/03/2010 by Yenkey Instruments and Controls Pvt. Ltd. Validity upto: 22/03/2011 Calibration details: Dated 24/03/2009 by Yenkey Instruments and Controls Pvt. Ltd. Dated 23/03/2010 by Yenkey Instruments and Controls Pvt. Ltd. Calibration covers the entire Monitoring period.
Measuring/ Reading/ Recording frequency:	Measured continuously and recorded daily.
Calculation method (if applicable):	Not Applicable.
QA/QC procedures applied:	There is a defined procedure on “GHG Performance Monitoring,



	<p>Measurement and Reporting of Data” which ensures that proper corrective actions are undertaken immediately if any discrepancies are identified in the export figures (like inconsistencies in reported parameters).</p> <p>These discrepancies are also documented as ‘History’ in the daily report.</p>
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D.2.5 Data and parameters monitored	
Data / Parameter:	Fuel Quantity
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:	Please refer to emission reduction calculation sheet submitted to DOE.
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>Certification done by: Power Tech Engineers (Consulting Engineers)</p> <p>Date of last certification: 06/02/2010</p> <p>Validity: 05/02/2011</p> <p>Certificate No. : VVL-SK-16-10</p> <p>Accuracy class: N/A</p> <p>Certification was also done on 10/02/2009.</p>
Measuring/ Reading/ Recording frequency:	Recorded on a daily basis.
Calculation method (if applicable):	Not Applicable.
QA/QC procedures applied:	<p>The daily rice husk consumption figure, as reported in the "Rice Husk Stock Register" can also be cross-verified with the rice husk consumption figure of the "Details of daily Report". The annual rice husk consumption figure can also be cross-checked from the audited (by a third party statutory auditor) Balance Sheet of VVL.</p> <p>There is a defined procedure on “GHG Performance Monitoring, Measurement and Reporting of Data” which ensures that proper</p>



	corrective actions are undertaken immediately if any discrepancies are identified in the rice husk consumption data. These discrepancies are also documented as ‘History’ in the daily report.
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D.2.6 Data and parameters monitored	
Data / Parameter:	Fuel Quantity
Data unit:	Tonnes
Description:	Total quantity of coal consumption
Measured /Calculated /Default:	Measured
Source of data:	Coal Stock Register
Value(s) of monitored parameter:	Please refer to emission reduction calculation sheet submitted to DOE.
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:</p> <p>Certification done by: Power Tech Engineers (Consulting Engineers)</p> <p>Date of last certification: 06/02/2010</p> <p>Validity: 05/02/2011</p> <p>Certificate No. : VVL-SK-16-10</p> <p>Accuracy class: N/A</p> <p>Certification was also done on 10/02/2009.</p>
Measuring/ Reading/ Recording frequency:	Recorded on a daily basis.
Calculation method (if applicable):	Not Applicable.
QA/QC procedures applied:	The daily coal consumption figure, as reported in the "Coal Stock Register" can also be cross-verified with the coal consumption figure of the "Details of daily Report". The annual coal consumption figure can also be cross-checked from the audited (by a third party statutory auditor) Balance Sheet of VVL. There is a defined procedure on “GHG Performance Monitoring, Measurement and Reporting of Data” which ensures that proper corrective actions are undertaken immediately if any discrepancies are identified in the coal consumption data. These discrepancies are also documented as ‘History’ in the daily report.

D.2.7 Data and parameters monitored



Data / Parameter:	Fuel Quality
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:	Please refer to emission reduction calculation sheet submitted to DOE.
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 following the standard testing procedure which will ensure lower uncertainty level of the parameter.

D.2.8 Data and parameters monitored	
Data / Parameter:	Fuel Quality
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:	Please refer to emission reduction calculation sheet submitted to DOE.
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.



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).

D.2.9 Data and parameters monitored	
Data / Parameter:	Fuel Quality
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:	Please refer to emission reduction calculation sheet submitted to DOE.
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)	Bomb Calorimeter Type: Advance Research Instrument Corporation, New Delhi Model: BCM/21018 Date of last calibration: 10/06/2009 Calibration frequency: Once in a year Validity upto: 09/06/2010 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 11/06/2008
Measuring/ Reading/ Recording frequency:	Recorded on a monthly basis.
Calculation method (if applicable):	Not Applicable.
QA/QC procedures applied:	There is a defined procedure on “GHG Performance Monitoring, Measurement and Reporting of Data” which ensures that proper corrective actions are undertaken immediately if any observations in the calorific value of rice husk (like inconsistencies in reported parameters) are identified

D.2.10 Data and parameters monitored	
Data / Parameter:	Equipment / Operation specific
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:	Please refer to emission reduction calculation sheet submitted to DOE.
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:	Not Applicable.
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 on “GHG Performance Monitoring, Measurement and Reporting of Data” which ensures that proper corrective actions are undertaken immediately if any observations in the efficiency of power generation (like inconsistencies in computed parameters) are identified. These discrepancies are also documented as ‘History’ in the daily report.

D.2.11 Data and parameters monitored	
Data / Parameter:	Operation specific
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:	Please refer to emission reduction calculation sheet submitted to DOE.
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:	Not Applicable.
Calculation method (if applicable):	The parameter is computed following the standard methods of calculation.



	$[(\text{Quantity of rice husk} \times \text{GCV of rice husk}) + (\text{Quantity of coal} \times \text{GCV of coal})] / \text{Gross generation}$
QA/QC procedures applied:	There is a defined procedure on “GHG Performance Monitoring, Measurement and Reporting of Data” which ensures that proper corrective actions are undertaken immediately if any observations in the plant heat rate (like inconsistencies in computed parameters) are identified. These discrepancies are also documented as ‘History’ in the daily report.

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).

E.2. Project emissions calculation

Project Emissions = $[(44/12) * \text{Quantity of Coal consumed} * \text{Carbon content of coal}] \text{ tCO}_2$

E.3. Leakage calculation

Not Applicable.

E.4. Emission reductions calculation / table

Emission Reductions = (Baseline Emissions – Project Emissions) tCO₂



Monitored parameters for the period April 2009 - March 2010											
Parameters Month	Electrical Energy				Rice Husk		Coal			Plant Operational	
	Gross Generation	Auxiliary Consumption	Export to CSEB (As per the in-house Export Meter of SEMS)	Export to CSEB Grid (As per CSEB Statement)	Consumption	GCV	Consumption	GCV	Total Carbon	Plant Heat Rate	Efficiency of Power Generation
	(kWh)	(kWh)	(kWh)	(kWh)	(tonnes)	(kCal/kg)	(tonnes)	(kCal/kg)	(%)	(kCal/kWh)	(%)
01/04/09 to 30/04/09	5014100	519250	4508480	4494720	5285.805	3208	1152.811	2855	29.70	4038.24	21.30
01/05/09 to 31/05/09	5545400	575050	4827680	4816880	5871.216	3194	1281.507	2835	29.30	4036.81	21.30
01/06/09 to 30/06/09	5233100	553350	4776240	4756480	5515.755	3219	1202.960	2965	29.20	4074.45	21.11
01/07/09 to 31/07/09	4981000	556450	4410400	4396720	5311.660	3174	1142.511	3070	31.90	4088.88	21.03
01/08/09 to 31/08/09	5605000	570400	4972480	4957920	6018.750	3152	1299.378	2620	28.40	3992.06	21.54
01/09/09 to 30/09/09	4253000	424700	3829840	3814560	4486.650	3186	982.790	2745	30.20	3995.35	21.53
01/10/09 to 31/10/09	5585700	558000	5000240	4984640	5998.099	3011	1300.517	2450	26.30	3803.74	22.61
01/11/09 to 30/11/09	4911300	527000	4426640	4412400	5227.178	3245	1139.129	2990	28.10	4147.21	20.74
01/12/09 to 31/12/09	5335000	530100	4818640	4797840	5729.850	3233	1242.354	2305	25.60	4009.04	21.45
01/01/10 to 31/01/10	5526300	551800	4884560	4868080	8534.362	3236	1354.297	2550	27.90	5622.32	15.30
01/02/10 to 28/02/10	5382500	502200	4703600	4689840	7665.613	3261	1250.572	2805	31.30	5295.94	16.24
01/03/10 to 31/03/10	1608900	144150	1540400	1536560	2082.946	3269	353.308	2995	28.10	4889.87	17.59
Total	58981300	6012450	52699200	52526640	67727.884		13702.134				



Emission Reductions for the period April 2009 - March 2010							
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)	(tCO ₂ /MU)	(tCO ₂)	(tonnes)	(%)	(tCO ₂)	(tCO ₂)
01/04/09 to 30/04/09	4494720	820.00	3686	1152.811	29.70	1255	2430
01/05/09 to 31/05/09	4816880	820.00	3950	1281.507	29.30	1377	2573
01/06/09 to 30/06/09	4756480	820.00	3900	1202.960	29.20	1288	2612
01/07/09 to 31/07/09	4396720	820.00	3605	1142.511	31.90	1336	2269
01/08/09 to 31/08/09	4957920	820.00	4065	1299.378	28.40	1353	2712
01/09/09 to 30/09/09	3814560	820.00	3128	982.790	30.20	1088	2040
01/10/09 to 31/10/09	4984640	820.00	4087	1300.517	26.30	1254	2833
01/11/09 to 30/11/09	4412400	820.00	3618	1139.129	28.10	1174	2444
01/12/09 to 31/12/09	4797840	820.00	3934	1242.354	25.60	1166	2768
01/01/10 to 31/01/10	4868080	820.00	3992	1354.297	27.90	1385	2606
01/02/10 to 28/02/10	4689840	820.00	3846	1250.572	31.30	1435	2410
01/03/10 to 31/03/10	1536560	820.00	1260	353.308	28.10	364	896
Total	52526640		43072	13702.134		14477	28595

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 (tCO ₂ e)	21076.2	28595

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 2009-2010 are calculated based on



- Baseline emissions corresponding to a net exported electricity of 52.526 GWh to CSEB grid for the year 2009-2010. 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 52.526 GWh is within the capacity of generation of 7.7 MW, i.e. with nearly 330 days of operation during the year 2009-2010, 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.
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- Project emissions resulting from co-firing of 13702.134 tonnes of coal with rice husk in 2009-2010 and a total carbon content of coal (measured monthly) ranging between 25.60% to 31.90%

The above explanation signifies:

- (i) an increase in baseline emissions of 5850 tonnes CO₂ in 2009-2010 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 1669 tonnes CO₂ in 2009-2010 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 2009-2010 by 7519 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
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Decision Class: Regulatory Document Type: Guideline, Form Business Function: Issuance		