

MONITORING REPORT
(Version- 01)
DATE: 27th May, 2010

9.8 MW Renewable Energy Generation for the grid at South Asian Agro Industries Limited in Raipur District, Chhattisgarh

Reference No. UNFCCC 1175
Methodology: AMS I.D
Version 10

Monitoring Period
01/02/2008 – 31/12/2009

Project Site
Raipur District, Chattisgarh, India

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1. General Information

1.1 Project Activity

The project activity is a biomass based power generation project with provisions to co-fire coal with biomass. As per the Registered PDD, the project activity could have used all types of renewable biomass residues generated in the region such as Paddy straw, wheat straw, maize stalk, Chana straw, tuwar stalk, rice husk etc. However for the monitoring period, the only biomass which has been used by the project activity to generate power is rice husk. The total capacity of the power plant is 9.8 MW. The project activity generates electricity which is exported to the Chhattisgarh State Electricity Board (CSEB) Grid after meeting the auxiliary consumption of the power plant equipment.

The Project got registered with UNFCCC as CDM project on 01st February 2008. As per the registered Project Design Document, the start date of the crediting period for the project activity under consideration is 01st February 2008. However the plant started commercial operation from 29th November 2008 and the data/parameters were monitored from 01st January 2009 onwards. Therefore although the monitoring period for first verification is chosen from 01/02/2008 to 31/12/2009 (both days included), actual monitoring has been done and emission reductions have been claimed for the period 01/01/2009 to 31/12/2009 (both days included). During this period the project activity has exported 48307400 kWh of electricity and used 59474.75 MT of biomass.

1.2 Project Commissioning

Start date of commercial operation: 29.11.2008

1.3 Monitoring Period

The monitoring period is chosen from 01/02/2008 to 31/12/2009 (both days included).

1.4 Monitoring Protocol

The monitoring protocol requires the following parameters to be monitored for the computation of emission reductions:

Parameters monitored for computation of Baseline Emissions

- Net power export
- Grid emission factor

Parameters monitored for computation of emission reductions:-

- Quantity of fossil fuel (coal) combusted to supplement the biomass residues in the project activity
- Net calorific value of the fossil fuel (coal)

- CO₂ emission factor of the fuel (coal)
- Oxidation factor of the fuel (coal)

Parameters monitored for computation of Leakage Emissions

- Surplus biomass availability (for estimation of leakage)

As per the monitoring plan in the Registered PDD, biomass assessment survey has been carried out for the monitoring period. From the study, it is evident that there is no leakage associated due to biomass usage in the project activity.

- Diesel used: No diesel has been procured during the monitoring period for usage for the project activity.

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

- Gross generation
- Auxiliary consumption
- Quantity of biomass used
- NCV of biomass used

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

Serial No.	Parameters	Monitoring Equipment	Monitoring Record(s)	Uncertainty Analysis
1.4.1.	Gross Generation	The gross electricity generation will be recorded at the project site by an Energy meter	Plant log sheets/DCS	The Gross Generation Energy meter is calibrated and regularly inspected by CSEB.
1.4.2	Auxiliary consumption	The auxiliary consumption will be recorded at the project site by an Energy meter	Plant log sheets/DCS	The Auxiliary consumption Energy meter is calibrated and regularly inspected by CSEB.
1.4.3	Power Import	The power import will be recorded at the project site by an Energy meter at the project site	Plant log sheets/ CSEB meter reading statement/ invoice	The power import Energy meter is calibrated and regularly inspected by CSEB. The parameter may be cross checked with the power import values as recorded in CSEB statements.

1.4.4	Power Export	The power export will be recorded at the grid substation, which is under the control of CSEB	Plant log sheets/ CSEB meter reading statement / invoice	The power export will be recorded at the grid substation, which is under the control of CSEB. The values may be cross checked from CSEB bills receipts. The CSEB readings are taken within the +/- 2 days of the last day of the month.
1.4.5	Total quantity of biomass used	The quantity of biomass consumed is measured by a weigh bridge meter	Plant log sheets / biomass purchase invoices	The weigh bridge meter will be calibrated by the project proponent as per the industrial standards of India. Fuel purchase records can be used for verification of each category of biomass purchased.
1.4.6	Total quantity of fossil fuels (coal) used	The quantity of fossil fuels (coal) consumed is measured by a weigh bridge meter	Plant log sheets /coal purchase invoice	The weigh bridge meter will be calibrated by the project proponent as per the industrial standards of India. Fuel purchase records can be used for verification of fossil fuel (coal) purchased.
1.4.7	NCV of Biomass used	The calorific value of the biomass sample will be found from tests conducted at reputed laboratories once in three months	Records of external laboratory	Testing the NCV of biomass sample at reputed laboratories will ensure accuracy of the NCV value.

1.4.8	NCV of coal used in the plant	The NCV of coal will be obtained from suppliers if available. Otherwise the calorific value of the biomass sample will be found from tests conducted at reputed laboratories for every batch	Suppliers' records or Records of external laboratory	The NCV value provided by the supplier or by testing the coal sample at reputed laboratories will ensure accuracy of the same.
1.4.9	Grid Emission Factor	The grid emission factor (for the Western Grid (which is a part of the NEWNE grid) is taken from the latest database published by CEA, Govt of India.	Available publicly at http://www.cea.nic.in/planning/c%20and%20e/Government%20of%20India%20website.htm	Since the values used to calculate Grid Emission Factor is taken from the CEA database Version 5.0, the authenticity of the data is guaranteed.
1.4.10	CO ₂ Emission factor and oxidation factor of coal	The CO ₂ emission factor and oxidation factor of coal has been taken from IPCC 2006 guidelines.	IPCC 2006 guidelines, Volume 2, Chapter 2	Since the values are taken from the IPCC database (which is internationally accepted), the authenticity of the data is guaranteed.

Meter & Meter Calibration details of the monitoring equipments

Parameter 1.4.1 Gross generation	
Parameter	Description
Measured, Calculated, Estimated	Measured
Source of Data	Plant log sheets
Monitoring Equipment	An in-house energy meter
Specification of Monitoring Equipment	<u>Make:</u> SEMS <u>Sl. No.:</u> CSE37896 <u>Type:</u> 3 Ph. 4 Wire meter <u>Date of last calibration:</u> 12.12.2008 <u>Calibrating house:</u> CSEB <u>Calibration schedule:</u> Periodically done by CSEB
Calibration of Monitoring Equipment	The meter is calibrated and maintained by CSEB (third party)
Accuracy of Monitoring Equipment	0.5s
Uncertainty of Data	Low
Justification	The uncertainty of data is low. This is ensured through calibration of the metering system by the CSEB. Discrepancies, if identified, are addressed immediately and proper preventive measures are undertaken.

Parameter 1.4.2: Auxiliary consumption	
Parameter	Description
Measured, Calculated, Estimated	Measured
Source of Data	Plant log sheets
Monitoring Equipment	An in-house energy meter

Specification of Monitoring Equipment	<u>Make:</u> SEMS <u>Sl. No.:</u> CSE37896 <u>Type:</u> 3 phase 4wire meter <u>Date of last calibration:</u> 12.12.2008 <u>Calibrating house:</u> CSEB <u>Calibration schedule:</u> Periodically done by CSEB
Calibration of Monitoring Equipment	The main meter is calibrated and maintained by CSEB (third party)
Accuracy of Monitoring Equipment	0.5s
Uncertainty of Data	Low
Justification	The uncertainty of data is low. This is ensured through calibration of the metering system by the CSEB. Discrepancies, if identified, are addressed immediately and proper preventive measures are undertaken.

Parameter 1.4.3: Power Import	
Parameter	Description
Measured, Calculated, Estimated	Measured
Source of Data	Plant log sheets
Monitoring Equipment	An in-house energy meter
Specification of Monitoring Equipment	<u>Make:</u> SEMS <u>Sl. No.:</u> CSE37896 <u>Type:</u> 3 phase 4 wire meter <u>Date of last calibration:</u> 12.12.2008 <u>Calibrating house:</u> CSEB <u>Calibration schedule:</u> Periodically done by CSEB
Calibration of Monitoring Equipment	The main meter is calibrated and maintained by CSEB (third party)
Accuracy of Monitoring Equipment	0.5s
Uncertainty of Data	Low
Justification	The uncertainty of data is low. This is ensured through calibration of the metering system by the CSEB. Discrepancies, if identified, are addressed immediately and

	proper preventive measures are undertaken.
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Parameter 1.4.4: Net Power Export	
Parameter	Description
Measured, Calculated, Estimated	Measured
Source of Data	CSEB meter reading statements
Monitoring Equipment	A meter present at the substation under the control of the CSEB
Specification of Monitoring Equipment	<u>Make:</u> SEMS <u>Sl. No.:</u> CSE37885 <u>Type:</u> 3 Phase 4 wire meter <u>Date of last calibration:</u> 12.12.2008 <u>Calibrating house:</u> CSEB <u>Calibration schedule:</u> Periodically done by CSEB
Calibration of Monitoring Equipment	The main meter is calibrated and maintained by CSEB (third party)
Accuracy of Monitoring Equipment	0.5s
Uncertainty of Data	Low
Justification	The uncertainty of data is low. This is ensured through calibration of the metering system by the CSEB. Discrepancies, if identified, are addressed immediately and proper preventive measures are undertaken.

Parameters 1.4.5 and 1.4.6: Total quantity of biomass and total quantity of fossil fuels (coal) used	
Parameter	Description
Measured, Calculated, Estimated	Measured
Source of Data	Plant log sheets
Monitoring Equipment	A weigh bridge meter present at the plant site

Specification of Monitoring Equipment	<u>Rating:-</u> Maximum capacity-60000 kg and minimum capacity-200 kg <u>Model No. :</u> SN60/163 <u>Sl. No. :</u> 8062 <u>Date of last calibration:</u> 26.06.2009 <u>Calibrating house:</u> Weights & Measurements division, Govt of India <u>Calibration schedule:</u> Periodically <u>Accuracy Class:</u> +/-200 kg
Calibration of Monitoring Equipment	The calibration is done on a periodic basis by a third party.
Uncertainty of Data	Low
Justification	The uncertainty of data is low. This is ensured through periodic calibration of the corresponding weigh bridges. Also, these values are crosschecked with the data given in the invoices to ensure consistency and proper monitoring of the data

2. Monitored Results

According to the Monitoring Plan of the registered PDD, the Emission Reduction is calculated based on the net electricity exported to the grid on the basis of the meter reading statement.

Parameters	Monitored parameters for the period									
	Electrical Energy						Biomass		Coal	
	Gross Generation	Auxiliary Consumption	Power Import (As per the in-house Energy Meter)	Power Import (As per CSEB statement)	Power Export to CSEB Grid (As per in-house meter)	Export to CSEB Grid (As per CSEB Statement)	Quantity used	NCV	Quantity used	NCV
Month	kWh	kWh	kWh	kWh	kWh	kWh	MT	kCal/kg	MT	kCal/kg
Jan-09	4325000	435100	30800	31000	3889900	3770200	4383.940	2635	496.380	2751
Feb-09	4483000	412234	29800	29800	4070766	3920200	4546.650	2825	514.580	2678
Mar-09	4211000	385898	38000	38000	3825102	3678600	4136.890	2837	482.800	2784
Apr-09	5586000	521997	29200	29200	5064003	4840400	5632.670	2746	577.040	2643
May-09	6013000	587072	29600	29600	5425928	5211200	6313.260	2743	697.640	2780
Jun-09	5719000	560267	38200	38200	5158733	4951000	6000.410	2845	729.720	2652
Jul-09	4715000	520673	54600	54600	4194327	4046800	5383.200	2866	672.280	2696
Aug-09	4201000	448500	37000	37000	3752500	3615200	4806.240	3100	661.850	3320
Sep-09	4123000	434808	34800	34400	3688192	3548000	4789.310	3055	660.040	1775
Oct-09	3283000	334281	33400	33800	2948719	2839800	3383.420	3005	519.250	1905
Nov-09	3644000	349065	25400	25400	3294935	3177200	4056.430	2938	484.120	3110
Dec-09	5415000	532729	17800	18000	4882271	4708800	6042.330	2998	743.900	2560
Total	55718000	5522624	398600	399000	50195376	48307400	59474.75		7239.6	

3. Computation of Emission Reductions

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

Baseline Emissions = (Grid Emission Factor * Net Power Export) tCO₂

Project Emissions = (Quantity of coal combusted * net calorific value of coal * CO₂ emission factor of coal * oxidation factor of fuel) tCO₂

Emission Reductions = (Baseline Emissions-Project Emissions) tCO₂

Parameters Months	Emission Reductions for the period								
	Baseline Emissions			Project Emissions					Emission Reductions
	Net Power Export	Grid Emission Factor	Baseline Emissions	Coal used	NCV of Coal	Emission Factor of coal	Oxidation Factor of coal	Project Emissions	
	kWh	tCO ₂ /MWh	tCO ₂	MT	kCal/kg	tCO ₂ /TJ		tCO ₂	tCO ₂
Jan-09	3739200	0.86	3216	496.380	2751	95.81	1	548	2668
Feb-09	3890400	0.86	3346	514.580	2678	95.81	1	553	2793
Mar-09	3640600	0.86	3131	482.800	2784	95.81	1	539	2592
Apr-09	4811200	0.86	4138	577.040	2643	95.81	1	612	3526
May-09	5181600	0.86	4456	697.640	2780	95.81	1	778	3678
Jun-09	4912800	0.86	4225	729.720	2652	95.81	1	776	3449
Jul-09	3992200	0.86	3433	672.280	2696	95.81	1	727	2706
Aug-09	3578200	0.86	3077	661.850	3320	95.81	1	881	2196
Sep-09	3513600	0.86	3022	660.040	1775	95.81	1	470	2552
Oct-09	2806000	0.86	2413	519.250	1905	95.81	1	397	2016
Nov-09	3151800	0.86	2711	484.120	3110	95.81	1	604	2107
Dec-09	4690800	0.86	4034	743.900	2560	95.81	1	764	3270
Total	47908400		41201	7239.600				7647	33554

4. Summary of the Emission Reductions

As per the PDD, 36,867 tCO₂ per annum is expected to reduce from the project activity. Actual emission reduction during the monitoring period has been less (by about 52.5%) (than that mentioned in the Registered PDD as the plant commenced operation only in January 2009 and was not operational for the period February 2008 to December 2008). However, the annual emission reduction for the year 2009 has been less by about 9%.

Year	Emission Reductions (tCO ₂)
1st February, 2008 to 31 st December, 2009	33554
Total Emission Reductions	33554