

MONITORING REPORT

(Version- 03)

DATE: 9th July 2010
(Fourth Monitoring Report)

“Rice Husk Based Power Project”

Reference No. UNFCCC 00000186

Date of Registration with UNFCCC – 9th February 2006.

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

Monitoring Period

1st April 2008 – 31st March 2009
(Both days included)

Project Site

Sirgitti Industrial Area of Bilaspur District, Chattisgarh State, India

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1. General Information

1.1 Project Activity

The project activity is a rice husk based power generation project with provisions to co-fire coal with rice husk and has been set up by Vandana Vidyut Limited. The total capacity of the power plant is 7.7MW. Entire power generated from the project activity is exported to the Chattisgarh State Electricity Board (CSEB) Grid after meeting the auxiliary consumption of the power plant equipment. The project has already been implemented.

1.2 Project Commissioning

Start date of commercial operation: 1st November 2001

(As per the “Investment Certificate” issued by Chattisgarh State Renewable Energy Development Agency)

The project was registered with UNFCCC on 9th of February, 2006. The project had two successful issuances for the periods from 01/04/2006 to 31/03/2007 and 01/04/2007 to 31/03/2008 respectively.

1.3 Monitoring Period

The monitoring period is chosen from 01/04/2008 to 31/03/2009 (both days included).

1.4 Monitoring Plan

The Monitoring and Verification (M&V) procedures define a project-specific standard against which the project's performance (i.e. GHG reductions) and conformance with all relevant criteria will be monitored and verified. It includes developing suitable data collection methods and data interpretation techniques for monitoring and verification of GHG emissions with specific focus on technical / efficiency / performance parameters. It also allows scope for review, scrutiny and benchmarking of all these information against reports pertaining to M & V protocols.

The M&V Protocol provides a range of data measurement, estimation and collection options/techniques in each case indicating preferred options consistent with good practices to allow project managers and operational staff, auditors, and verifiers to apply the most practical and cost effective measurement approaches to the project. 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

would be to direct and support continuous monitoring of project performance/key project indicators to determine project outcomes, greenhouse gas (GHG) emission reductions.

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 would mainly comprise of these meters as far as power export is concerned. The rice husk input is also to be monitored. The export of electricity will be through invoices to CSEB. The invoices, based on meter readings will also be covered in the regular finance audit. The measurement of the quantity of rice husk used will produce evidence to the quantity of energy generated with zero net CO₂ emissions. The CERs will be generated from the quantity of power generation from rice husk. The determination of quality and quantity of coal co-fired with rice husk will help us to determine the project emissions due to this in terms of mass CO₂.

The project employs Distributed Control System (DCS) type monitoring and control equipment that will measure, record, report, monitor and control various key parameters. Parameters monitored will be quantity and quality of rice husk fuel used, quantity and quality of coal used, total power generated, power exported to the grid, etc.(details enclosed in the tables given below). These monitoring and controls will be the part of the DCS of the entire plant. All monitoring and control functions will be done as per the internally accepted standards and norms of VVL. The instrumentation system for the project will mostly comprise microprocessor-based instruments of reputed make with desired level of accuracy. All instruments will be calibrated and marked at regular intervals so that the accuracy of measurement can be ensured all the time. The quantity of emission reduction claimed by the project will only be a fraction of the total generated emission of the grid, which depends on the actual generation mix of the grid in a particular year.

Data needed to calculate the emission factor of the CSEB grid are based on information available from authorized government agencies - Central Electricity Authority (www.cea.nic.in), Western Regional Electricity Board (www.wreb.gov.in) - a subsidiary of CEA and the Chattisgarh State Electricity Board (www.cseb-powerhub.com) sources. The government authorised agencies monitor power generated and supplied to state grid. The grid mix scenario through the entire crediting period will be based on records and reports with CEA and CSEB. CEA and CSEB monitor the performance of all power generation unit connected to the CSEB grid under their own monitoring schedule monthly/ annually. The state grid transmission and distribution network includes monitoring and control facilities at

each generation unit level, as well as voltage, substation and consumer level. The power records from the State Grid contain all information related to sources and origin of generation like thermal, hydro and renewable energy sources, installed and de-rated capacity, performance of generating unit like actual and expected generation, and planned capacity additions during the year, etc. Hence, the transparency of measurements, recording, monitoring and control of the generation mix of the State Grid is ensured all the time. These records can be used for verification of generation mix and emission factor (EF) for baseline calculation for a particular year.

1.5 Monitoring Protocol

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

Please refer to the following table for a detail description on the Monitoring Protocol:

Serial No.	Parameters	Monitoring Equipment	Monitoring Record(s)	Uncertainty Analysis
Parameters required to be monitored for the computation of Emission Reductions				
1.4.1	Power export	The CSEB Main Meter (MM) readings are used to determine the net export quantity. Under circumstances wherein the Main Meter is not functional, the CSEB Check Meter (CM) readings are used to determine the same.	CSEB- HT Meter Reading Statement	<p>1. These meters are maintained and calibrated by CSEB. All these meters are sealed by CSEB. Furthermore, the accuracy of the Main Meter readings is substantiated by the Check Meter readings.</p> <p>2. The parameter can also be cross-checked with the measured values of the net export, monitored by the In-house Export Meter. The In-house Export Meter (or the Static Meter) is a micro-processor based metering device supplied by Secure Meter Limited (SEMS).</p> <p>3. Any discrepancies in the Main Meter reading (for example, difference between Main Meter and Check Meter readings or extreme deviation in the net export figure from that reported by the In-house Export Meter of VVL), if identified, will immediately be brought to the notice of CSEB. CSEB will ensure the corrective actions to be undertaken at their earliest.</p> <p>4. Calibration of Monitoring Equipment a) CSEB HT Meter - Maintained and calibrated by CSEB. All these meters are sealed by CSEB on a regular basis. b) In-house Export Meter (SEMS) - Calibrated once in a year by Yenkey Instruments And Controls Pvt. Ltd. Sl. No. - TNB00708 Certificate No:-YB/VVL/07-08/EM-01 dtd 24/03/2008 & YB/VVL/2008-09/M-06 dtd 24/03/2009.</p>

Serial No.	Parameters	Monitoring Equipment	Monitoring Record(s)	Uncertainty Analysis
Parameters required to be monitored for the computation of Emission Reductions				
1.4.2	Total quantity of coal consumption	The quantity of coal consumed is monitored by scaling of 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.	Coal Stock Register	<p>1. The scaling of bunker was carried out by VVL which was certified by Power Tech Engineers (Consulting Engineers).</p> <p>2. 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".</p> <p>3. The annual coal consumption figure can also be cross-checked from the audited (by a third party statutory auditor) Balance Sheet of VVL.</p> <p>4. 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.</p> <p>5. Bunker Capacity Certificate- Certified by Power Tech Engineers (Consulting Engineers on 10/02/2009. Certified on a yearly basis . Sl. No. - MS/PTE/09/23</p>
1.4.3	Carbon content in coal	-	Coal Analysis Reports of National Accredited Laboratory	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.

Serial No.	Parameters	Monitoring Equipment	Monitoring Record(s)	Uncertainty Analysis
Supplementary parameters required to be monitored for checking the operational performance of the power plant				
1.4.4	Total electricity generated	In-house Generation Meter	Monthly Performance Report	<p>1. The In-house Generation Meter (or the Energy Meter) is a micro-processor based metering device which is supplied by ABB. It is calibrated by a third party on a regular basis.</p> <p>2. The In-house Export Meter (or the Static Meter) is a micro-processor based metering device which is supplied by Secure Meter Limited (SEMS). This is calibrated as per the manufacturer's calibration schedule.</p>
1.4.5	Auxiliary consumption	Auxiliary Meter		<p>3. The Auxiliary meter is a micro-processor based metering device which is supplied by GEC ALSTOM. This is calibrated as per VVL's calibration schedule.</p> <p>4. The monthly generation, consumption and export figures, as reported in the "Monthly Performance Report" can also be cross-verified with the corresponding figures as reported in the "Details of daily Report".</p> <p>5. The annual generation, consumption and export figures can also be cross-checked from the audited (by a third party statutory auditor) Balance Sheet of VVL.</p> <p>6. 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 generation, consumption and export figures (like inconsistencies in reported parameters) and/or discrepancies in the operation of the power plant.</p>

				<p>These discrepancies are also documented as 'History' in the daily report.</p> <p>7. Calibration of Monitoring Equipment</p> <p>a) In-house Generation Meter (ABB) - Calibrated once in a year by Yenkey Instruments And Controls Pvt. Ltd. Sl. No-02131300 Certificate Nos:-YB/VVL/07-08/EM-02 dated 24/03/2008 and YB/VVL/2008-09/M-07 dated 24/03/2009.</p> <p>b) In-house Export Meter (SEMS) - Calibrated once in a year by Yenkey Instruments And Controls Pvt. Ltd. Sl. No. - TNB00708 Certificate Nos:-YB/VVL/07-08/EM-01 dated 24/03/2008 and YB/VVL/2008-09/M-06 dated 24/03/2009.</p> <p>c) Auxiliary Meter (GEC ALSTOM) - Calibrated once in a year by Yenkey Instruments And Controls Pvt. Ltd. Sl. No-7138950 Certificate Nos:-YB/VVL/07-08/EM-03 dated 24/03/2008 and YB/VVL/2008-09/EM-04 dated 24/03/2009.</p>
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Serial No.	Parameters	Monitoring Equipment	Monitoring Record(s)	Uncertainty Analysis
Supplementary parameters required to be monitored for checking the operational performance of the power plant				
1.4.6	Total quantity of rice husk consumption	The quantity of rice husk consumed is monitored by scaling of 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.	Rice Husk Stock Register	<p>1. The scaling of bunker was carried out by VVL which was certified by Power Tech Engineers(Consulting Engineers)</p> <p>2. 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".</p> <p>3. 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>4. 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 rice husk consumption data. These discrepancies are also documented as 'History' in the daily report.</p> <p>5. Bunker Capacity Certificate-Certified by Power Tech Engineers (Consulting Engineers on 10/02/2009. Certified on a yearly basis . Sl. No. - MS/PTE/09/23</p>
1.4.7	Calorific value of coal used	-	Reports of National Accredited Laboratory	<p>1.The calorific value of coal is tested by an external Laboratory, which is a National Accredited Laboratory (Central Fuel Research Institute, Bilaspur Unit).</p> <p>2. 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 calorific value data of coal. These</p>

				discrepancies are also documented as 'History' in the daily report.
1.4.8	Calorific value of rice husk used	Bomb Calorimeter	Lab Analysis Report	<p>1. 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.</p> <p>2. The Bomb Calorimeter is calibrated once in every year following the standard procedure for calibration.</p> <p>3. 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.</p>

Serial No.	Parameters	Monitoring Equipment	Monitoring Record(s)	Uncertainty Analysis
Supplementary parameters required to be monitored for checking the operational performance of the power plant				
1.4.9	Plant Heat Rate	Computed	Computation Sheet	1. The parameters are computed following the standard methods of calculation.
1.4.10	Efficiency of power generation activity			2. 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 or efficiency of power generation (like inconsistencies in computed parameters) are identified. These discrepancies are also documented as ‘History’ in the daily report.
1.4.11	Internal Audit Report	The date and period of observation for internal audit reporting is mentioned in the table below:-		
		Internal Audit Report Date		Period of Observation
		11 th July 2008		1.04.2008 to 30.06.2008
		7 th October 2008		1.06.2008 to 30.09.2008
		7 th January 2009		1.10.2008 to 31.12.2008
		9 th April 2009		01.01.2009 to 31.03.2009

2. Monitored Results

Monitored parameters for the period April 2008 - March 2009											
Parameters Month	Electrical Energy				Rice Husk		Coal			Plant Operational Parameter	
	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)	(%)
Apr-08	4970600	516150	4421920	4679520	5268.836	2842	1540.886	2895	31.40	3909.97	22.00
May-08	4968400	523900	4417760	4331200	5326.125	2710	1540.204	2730	29.80	3751.42	22.92
Jun-08	5127200	469650	4654560	4653280	5490.384	3044	1595.805	2040	23.10	3894.56	22.08
Jul-08	5703700	599850	5075680	4982400	6114.363	2906	1842.300	2595	29.40	3953.42	21.75
Aug-08	5561500	567300	4967850	4788080	5967.491	2890	1807.496	2310	27.30	3851.72	22.33
Sep-08	5374500	537850	4806560	4993600	5815.207	2916	1762.838	2755	29.10	4058.75	21.19
Oct-08	5472400	582800	4883400	4837360	5746.020	3020	1756.637	2870	31.90	4092.27	21.02
Nov-08	5327100	565750	4758250	4575680	5540.184	2984	1534.208	2435	24.70	3804.64	22.60
Dec-08	5331400	548700	4761986	4896960	5491.548	3062	1540.832	2335	25.70	3828.82	22.46
Jan-09	5797400	598300	5172750	5144800	5909.268	2858	1297.727	2020	22.60	3365.32	25.55
Feb-09	5231200	527000	4696960	4695840	5440.448	3016	1192.721	2705	28.40	3753.38	22.91
Mar-09	5777500	607600	5157120	5107200	5893.050	2898	1311.486	1935	21.80	3395.20	25.33
Total	64642900	6644850	57774796	57685920	68002.924		18723.140				

According to the Monitoring Plan of the Registered PDD, the Emission Reduction is calculated based on the electricity exported to the grid as per the CSEB Statement. The gross generation, auxiliary consumption and export to CSEB (as per in-house export meter of SEMS) has been recorded for monitoring purpose only as per the Monitoring Plan of the Registered PDD.

3. Computation of Emission Reductions

The emission reduction figures have been calculated based on the following equations:

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

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

Emission Reductions = (Baseline Emissions – Project Emissions) tCO₂

Note: 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).

Emission Reductions for the period April 2008 - March 2009							
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)
Apr-08	4679520	820.00	3837	1540.886	31.40	1774	2063
May-08	4331200	820.00	3552	1540.204	29.80	1683	1869
Jun-08	4653280	820.00	3816	1595.805	23.10	1352	2464
Jul-08	4982400	820.00	4086	1842.300	29.40	1986	2100
Aug-08	4788080	820.00	3926	1807.496	27.30	1809	2117
Sep-08	4993600	820.00	4095	1762.838	29.10	1881	2214
Oct-08	4837360	820.00	3967	1756.637	31.90	2055	1912
Nov-08	4575680	820.00	3752	1534.208	24.70	1389	2363
Dec-08	4896960	820.00	4016	1540.832	25.70	1452	2564
Jan-09	5144800	820.00	4219	1297.727	22.60	1075	3143
Feb-09	4695840	820.00	3851	1192.721	28.40	1242	2609
Mar-09	5107200	820.00	4188	1311.486	21.80	1048	3140
Total	57685920		47302	18723.140		18747	28556
Total Emission Reduction							28555

4. Summary of the Annual Emission Reductions

Year	Emission Reductions (tCO₂)	Emission Reduction as in Registered PDD (tCO₂)
April 2008 – March 2009	28555	21076.2
Total Emission Reductions	28555	

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 2008-2009 are calculated based on

- Baseline emissions corresponding to a net exported electricity of 57.686 GWh to CSEB grid for the year 2008-2009
- Project emissions resulting from co-firing of 18723.140 tonnes of coal with rice husk in 2008-2009 and a total carbon content of coal (measured monthly) ranging between 21.80% to 31.90%

The above explanation signifies:

- (i) an increase in baseline emissions of 10080 tonnes CO₂ in 2008-2009 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 marginal increase in project emissions of 2601 tonnes CO₂ in 2008-2009 with respect to that in 2002-2003 (as provided in the registered PDD) which is attributed to an increase in coal consumption but a corresponding reduction in total carbon content of coal used.

This justifies an increase in emission reductions for the period 2008-2009 by 7479 tonnes of CO₂ with respect to that projected in the registered PDD.