

**MONITORING REPORT FORM (CDM-MR)**
Version 01; 01/10/2010**CONTENTS**

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**MONITORING REPORT**

Version 01; 01/10/2010

**SRI BALAJI 6 MW NON-CONVENTIONAL RENEWABLE SOURCES BIOMASS
POWER PROJECT**

Reference number: 0362

Fifth Monitoring Report: 25.09.2009 to 24.09.2010 (first and last days included)

SECTION A. General Description of the project activity**A.1. Brief description of the project activity: >>**

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The purpose of the project activity is to utilize the abundantly available biomass fuels in the region effectively for generation of clean power. The entire generated clean and green power will be exported to the power deficit state grid for sustainable economic growth, conservation of environment through use of biomass fuels and for Green House Gas (GHG) emission reduction.

The project activity is 6 MW capacity grid-connected biomass based renewable energy power plant with high-pressure steam turbine configuration. The power plant has one condensing steam turbo generator unit with a matching boiler with Travelling Grate type technology capable of firing multi fuels. The boiler is sized to produce a maximum of 33 tons per hour of steam. The steam conditions at the super heater outlet are at a pressure of 67 kg/cm² and temperature of 480 °C \pm 10 °C.

Project was commissioned on 14.04.2004.

Total emission reductions for the monitoring period accounts to 34,155 tCO₂e

A.2. Project Participants

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Name of Party involved (*) ((host) indicates a host Party)	Private and/or public entity(ies) project participants (*) (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
India (Host)	Sri Balaji Biomass Power (P) Limited. (Private entity, Project developer)	No

A.3. Location of the project activity:

Village : Chennur
Mandal : Chennur



District : Kadapa
State : Andhra Pradesh
Country : India
GPS Coordinates: 14°34'13" N and 78°47'23" E.

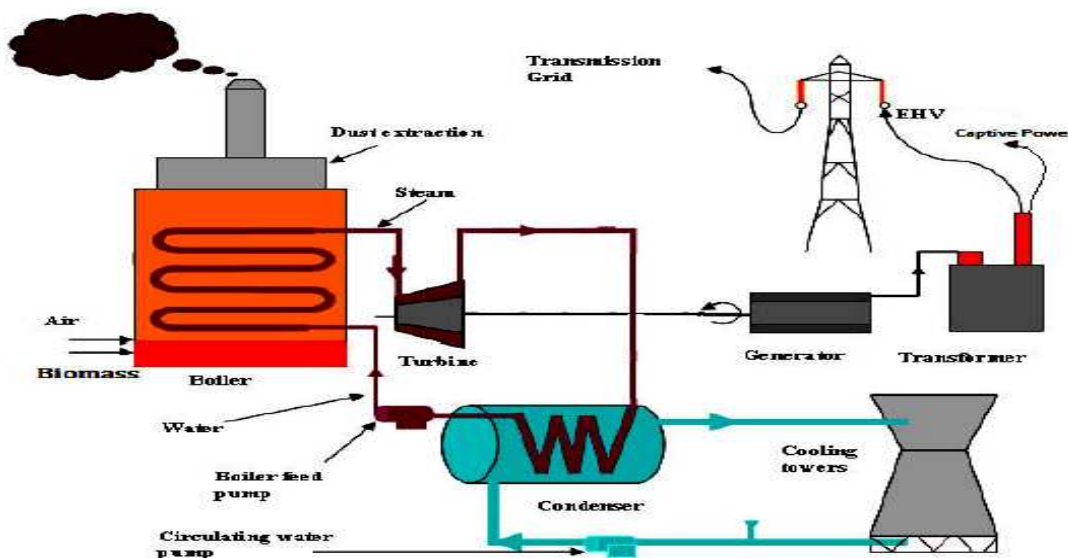
A.4. Technical description of the project

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The project is designed to generate electricity for grid system using multi-fuels. The basic technology is Rankine cycle route where direct combustion of biomass materials takes place through the multi-fuel fired boiler to generate high pressure and high temperature steam, which drives a multi stage Impulse bleed cum condensing type turbine generator set. The specifications of major equipment and their suppliers are detailed below

S. No	Equipment	Supplier	Specifications	
1	Boiler	Walchand Nagar Industries Ltd, Pune	Capacity -	33 M.T Super Heater Steam
			Pressure -	67 kg/cm(square)
			Temperature	480° C +/- 10C
			Type	Water tube Bio-drum Bottom supported Boiler
2	Turbo Generator	Triveni Engineering & Industries Ltd.	Model	FRAME - 13E (Bleed & condensing Turbine)
			Rating	6.0 M.W
			Pressure	67 kg/cm(square)
			Temperature	480° C
3	Alternator	BHEL	Horizontal shaft cylindrical Rotor Brushless Alternator 7500- KW, 0.8 P. F(lag), 11kvVolts, 425Amps, 3Phase, 1500RPM, 50 Hz.	
4	Cooling tower	Shriram EPC	Type	Induced draft, RCC
			Capacity	2400m3 / hour
5	R .O. Plant	Ion Exchange	Capacity	5 m3/Hour

Schematic diagram of power plant is given below:



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

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Sectoral Scope: 1: Energy industries (renewable - / non-renewable sources)

Methodology : AMS I. D, Version 07, Renewable Energy Generation for a Grid

A6 Registration date of the project activity:

>> 21st May 2006

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

>> The crediting period of the project activity is renewable. The length of each crediting period is 7 years. First crediting period is from 15 April 2004 to 14 April 2011, and no changes to the start date of the crediting period have been applied since the registration of the project.

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

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The entity responsible for completing the monitoring report is Sri Balaji Biomass Power (P) Limited. Details are given below:

Sri Balaji Biomass Power (P) Limited.

Plot No 1071, Road No 44, Jubilee Hills, Hyderabad – 500 03, Andhra Pradesh, India

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

The commercial operation of the project was started on 14/04/2004. The project promoter has installed the monitoring equipments to monitor the parameters, which were described in the registered CDM-PDD.

During the monitoring period i.e. from 25.09.2009 till 24.09.2010 no special events such as overhauls, equipment change, downtimes have occurred that might impact the applicability of the methodology.

The planned and unplanned shut down periods during the current monitoring period are as follows:

Month	Running Hours	Planned Outages (Hr-Min)	Forced Outages (Hr-Min)	REASON FOR MAJOR OUTAGES
Oct-09	479-30	242-08	4-22	Travelling grate T- Bars bent. PRDS control valve gland leak arrested. Bleed steam leak arrested. BC-1 tunnel cleaning work. Lube oil, Control oil & EOP oil filters cleaning work. Oil centrifuge bowls cleaning work. Servicing of 33 KV VCB at plant switch yard. Inspection of 33 KV over head lines.
Nov-09	481-26	255-20	7-14	Travelling Grate front & rare bearings inspection. Travelling grate eroded skid shoes replacement (25 No's). Boiler refractory work. Grid enter section hoper (left side)replacement. General maintenance of Motors. Servicing of 33 KV VCB.
Dec-09	640-52	74-10	4-58	Travelling grate front & rare bearings inspection. Drum level transmitter water line isolation valve gland leak arrested. Belt Conveyors duct plate cleaning. Servicing of 33 KV VCB.
Jan-10	554-03	182-54	7-03	ESP doors rectification. Travelling grate hydraulic oil and lube oil centrifuge work done. Secondary super heater coils support hooks welded. Travelling grate T- Bars bent were removed and worn out skid shoe replaced. All Plummer blocks greasing work done. Servicing of ACB of main in comer (LT supply). MCW, ACW, CEP- strainers cleaning work done.



Feb-10	709-18	0-00	34-42	1. Differential relay operation, Generator breaker was opened. 2. Super Heater Coil leakage
Mar-10	561-46	0-00	110-14	1. Secondary Super Heater Coil No 2 puncture. 2. Boiler Front Wall Water Tube puncture. 3. Final super Heater coil puncture
Apr-10	715-58	0-00	28-02	Travelling Grate Problem.
May-10	622-19	91-47	5-54	1. Steam drum man hole covers opened and inspected and cleaned. 2. Flu gas duct patch welding job carried out. 3. Super heater 1st and 2nd cleaning. 4. Travelling Grate bottom hopper cleaning. 5. Steam drum man hole covers opening inspection and cleaning. 6. Oil cooler Tube bundle cleaning. 7. MCW & ACW pumps suction strainer cleaning. 8. General inspection 11 KV and 33 K.V panels
Jun-10	631-28	61-10	51-22	Bank tubes area cleaning work done. Economizer and air pre- heater area cleaning. Sub ash belt conveyor cleaning and plate welding job. ACW, MCW pumps suction strainers were cleaned. M.C.C. panels & Control panels inspection
Jul-10	625-56	91-51	2-13	1. Hydraulic drive oil line welding done. 2. Travelling grate hydraulic oil centrifuge line welding. 3. Boiler feed water pump suction strainers cleaning. 4. Super Heater coil bank tubes, economizer, APH tubes cleaning. 5. All conveyors Gear boxes oil level checking and replaced the oil. 6. Belt Conveyors duct plate cleaning. 7. General maintenance of Motors. 8. Servicing of 33 KV VCB. 9. No. 5 APH RAV strengthening is done. 10. General maintenance of instrumentation junction boxes.
Aug-10	586-33	121-36	35-51	1. I.D. Fan inlet damper inspection and rectification was carried out. 2. S.A. Fan damper over hauling. 3. Testing of Air heater tubes leakage was done. 4. E.S.P. man hole covers fabrication work completed. 5. BC1, BC2, BC3 conveyors duct plates cleaning. 6. All gear boxes oil level checking and oil filling. 7. Cooling Tower gear box, Cooling Tower fan inspection and gear box oil replaced. 8. I.D. Fan out let expansion bellow replaced.



Sep-10	543-12	161-17	39-31	1. Travelling grate T- Bars bent were removed and worn out skid shoe was replaced. 2. Trvelling grate front & rear shaft bearing blocks to be opened. 3. Secondary super heater coils support hooks to be welded. 4. BC-1, BC-2 discharge chute leaks to be arrested. 5. Belt conveyor hood sheets are to be arranged. 6. Basin 1 & 2 water draining and cleaning. 7. General inspection of Alternator, excitor and MCC panels. 8. SMBC welding works done and discharge chute replaced.
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B.2. Revision of the monitoring plan

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Not Applicable.

B.3 Request for deviation applied to this monitoring period

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Not Applicable

B.4 Notification or request of approval of changes

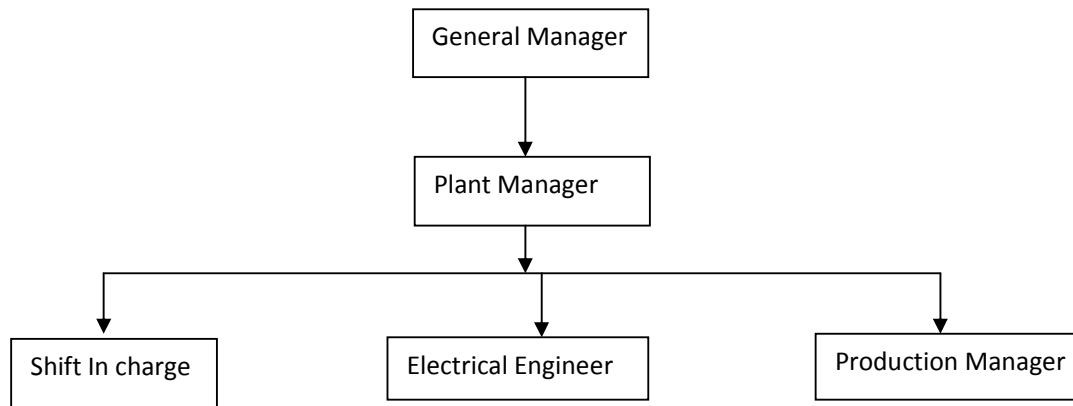
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The Project has been implemented as mentioned in the registered CDM-PDD. Hence, no notification or request of approval of changes has been made for the project.

SECTION C. Description of the monitoring system

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A CDM team has been formed in Sri Balaji Biomass Power (P) Limited (SBBPL) for monitoring and verification of all the monitoring parameters as per the guidelines formulated by the management. Qualified and trained people monitor the parameters and emission reduction calculations. SBBPL is the sole agency responsible for implementation and monitoring of the project activity. The monitoring organization structure is shown below:



**Roles and Responsibilities:**

General Manager is responsible for the total monitoring plan. The General Manager will examine the reports generated by the Plant Manager w.r.t, the monthly electricity generated, exported and annual emission reduction calculations as per the monitoring plan. He also examines the internal audit reports prepared by internal auditor and will in particular take note of any deviations in data over the norms and monitor that the corrective actions have resulted in adherence to standards.

Plant Manager assists and reports to General Manager for completing the tasks. The Plant Manager is responsible for review of the monitored parameters for correctness, corrective measures in case of minor errors in the monitored data for the electricity generations at their individual locations. He will generate timely internal audit reports, and will be submitted to the General Manager for necessary actions.

Shift in charge is responsible for recording the total electricity generation, electricity export, electricity import, if any etc. The daily reports will be generated and submitted to the Plant Manager for verification and emission reduction calculations.

Electrical Engineer is responsible for recording all the electrical parameters in the plant which will be submitted to the Plant manager for preparing the shutdown details, diesel consumption and Electrical Engineer also maintains the plant maintenance records.

Fuel Manager is responsible to assess the suppliers based on the key parameters and submits recommendation to Plant Manager for approval. He is also responsible to procure the fuels permitted by the Local statutory authorities and to meet the plant daily requirement without any shortage.

Monitoring Team:

S No	Name	Responsibility
1.	Mr. Raju M	Overall project Implementation
2.	J. Hanumantha Rao	Technical Audit, daily monitoring parameters
3. 4.	Mr. Murali krishna M Mr. Venkata Srinivas P	MIS Reporting, CDM Documentation

Calibration and Emergency Procedures:

As per the Power Purchase Agreement (PPA), the energy exported to the Andhra Pradesh State Power Transmission Co Ltd is recorded from two independent meters viz., Main Meter and Check Meter and reading of main meter is used for billing. In the event of main meter not in operation / fails, the reading of the check meter shall be used for Billing.

As per the requirements of Andhra Pradesh State Power Transmission Co Ltd, calibration has to be carried out at least once in five years however the plant will undertake the calibration of meters once in a year to make sure the accurateness of readings.

The plant maintains all the data in both hard and soft copy formats.

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

Data / Parameter:	Baseline Emission Factor
Data unit:	kgCO ₂ /kWh
Description:	CO ₂ Emission factor for the grid system
Source of data used:	Please refer to PDD. http://cdm.unfccc.int/UserManagement/FileStorage/FOO6XRS0QNPDL
Value(s) :	0.830
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline Emissions
Additional comment:	The value is fixed ex-ante for the entire crediting period.

Data / Parameter:	ρ_d
Data unit:	kg/Lit
Description:	Density of the fossil fuel used for the project site (Diesel)
Source of data used:	Indian Oil Corporation limited (IOCL) http://www.iocl.com/Products/DieselSpecifications.pdf
Value:	0.86
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	The IOCL value is considered as it is publicly available and can be referred as authentic source.
Additional comment:	--



Data / Parameter:	EF _{CO₂,d}
Data unit:	tCO ₂ /TJ
Description:	Emission factor of diesel
Source of data used:	IPCC Default Value, Table 1.4, Chapter 1, Volume 2, 2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value applied:	74.1
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	The data is used to calculate the Project emissions
Additional comment:	The data is considered from the available authentic data source due to absence of the authentic measurement procedures by PP

D.2 Data and parameters monitored

Data / Parameter:	EG _{gross}
Data unit:	kWh
Description:	Gross Energy Generated
Measured /Calculated /Default:	Measured
Source of data:	Readings of the Meters installed at the plant site, which are recorded in the logbook
Value(s) of monitored parameter:	46454600
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	The data is used to calculate Baseline emissions



Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)		
	Parameter	Generation Meter
	Accuracy class (\pm %)	$\pm 0.5\%$
	S No	KAU 01064
	Calibration Frequency	Annually
	Calibration Dates	31/01/2010, 30/01/2010.
Validity	29/01/2011	
Measuring/ Reading/ Recording frequency:	Measurement and Recording frequency will be hourly.	
Calculation method (if applicable):	The monthly electricity generation is calculated by subtracting the first meter reading from the final meter reading of the month.	
QA/QC procedures applied:	The meter is calibrated according to the relevant national standard on annual basis.	

Data / Parameter:	E_{aux}
Data unit:	kWh
Description:	Auxiliary Power consumption in the power plant
Measured /Calculated /Default:	Measured
Source of data:	The auxiliary power consumption will be calculated based on difference between power generated and exported.
Value(s) of monitored parameter:	5128900
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	The data is used to calculate Baseline emissions.



Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Parameter	Auxiliary Meter
	Accuracy class (+ %)	+ 0.5%
	S No	F30/783-1103
	Calibration Frequency	Annually
	Calibration Dates	31/01/2009, 30/01/2010.
	Validity	29/01/2011
Measuring/ Reading/ Recording frequency:	Meter readings will be recorded every shift in the plant log book.	
Calculation method (if applicable):	The monthly electricity generation is calculated by subtracting the first meter reading from the final meter reading of the month. This is also calculated using the below formula: Auxiliary power consumption of the power plant = (Gross Electricity generated – Electricity export)	
QA/QC procedures applied:	The meter is calibrated according to the relevant national standard on annual basis.	

Data / Parameter:	EG _{export}
Data unit:	kWh
Description:	Electricity export by the power plant
Measured /Calculated /Default:	Measured
Source of data:	Readings of the Meters installed are recorded daily in the plant logbook. In addition to this, monthly billing records of the Andhra Pradesh State Electricity Board for the electricity supplied to the grid.
Value(s) of monitored parameter:	41325700
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	The data is used to calculate Baseline emissions.



Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	During the Present monitoring period the existing meters, main meter and check meter, were calibrated and replaced with the new meters. The details of the meters are given below.		
	<u>Old Meters</u>		
	Parameter	Main meter	Check Meter
	Accuracy class (%)	±0.2%	± 0.2%
	S No	APB00395	APB00396
	Frequency	Annually	Annually
	Calibration Dates	24/09/2009	24/09/2009
Validity	23/09/2010	23/09/2010	
<u>New Meters</u>			
Parameter	Main meter	Check Meter	
Accuracy class (%)	±0.2%	± 0.2%	
S No	APH 25534	SECURE/KA901916	
Frequency	Annually	Annually	
Calibration Dates	27/08/2010	31/08/2010	
Validity	27/08/2011	31/08/2011	
Measuring/ Reading/ Recording frequency:	Measured continuously and APTRANSCO issues Joint meter reading statements on monthly basis.		
Calculation method (if applicable):	NA		
QA/QC procedures applied:	The meter is calibrated according to the relevant national standard on annual basis.		

Data / Parameter:	EG _{import}
Data unit:	kWh
Description:	Electricity imported from the power plant
Measured /Calculated /Default:	Measured



Source of data:	Readings of the Meters installed are recorded daily in the plant logbook. In addition to this, monthly billing records of the Andhra Pradesh State Electricity Board for the electricity supplied to the grid.																																				
Value(s) of monitored parameter:	120200																																				
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	The data is used to calculate Project emissions.																																				
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	<p>During the Present monitoring period existing import meters, main meter and check meter, were calibrated and replaced with the new meters. The details of the meters are given below.</p> <p><u>Old Meters</u></p> <table><tr><th>Parameter</th><th>Main meter</th><th>Check Meter</th></tr><tr><td>Accuracy class (%)</td><td>±0.2%</td><td>± 0.2%</td></tr><tr><td>S No</td><td>APB00395</td><td>APB00396</td></tr><tr><td>Frequency</td><td>Annually</td><td>Annually</td></tr><tr><td>Calibration Dates</td><td>24/09/2009</td><td>24/09/2009</td></tr><tr><td>Validity</td><td>23/09/2010</td><td>23/09/2010</td></tr></table> <p><u>New Meters</u></p> <table><tr><th>Parameter</th><th>Main meter</th><th>Check Meter</th></tr><tr><td>Accuracy class (%)</td><td>±0.2%</td><td>± 0.2%</td></tr><tr><td>S No</td><td>APH 25534</td><td>SECURE/KA901916</td></tr><tr><td>Frequency</td><td>Annually</td><td>Annually</td></tr><tr><td>Calibration Dates</td><td>27/08/2010</td><td>31/08/2010</td></tr><tr><td>Validity</td><td>27/08/2011</td><td>31/08/2011</td></tr></table>	Parameter	Main meter	Check Meter	Accuracy class (%)	±0.2%	± 0.2%	S No	APB00395	APB00396	Frequency	Annually	Annually	Calibration Dates	24/09/2009	24/09/2009	Validity	23/09/2010	23/09/2010	Parameter	Main meter	Check Meter	Accuracy class (%)	±0.2%	± 0.2%	S No	APH 25534	SECURE/KA901916	Frequency	Annually	Annually	Calibration Dates	27/08/2010	31/08/2010	Validity	27/08/2011	31/08/2011
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S No	APB00395	APB00396																																			
Frequency	Annually	Annually																																			
Calibration Dates	24/09/2009	24/09/2009																																			
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Calibration Dates	27/08/2010	31/08/2010																																			
Validity	27/08/2011	31/08/2011																																			
Measuring/ Reading/ Recording frequency:	Measured continuously and APTRANSCO issues Joint meter reading statements on monthly basis.																																				
Calculation method (if applicable):	NA																																				



QA/QC procedures applied:	The meter is calibrated according to the relevant national standard on annual basis.
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Data / Parameter:	Biomass used
Data unit:	MT
Description:	Biomass used in the Power plant
Measured /Calculated /Default:	On-site measurements
Source of data:	Plant daily reports
Value(s) of monitored parameter:	62693
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Value is used to cross check the biomass consumed by the project activity during the monitoring period.
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Weighbridge Capacity: 30 Tons Make: SANMAR. M/c No: 4401 Calibrated on: 06/12/2008, 10/12/2009 Valid up to: 09/12/2010 Calibration Frequency: Annually
Measuring/ Reading/ Recording frequency:	Recorded daily and aggregated to monthly.
Calculation method (if applicable):	-----
QA/QC procedures applied:	The quantity is recorded at the entry level by weighing through a weigh bridge. The amount fed to the boiler is recorded on a daily basis. The weighbridge is calibrated at regular intervals

Data / Parameter:	
Data unit:	kCal/kg
Description:	Average Calorific Value of Biomass fuels used in the plant
Measured /Calculated /Default:	Measured



Source of data:	Fuel test reports								
Value(s) of monitored parameter:	<table><tr><th>Biomass</th><th>Average CV (kCal/kg)</th></tr><tr><td>Rice Husk</td><td>3009</td></tr><tr><td>Julie Flora</td><td>3815</td></tr><tr><td>GN shell</td><td>3899</td></tr></table>	Biomass	Average CV (kCal/kg)	Rice Husk	3009	Julie Flora	3815	GN shell	3899
Biomass	Average CV (kCal/kg)								
Rice Husk	3009								
Julie Flora	3815								
GN shell	3899								
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)	----								
Measuring/ Reading/ Recording frequency:	Monthly								
Calculation method (if applicable):	---								
QA/QC procedures applied:	Fuel samples will be tested at government approved laboratories.								

Data / Parameter:	
Data unit:	MT
Description:	Coal used in the Power plant
Measured /Calculated /Default:	On-site measurements
Source of data:	Plant daily reports
Value(s) of monitored parameter:	0
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project Emissions



Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Weighbridge Capacity: 30 Tons Make: SANMAR. M/c No: 4401 Calibrated on: 06/12/2008, 10/12/2009 Valid up to: 09/12/2010 Calibration Frequency: Annually
Measuring/ Reading/ Recording frequency:	Recorded daily and aggregated to monthly.
Calculation method (if applicable):	-----
QA/QC procedures applied:	The quantity is recorded at the entry level by weighing through a weigh bridge. The amount fed to the boiler is recorded on a daily basis. The weighbridge is calibrated at regular intervals

Data / Parameter:	
Data unit:	Percent
Description:	Carbon Content in coal
Measured /Calculated /Default:	Measured
Source of data:	Fuel test reports
Value(s) of monitored parameter:	0
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project Emissions
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	----
Measuring/ Reading/ Recording frequency:	Monthly
Calculation method (if applicable):	---



QA/QC procedures applied:	Fuel samples will be tested at government approved laboratories.
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Data / Parameter:	
Data unit:	Litres
Description:	Quantity of diesel combusted in power plant
Measured /Calculated /Default:	Measured
Source of data:	Daily diesel reports.
Value(s) of monitored parameter:	16521
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project Emissions calculation
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	----
Measuring/ Reading/ Recording frequency:	Daily
Calculation method (if applicable):	---
QA/QC procedures applied:	The quantity of diesel used is directly measured and monitored on a daily basis at the project site using level gauge measurement.

SECTION E. Emission reductions calculation

E.1 Baseline emissions calculation

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Baseline Emissions are calculated as follows.

$$BE_y = EG_y * EF_y$$

Where,  $EG_y$  is the net electricity exported to grid in kWh

$EF_y$  is the baseline emission factor for a given year (kgCO<sub>2</sub>/kWh)

$$\begin{aligned} BE_y &= 46454700 \text{ kWh} \times 0.830 \text{ kg/kWh} \\ &= 34300 \text{ tCO}_2 \end{aligned}$$

**E.2 Project emissions calculation**

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Project Emissions are calculated using the following formula

$$\text{Project Emissions} = E_{\text{import}} + E_{\text{Coal}} + E_{\text{diesel}}$$

Where,  $E_{\text{Coal}}$  is the stoichiometric carbon dioxide emission due to coal burning at the project, MT

$E_{\text{diesel}}$  is the Emissions due to diesel consumption

$E_{\text{import}}$  is the electricity imported.

$$E_{\text{import}} = \text{Electricity imported} * \text{CO}_2 \text{ Emission factor}$$

$E_{\text{coal}}$  are calculated using the following formula

$$E_{\text{coal}} = (44/12) * C * Q$$

Where,

C is the carbon percentage in coal

Q is the quantity of coal burned, MT

$E_{\text{diesel}}$  are calculated using the following formula

$E_{\text{diesel}} = (\text{Diesel consumed in Litres} * \text{Calorific value (TJ/kg)} * \text{density (kg/l)} * \text{IPCC emission factor (tCO}_2\text{/TJ)} * \text{Oxidation factor})$

$$\begin{aligned} E_{\text{import}} &= 120200 \text{ kWh} * 0.83 \text{ kgCO}_2\text{/kWh} \\ &= 100 \text{ tCO}_2 \end{aligned}$$

$$E_{\text{diesel}} = 45 \text{ tCO}_2$$

$$E_{\text{coal}} = 0 \text{ tCO}_2$$

$$\text{Total Project Emissions} = 145 \text{ tCO}_2$$

**E.3. Leakage calculation**

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As the fuels used in the power plant were procured from local areas to meet the requirement, the emissions due to transportation of biomass and disposal of ash from the project activity are negligible. Hence, the project has considered zero leakages.

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

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The following formula is adopted for calculating emission reductions generated by the project activity:

$$ER_y = BE_y - PE_y - L_y$$



Where,  $ER_y$  is emission reductions in a given year  
 $BE_y$  is baseline emissions in a given year  
 $PE_y$  is project emissions in a given year  
 $L_y$  is leakage in a given year

| Month        | Biomass<br>consumed, MT | Electricity<br>Exported, kWh | Base Line<br>Emissions | Project Emissions, tCO <sub>2</sub> |             |               | Total Project<br>Emissions, tCO <sub>2</sub> | Net Emission<br>Reductions, tCO <sub>2</sub> |
|--------------|-------------------------|------------------------------|------------------------|-------------------------------------|-------------|---------------|----------------------------------------------|----------------------------------------------|
|              |                         |                              |                        | Due to Import                       | Due to Coal | Due to Diesel |                                              |                                              |
| Oct-09       | 4350                    | 2917600                      | 2422                   | 11                                  | 0           | 4             | 16                                           | 2406                                         |
| Nov-09       | 4012                    | 2674700                      | 2220                   | 9                                   | 0           | 4             | 13                                           | 2207                                         |
| Dec-09       | 4806                    | 3097700                      | 2571                   | 4                                   | 0           | 3             | 7                                            | 2564                                         |
| Jan-10       | 5132                    | 3097600                      | 2571                   | 13                                  | 0           | 4             | 17                                           | 2554                                         |
| Feb-10       | 6414                    | 4207000                      | 3492                   | 6                                   | 0           | 3             | 9                                            | 3483                                         |
| Mar-10       | 4955                    | 3379100                      | 2805                   | 14                                  | 0           | 4             | 17                                           | 2787                                         |
| Apr-10       | 6306                    | 4285300                      | 3557                   | 2                                   | 0           | 3             | 6                                            | 3551                                         |
| May-10       | 5518                    | 3747200                      | 3110                   | 7                                   | 0           | 3             | 10                                           | 3100                                         |
| Jun-10       | 5363                    | 3605700                      | 2993                   | 7                                   | 0           | 4             | 11                                           | 2981                                         |
| Jul-10       | 5558                    | 3634700                      | 3017                   | 7                                   | 0           | 4             | 11                                           | 3005                                         |
| Aug-10       | 5235                    | 3389500                      | 2813                   | 11                                  | 0           | 4             | 15                                           | 2798                                         |
| Sep-10       | 5045                    | 3289600                      | 2730                   | 7                                   | 0           | 4             | 11                                           | 2719                                         |
| <b>Total</b> | <b>62693</b>            | <b>41325700</b>              | <b>34300</b>           | <b>100</b>                          | <b>0</b>    | <b>45</b>     | <b>145</b>                                   | <b>34155</b>                                 |

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

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| Item                                        | Values applied in ex-ante<br>calculation of the registered<br>CDM-PDD | Actual values reached during the<br>monitoring period |
|---------------------------------------------|-----------------------------------------------------------------------|-------------------------------------------------------|
| Emission reductions<br>(tCO <sub>2e</sub> ) | 28,590                                                                | 34,155                                                |

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

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The emission reductions achieved during the monitoring period were marginally higher than the emission reductions estimated in the PDD for the equivalent period because the actual plant availability was marginally higher than estimated in the PDD.

During the current monitoring period, plant operated with a PLF of 88.3%. The net power exported by the plant has increased, resulting in increase in the number of CERs.



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## History of the document

| Version                                                                                                    | Date                           | Nature of revision |
|------------------------------------------------------------------------------------------------------------|--------------------------------|--------------------|
| 01                                                                                                         | EB 54, Annex 34<br>28 May 2010 | Initial adoption.  |
| <b>Decision Class:</b> Regulatory<br><b>Document Type:</b> Guideline<br><b>Business Function:</b> Issuance |                                |                    |