MONITORING REPORT FORM (F-CDM-MR)
Version 02.0

MONITORING REPORT

Title of the project activity	Biomass based power generation project in Maharashtra, India
Reference number of the project activity	4078
Version number of the monitoring report	1.0
Completion date of the monitoring report	21/06/2012
Registration date of the project activity	26/01/2011
Monitoring period number and duration of this monitoring period	Monitoring period No:2 01/04/2011 – 31/03/2012 (First and last day included)
Project participant(s)	M/s. A.A. Energy Limited (Private Entity)
	Eneco Energy Trade B.V.
Host Party(ies)	India
Sectoral scope(s) and applied methodology(ies)	Sectoral scope 1 : Energy industries (renewable - / non-renewable sources Methodology: AMS-I.D. ver. 15 – "Grid connected renewable electricity generation"
Estimated amount of GHG emission reductions or net anthropogenic GHG removals by sinks for this monitoring period in the registered PDD	55,195
Actual GHG emission reductions or net anthropogenic GHG removals by sinks achieved in this monitoring period	56,456

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

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The project proponent M/s. A.A. Energy Limited (AAEL) has set up an eco-friendly 10 MW biomass based power generation project at Desaiganj Wadsa in Gadchiroli district of Maharashtra. The proposed small scale project utilise the surplus biomass residues primarily from rice husk available locally to generate power through sustainable means without causing any negative impacts on the environment. The project activity hence replaces an equivalent amount of power that would have been generated from fossil fuel based thermal power generation plant and thereby reducing the greenhouse gas emissions.

The process of power generation is based on Rankine cycle using boiler and turbine. Steam generated at a high pressure of 66 kg/cm^2 and temperature of 490^{o}C is supplied to an extraction cum condensing turbine generator (TG) set at around 64 kg/cm^2 and 480^{o}C. Fuel is supplied to boiler and entire steam generated is passed through the 10 MW steam turbine generator (STG) for generating of power. The details on the technology used have been provided in section B.1 of the report. Auxiliaries of the biomass power plant are supplied by in-house generated power & balance of power generated is synchronized and exported to the grid. The generated power, after meeting the auxiliary power requirements, is sold to Tata Power Trading Company Limited (TPTCL).

The purchase order for the project activity was placed on 20/08/2008 and the project was commissioned on 30/04/2010.

The monitored electricity generation (EG_y) is compared with its corresponding value of SFC and the lowest of two is considered for the calculation of emission reduction. The total emission reductions for the monitoring period accounts to 56,456 tCO_2e.

A.2. Location of project activity

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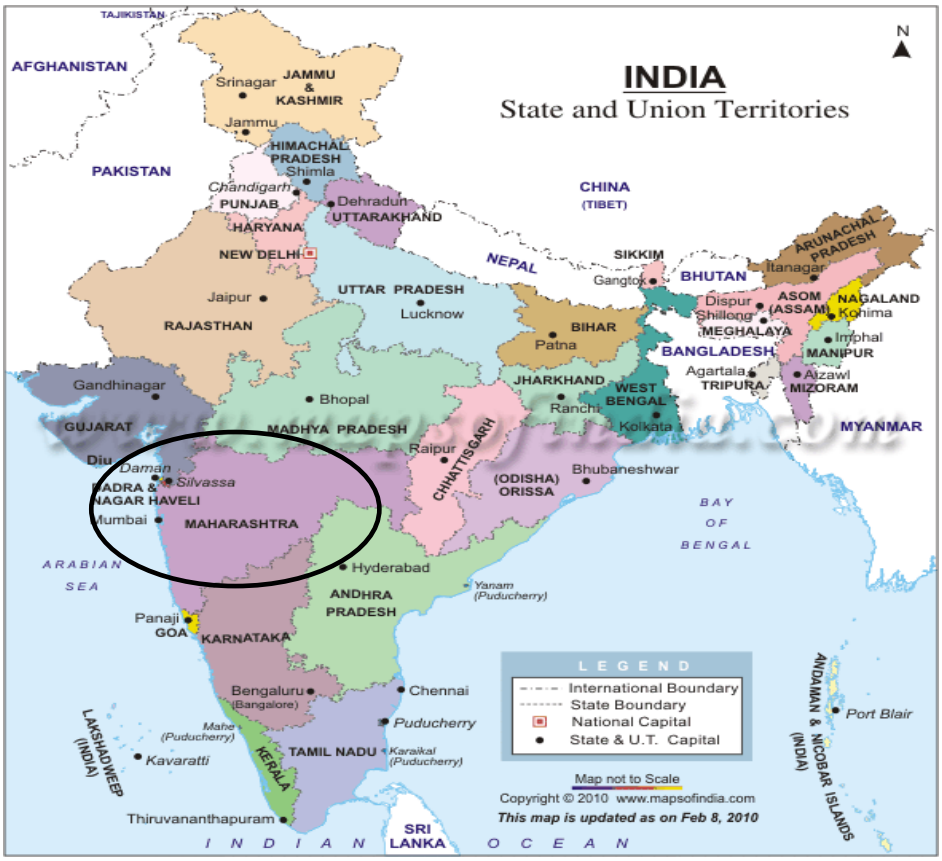
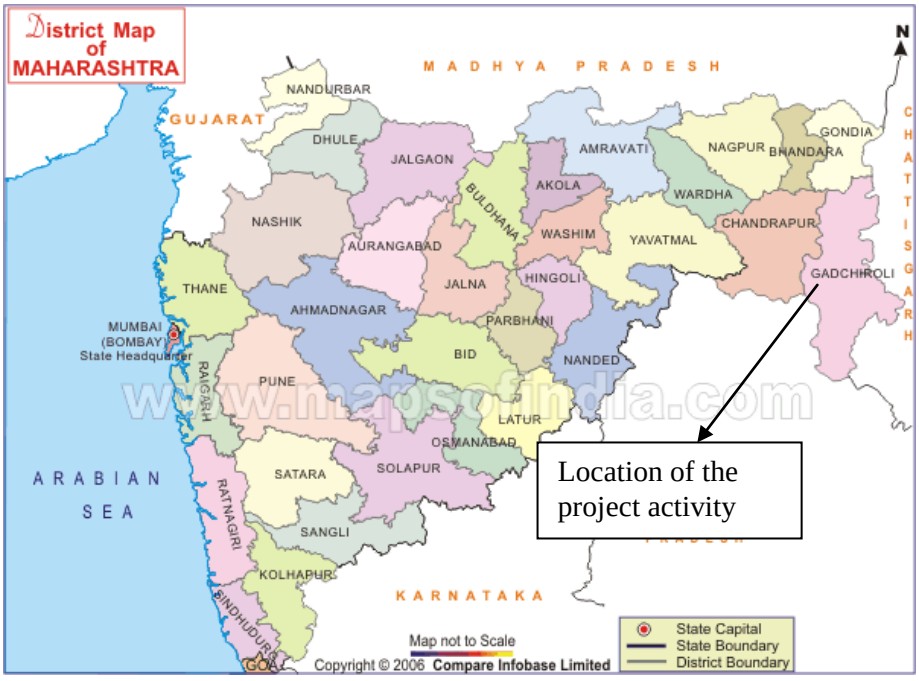
The project is located at Desaiganj Wadsa in Gadchiroli district. The nearest town Desaiganj Wadsa is 7 km from the project site, the nearest railway station is at Desaiganj Wadsa. The nearest airport is at Nagpur, which is 160 km from the project site is accessible from NH-6 Nagpur – Raipur National Highway. The geographical co-ordinates of the project activity are 20^{o}37’22’’ North to 79^{o}57’32’’ East.





(The district map of Maharashtra indicating the location of the project activity)

A.3. Parties and project participant(s)

Party involved ((host) indicates a host Party)	Private and/or public entity(ies) project participants (as applicable)	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
India (Host)	M/s. A.A. Energy Limited (Private Entity)	No
United Kingdom of Great Britain and Northern Ireland (other party)	Eneco Energy Trade B.V.	No

A.4. Reference of applied methodology

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AMS ID – Grid connected renewable electricity generation, Version 15[1]

Tool to calculate the emission factor for an electricity system' version 01.1 Annex 12 EB 35[2]

Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion", version-02, EB41[3]

A.5. Crediting period of project activity

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Start date of crediting period: 26/01/2011

Choice of crediting period: 10 years (Fixed)

Crediting period: 26 Jan 2011 - 25 Jan 2021

SECTION B. Implementation of project activity

B.1. Description of implemented registered project activity

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The plant was successfully commissioned and handed over to PP on 30/04/2010. The plant has been in operation continuously since commissioning.

Technical description of the project activity

The process of power generation is by Rankine cycle. Steam generated at high a pressure of 66 kg/cm^2 and 490^{o}C is supplied to an extraction cum condensing turbine generator (TG) set at around 64 kg/cm^2 and 480^{o}C. Fuel is supplied to boiler and entire steam generated is passed through the 10 MW steam turbine generator (STG) for generating of power. Auxiliaries of the biomass power plant are supplied in-house generated power & balance of power generated is synchronized and exported to the grid.

[1] http://cdm.unfccc.int/UserManagement/FileStorage/7QXAZ5036WN8BEYKUDFRPJGL21V4I9
[2] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v1.1.pdf
[3] http://cdm.unfccc.int/EB/041/eb41_repan11.pdf

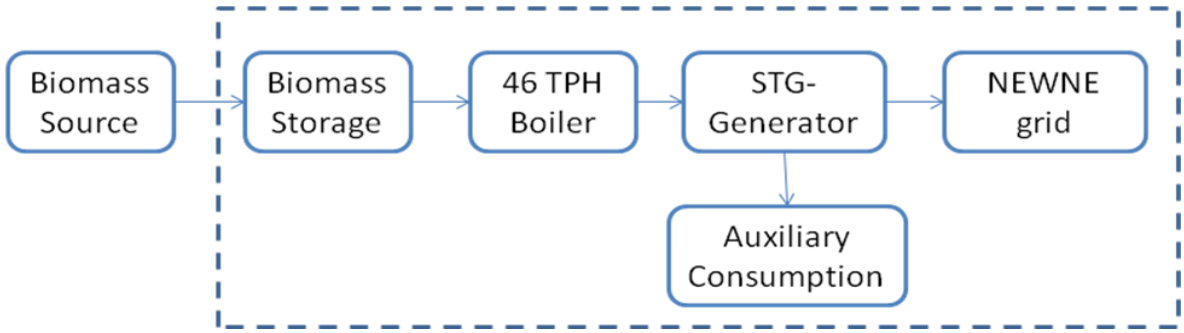
The biomass power plant STG has been designed with a bleed at 4 kg/cm² for supplying steam to de-aerator. Balance steam for maximizing power generation is condensed in the surface condenser. The high pressure steam in small quantities, required for steam jet air ejector and gland sealing is tapped from the main steam line through Pressure Reducing & De-Super Heating (PRDSH) station.

The power generated at 11 KV from the 10 MW STG set is stepped down to 415 V for meeting all power requirements of auxiliaries. The balance of power generated is synchronized with MSEDCL grid stepped up to 132 KV level and transported to a substation of MSEDCL at 16 km distance, for export purposes.

The boiler of 46 TPH has been designed for multi fuel operations and has a travelling grate design. However the primary fuel source used would be rice husk and the plant operates throughout the year on rice husk only. The electro static precipitator (ESP) has been installed as a part of the boiler, along with reinforced cement concrete (RCC) chimney, to limit the emissions well below 100 mg/Nm^3, stipulated norm by the Pollution Control Board. The plant controls are digital control system (DCS) based to ensure most efficient operations & monitoring of operating parameters. The Technical details of the power plant are as tabulated below –

Boiler	
Type	Travelling Grate
Boiler capacity (100 % load) / Steam Flow rate	46 TPH
Steam pressure at super heater outlet	66 kg/cm^2
Steam temperature at super heater outlet	490^oC
Turbo Generator	
Type	Extraction cum Condensing
Steam pressure at the TG inlet	64 kg/cm^2
Steam temperature at the TG inlet	480^oC
Frequency	50 Hz
Power Evacuation	
Grid Voltage	132 kV
MSCDCL substation	11/132 kV in Brahmapuri
Energy Production (For Optimum year)	
Gross Energy	10 MW
Auxiliary Consumption (10%)	1 MW
Voltage level	415 V (for auxiliary consumption)
Net Energy Export to Grid	9 MW

The project boundary includes the entire power plant site including all machinery & equipments required for power generation in this plant and biomass storage area. Project boundary is illustrated in the following diagram.



No major equipment has been replaced or exchanged since commissioning. Further no breakdown was observed in the boiler during the present monitoring period.

Outage details for the monitoring period:

MONTH	DATE	TOTAL DOWN TIME	Reasons
April-11	03/04/2011	24:00 HRS	Plant stopped for boiler maintenance work.
	04/04/2011	24:00 HRS	Plant stopped for boiler maintenance work.
	05/04/2011	24:00 HRS	Plant stopped for boiler maintenance work.
	06/04/2011	23:30 HRS	Plant stopped for boiler maintenance work.
	16/04/2011	03:10 HRS	Generator breaker C T failed.
	20/04/2011	08:15 HRS	PA Fan Drive Panel Commissioning
	24/04/2011	02:45 HRS	PA Fan Motor coupling Problem.
		109:40 HRS	
May-11	21/05/2011	05:20 HRS	Plant trip due to Grid failure
	22/05/2011	04:00 HRS	Plant trip due to Grid failure
	25/05/2011	12:25 HRS	Due to outage on 132 KV line for Adani Power
		21:45 HRS	
June-11	04/06/2011	01:00 HRS	Plant trip due to Grid failure
	16/06/2011	00:40 HRS	Plant trip due to Grid failure
	17/06/2011	01:10 HRS	Plant trip due to Grid failure
	19/06/2011	01:30 HRS	DCS Failure
	23/06/2011	00:55 HRS	Plant trip due to Grid failure
		05:15 HRS	
July-11	06/07/2011	14:50 HRS	Turbine oil filter Cleaning.
	11/07/2011	08:40 HRS	Boiler steam line leakage.
	14/07/2011	01:20 HRS	132 KV line trip.
	16/07/2011	01:00 HRS	132 KV line trip.
		25:50 HRS	
August-11	06/08/2011	17:25 HRS	Process Problem
	11/08/2011	24:00 HRS	Process Problem
	12/08/2011	01:35 HRS	Process Problem
	12/08/2011	01:00 HRS	Boiler MCC Trip
	12/08/2011	01:00 HRS	Boiler Pressure/Temp. Low

	13/08/2011	14:45 HRS	Boiler Pressure/Temp. Low
	14/08/2011	01:15 HRS	Boiler MCC Trip
	14/08/2011	12:20 HRS	BC-3 Belt damage
	21/08/2011	03:00 HRS	Plant trip due to Grid failure
	22/08/2011	18:00 HRS	Plant trip due to Grid failure
	26/08/2011	01:55 HRS	Plant trip due to Grid failure
	29/08/2011	00:05 HRS	Plant trip due to Grid failure (Home Load)
	30/08/2011	05:35 HRS	Boiler Pressure/Temp. Low
	30/08/2011	00:50 HRS	Boiler Pressure/Temp. Low
	31/08/2011	12:15 HRS	Boiler Pressure/Temp. Low
	31/08/2011	01:00 HRS	Boiler Pressure/Temp. Low
		116 HRS	
September-11	01/09/2011	24:00 HRS	Plant Shutdown for Boiler Maintenance
	02/09/2011	24:00 HRS	Plant Shutdown for Boiler Maintenance
	03/09/2011	24:00 HRS	Plant Shutdown for Boiler Maintenance
	04/09/2011	24:00 HRS	Plant Shutdown for Boiler Maintenance
	05/09/2011	24:00 HRS	Plant Shutdown for Boiler Maintenance
	06/09/2011	20:00 HRS	Plant Shutdown for Boiler Maintenance
	09/09/2011	00:30 HRS	Plant trip due to Grid failure (Plant on Self Load)
	09/09/2011	01:55 HRS	Process & Electrical problem
	13/09/2011	05:45 HRS	plant trip due to AVR panel fail & exciter diode fail
		148:10 HRS	
October-11	10/10/2011	00:40 HRS	Plant trip due to Grid failure
	12/10/2011	00:15 HRS	Plant trip due to Grid failure (Plant on Self Load)
	12/10/2011	00:05 HRS	Plant trip due to Grid failure (Plant on Self Load)
	15/10/2011	05:00 HRS	Plant Trip due to generator breaker C T failed.
	16/10/2011	00:35 HRS	Plant Trip due to generator breaker C T failed.
	16/10/2011	02:35 HRS	plant trip due to AVR panel fail & exciter diode fail
	21/10/2011	02:15 HRS	Plant Trip due to DCS failure
	22/10/2011	02:05 HRS	Plant Trip due to DCS failure
	30/10/2011	01:30 HRS	Plant Trip due to Boiler Drum Level Low
		15:00 HRS	
November-11	01/11/2011	03:05 HRS	Plant trip due to Grid failure
	07/11/2011	01:20 HRS	Plant trip due to Grid failure
	09/11/2011	09:35 HRS	Plant shut due to PGCIL Outage
		14:00 HRS	
December-11	01/12/2011	08:45 HRS	Plant shut due to ESP work
	02/12/2011	19:00 HRS	Plant shut due to ESP work
	04/12/2011	01:05 HRS	Plant trip due to Instrument air leakage
	05/12/2011	06:15 HRS	Plant Trip due to Boiler Bunker Level Low (Due to JCB Failure)
	05/12/2011	01:10 HRS	Plant Manually Trip due to Turbine Casing drain valve Leakage.
	12/12/2011	16:10 HRS	Plant Shut for Boiler Work

		52.25 HRS	
January-12	05/01/2012	01:35 HRS	Plant trip due to Grid failure
		03:10 HRS	Turbine Steam drain line valve leakage
		04:45 HRS	
February-12	01/02/2012	13:00 HRS	Plant Hand Trip due to MSETCL Outage
	02/02/2012	00:20 HRS	Plant Hand Trip due to MSETCL Outage
	03/02/2012	01:00 HRS	Grid fluctuation
	14/02/2012	01:15 HRS	Grid fluctuation
	14/02/2012	01:00 HRS	Grid fluctuation
	15/02/2012	02:10 HRS	Alternator Winding temp. high
	15/02/2012	00:35 HRS	Alternator Winding temp. high
	16/02/2012	01:25 HRS	Alternator Winding temp. high
		20:45 HRS	
March-12	03/03/2012	19:00 HRS	Clinker formation in Boiler & PA line change
	22/03/2012	00:50 HRS	Plant trip due to Grid failure
	25/03/2012	01:00 HRS	Turbine gearbox bearing temp. high
		20:50 HRS	

During the monitoring period, the project activity has been operated and monitored in accordance with the approved monitoring methodology and approved monitoring plan of registered PDD.

B.2. Post registration changes

B.2.1. Temporary deviations from registered monitoring plan or applied methodology

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No temporary deviation is applied during this monitoring period.

B.2.2. Corrections

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No corrections to the project information or parameters fixed at validation have been approved during this monitoring period or submitted with this monitoring report.

B.2.3. Permanent changes from registered monitoring plan or applied methodology

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No permanent changes from the registered monitoring plan or applied methodologies have been approved during this monitoring period or submitted with this monitoring report.

B.2.4. Changes to project design of registered project activity

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No changes to the project design of the project activity have been approved during this monitoring perioid or submitted with this monitoring report.

B.2.5. Changes to start date of crediting period

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No changes in start date of the crediting period have been approved during this monitoring period or submitted with this monitoring report.

B.2.6. Types of changes specific to afforestation or reforestation project activity
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Not applicable

SECTION C. Description of monitoring system
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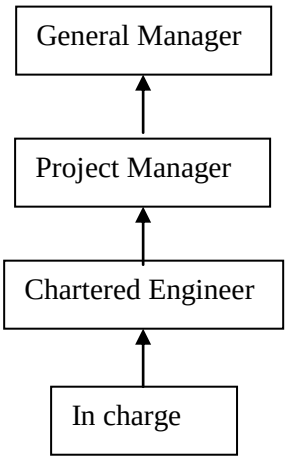
AAEL proposes the following structure for data monitoring, collection, data archiving and calibration of equipments for this project activity.

Organization chart:-



The General Manager overseas the overall functioning and maintenance of the project activity, the dedicated team formed under his supervision will work on specified tasks.

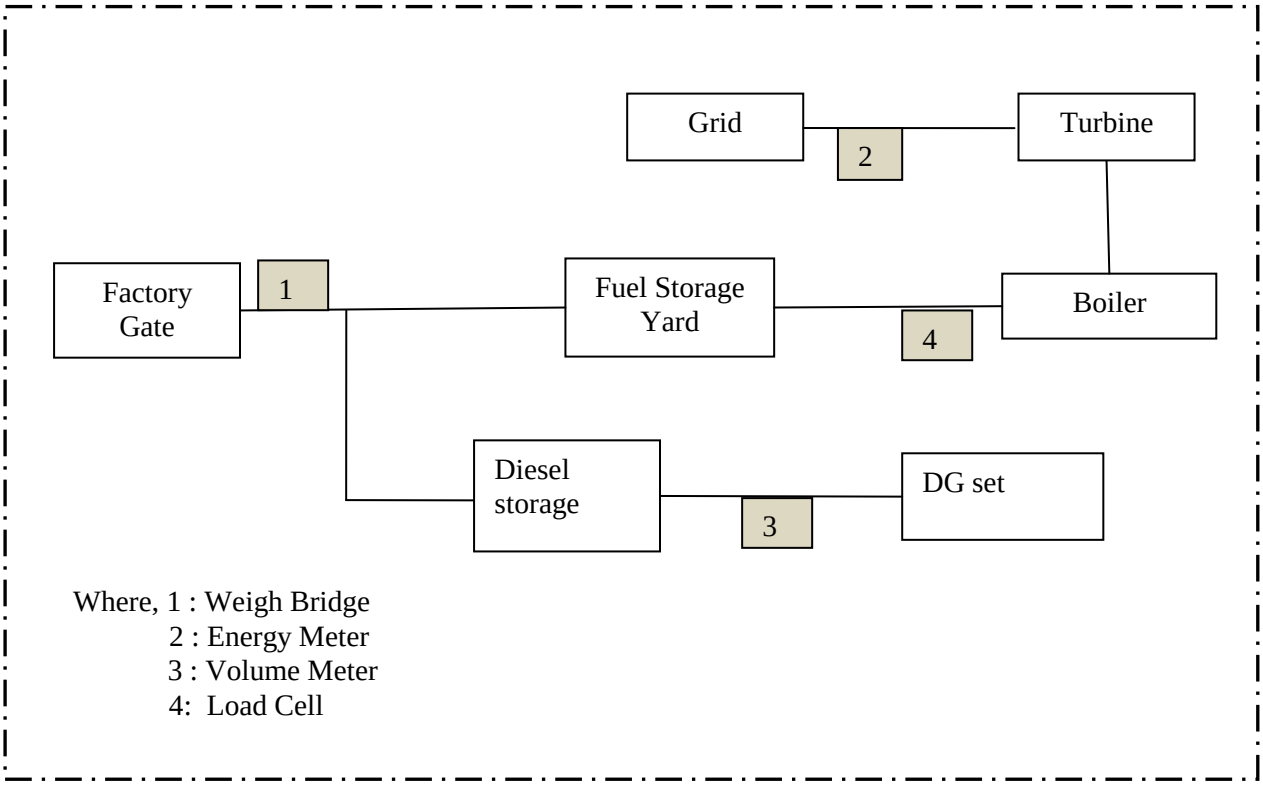
At the project site the in-charge maintains the data records, ensures completeness of data, and reliability of data (calibration of equipments). Wherein even day to day data of electricity generation is collected and maintained through a log book for data to be monitored. These reports are checked periodically by the Chartered Engineer and discussed thoroughly with the data monitoring personnel. A separate log will also be maintained for the biomass supply on the site, its storage and usage in the project activity. Similarly the usage of coal during contingency would be recorded along with biomass usage data. To ensure reliability of the measuring equipments via energy meter (used to measure net saleable power), weighbridge; will be calibrated annually by external agencies. Documents pertaining to annual calibration of equipments (energy meter, weighbridge) shall be maintained at the plant site.

All data collected as part of monitoring should be archived in paper and will be kept at least for 2 years after the end of the crediting period.

The Chartered Engineer ensures the proper functioning of all the equipments/ instruments and shall take a corrective action if found not operating as and when required. Further the project activity will not result in any unidentified activity that can result in substantial emissions from the project activity.

Emission reduction calculations and monitoring report will be done based on the data collected. The monitoring report and the emission reduction calculation will be maintained at the plant site/head office for annual verification purposes.

Line diagrams showing all relevant monitoring points:-



SECTION D. Data and parameters

D.1. Data and parameters fixed ex ante or at renewal of crediting period

Data/Parameter	**EF_{CO2}**
Unit	tCO_2/MWh
Description	Fixed ex-ante combined margin emission factor of NEWNE grid derived from the OM and BM values
Source of data	CO_2 Baseline Database Version 4.0 dated October 2008 published by CEA
Value(s) applied	0.805
Purpose of data	Calculation of baseline emissions
Additional comment	As per registered PDD.

Data/Parameter	$SFC_{rice\ husk}$
Unit	Tonne of rice husk/MWh
Description	Specific fuel consumption of rice husk
Source of data	Calculated based on NCV of rice husk and design data of the boiler and turbine
Value(s) applied	1.1089
Purpose of data	To cross check the calculation of baseline emissions
Additional comment	As per registered PDD.

D.2. Data and parameters monitored

<table>
<tr><td>Data/Parameter</td><td>EG_y</td></tr>
<tr><td>Unit</td><td>GWh</td></tr>
<tr><td>Description</td><td>Net electricity exported to the grid from this project activity</td></tr>
<tr><td>Measured/Calculated /Default</td><td>Measured & calculated</td></tr>
<tr><td>Source of data</td><td>Monthly energy meter reading records issued by the TPTCL / sales invoice raised by AAEL.</td></tr>
<tr><td>Value(s) of monitored parameter</td><td>
<table>
<tr><th>Month</th><th>Value (MWh)</th></tr>
<tr><td>01/04/2011 - 30/04/2011</td><td>5611.08</td></tr>
<tr><td>01/05/2011 - 31/05/2011</td><td>6659.43</td></tr>
<tr><td>01/06/2011 - 30/06/2011</td><td>6645.40</td></tr>
<tr><td>01/07/2011 - 31/07/2011</td><td>6631.44</td></tr>
<tr><td>01/08/2011 - 31/08/2011</td><td>4324.00</td></tr>
<tr><td>01/09/2011 - 30/09/2011</td><td>5024.78</td></tr>
<tr><td>01/10/2011 - 31/10/2011</td><td>6680.10</td></tr>
<tr><td>01/11/2011 - 30/11/2011</td><td>6480.72</td></tr>
<tr><td>01/12/2011 - 31/12/2011</td><td>6253.19</td></tr>
<tr><td>01/01/2012 - 31/01/2012</td><td>6696.13</td></tr>
<tr><td>01/02/2012 - 29/02/2012</td><td>6218.97</td></tr>
<tr><td>01/03/2012 - 31/03/2012</td><td>6690.20</td></tr>
<tr><td>Total</td><td>73915.44</td></tr>
</table>
</td></tr>
<tr><td>Monitoring equipment</td><td>Monitoring Equipment: Energy meter
Accuracy class: 0.2 S
Main meter: Serial number: MSB09097
Calibration frequency: annually
Date of calibration: 12/04/2011
15/04/2010
Validity: 11/04/2012

Check meter: Serial number: MSB09096
Accuracy class: 0.2 S
Calibration frequency: annually
Date of calibration: 12/04/2011
15/04/2010

Validity: one year</td></tr>
<tr><td>Measuring/Reading/ Recording frequency</td><td>Measuring: Continuously
Reading: Hourly
Recording: Monthly</td></tr>
<tr><td>Calculation method (if applicable)</td><td>The energy meter installed at the site is a two-way metering system, which directly measures the exported and imported electricity. EGy, net electricity exported to the grid, is the simple difference of these two directly measured values with no other data/ value/ procedure being involved. This is direct measurement and it is only the display of net value</td></tr>
</table>

<table>
<tr><td></td><td>which is not direct.

EG_y = (Electricity exported to the grid – Electricity imported from grid)</td></tr>
<tr><td>QA/QC procedures</td><td>The meter is calibrated annually. Measurement results can be cross-checked with records for sold electricity.
The actual gross electricity generated for the given monitoring period has also been compared with biomass quantity consumed and specific fuel consumption and it is found that the actual generation is less than the estimated generation.

Summary of comparison:-

<table><tr><th>Parameter</th><th>Value</th><th>Unit</th></tr><tr><td>Total gross electricity generated (Actual)</td><td>83022.70</td><td>MWh</td></tr><tr><td>Gross electricity generation based on SFC</td><td>86342.61</td><td>MWh</td></tr></table></td></tr>
<tr><td>Purpose of data</td><td>Calculation of baseline emissions</td></tr>
<tr><td>Additional comment</td><td>-</td></tr>
</table>

Data/Parameter	$Q_{biomassy}$
Unit	Tonnes/annum
Description	Quantity of biomass (rice husk) used for power generation process in year y
Measured/Calculated /Default	Measured.
Source of data	On site measurement using weighing scales and the same was recorded in the log book. For the purpose of continuous measurement of actual quantity of biomass, PP has also installed an online load cell in the conveyor for the measurement of the quantity of biomass.
Value(s) of monitored parameter	
Monitoring equipment	Monitoring Equipment: Weigh Bridge Accuracy class: Class III Serial number: 149/08 Calibration frequency: annually Date of last calibration:24/05/2011 25/05/2010 Validity: valid till 24/05/2012 Monitoring equipment: Load cell Nominal load: 6.33 kg Serial number: 6111000597-2-2-001-01 Load cell Type: S Calibration frequency: annually Date of first calibration: 14/05/2011 16/05/2010

Month	$Q_{biomassy}$ (consumed)[4] (Tonnes)	$Q_{biomassy}$ (Procured)[5] (Tonnes)
01/04/2011 - 30/04/2011	7383.00	8130.64
01/05/2011 - 31/05/2011	8702.00	8423.17
01/06/2011 - 30/06/2011	8657.00	8318.51
01/07/2011 - 31/07/2011	8661.00	9422.37
01/08/2011 - 31/08/2011	4086.00	6735.58
01/09/2011 - 30/09/2011	6303.00	3170.17
01/10/2011 - 31/10/2011	8761.00	9211.75
01/11/2011 - 30/11/2011	8462.00	10143.00
01/12/2011 - 31/12/2011	8167.00	8174.37
01/01/2012 - 31/01/2012	8777.00	8813.26
01/02/2012 - 29/02/2012	8560.00	8520.28
01/03/2012 - 31/03/2012	9226.32	9514.20
Total	**95745.32**	**98577.30**

[4] Actual quantity of biomass combusted in boiler, measured by load cell mounted on conveyer.
[5] Quantity of biomass procured and measured at weighbridge.

	Validity: one year
Measuring/Reading/ Recording frequency	Measuring: Continuously Reading: Daily Recording: Daily
Calculation method (if applicable)	NA
QA/QC procedures	The weigh scale used for measuring fuels is calibrated annually. The data can be cross checked with the biomass procurement data.
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data/Parameter	$FC_{Coal,j,y}$
Unit	Tonnes/annum
Description	Quantity of coal used for the project activity in year y.
Measured/Calculated /Default	Measured.
Source of data	On site measurement using weighbridge and the same was recorded in the log book. For the purpose of continuous measurement of actual consumption of coal, PP has also installed an online load cell in the conveyor for the measurement of the quantity of coal.
Value(s) of monitored parameter	See table below
Monitoring equipment	Monitoring Equipment: Weigh Bridge Accuracy class: Class III Serial number: 149/08 Calibration frequency: annually Date of last calibration:24/05/2011 25/05/2010 Validity: valid till 24/05/2012 Monitoring equipment: Load cell Nominal load: 6.33 kg Serial number: 6111000597-2-2-001-01 Load cell Type: S Calibration frequency: annually Date of last calibration: 14/05/2011 16/05/2010

Month	$FC_{Coal,j,y}$ (consumed) * (Tonnes)	$FC_{Coal,j,y}$ (procured) (Tonnes)
01/04/2011 - 30/04/2011	0.00	0.00
01/05/2011 - 31/05/2011	0.00	0.00
01/06/2011 - 30/06/2011	0.00	0.00
01/07/2011 - 31/07/2011	0.00	0.00
01/08/2011 - 31/08/2011	1529.00	0.00
01/09/2011 - 30/09/2011	273.00	981.51
01/10/2011 - 31/10/2011	0.00	705.98
01/11/2011 - 30/11/2011	0.00	0.00
01/12/2011 - 31/12/2011	0.00	0.00
01/01/2012 - 31/01/2012	0.00	0.00
01/02/2012 - 29/02/2012	0.00	0.00
01/03/2012 - 31/03/2012	0.00	0.00
Total	**1802.00**	**1687.49**

* Actual quantity of coal combusted in the power plant.

	Validity: one year
Measuring/Reading/ Recording frequency	Measuring: Continuously Reading: Daily Recording: Daily
Calculation method (if applicable)	NA
QA/QC procedures	The weight scale used for measuring fuels is calibrated annually. The quantity of fossil fuel (coal) weighed on the weighbridge is crossed checked with fuel bills also.
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data/Parameter	**$FC_{Diesel,j,y}$**
Unit	volume/annum
Description	Quantity of diesel used for the project activity in year y.
Measured/Calculated /Default	Measured.
Source of data	On site measurement using volume meter and the same was recorded in the log book.
Value(s) of monitored parameter	
Monitoring equipment	Monitoring Equipment: Volume meter
Measuring/Reading/ Recording frequency	Measuring: Continuously Reading: Daily Recording: Daily
Calculation method (if applicable)	NA
QA/QC procedures	Volume meters (cans) are approved by the Weights & Measures Department and replaced on annually basis with new volume meters (cans). The quantity of fossil fuel (Diesel) measured by volume meters is crossed checked with fuel bills.
Purpose of data	Calculation of baseline emissions
Additional comment	

Month	$FC_{diesel,i,y}$ (Procured) [6]Litres	$FC_{diesel,i,y}$ (Consumed) Litres
01/04/2011 - 30/04/2011	4400.00	3970.00
01/05/2011 - 31/05/2011	2000.00	2535.00
01/06/2011 - 30/06/2011	1000.00	847.00
01/07/2011 - 31/07/2011	2000.00	2350.00
01/08/2011 - 31/08/2011	11000.00	8464.00
01/09/2011 - 30/09/2011	5000.00	6740.00
01/10/2011 - 31/10/2011	2000.00	2206.00
01/11/2011 - 30/11/2011	2000.00	1552.00
01/12/2011 - 31/12/2011	4000.00	4580.00
01/01/2012 - 31/01/2012	2000.00	697.00
01/02/2012 - 29/02/2012	3000.00	3176.00
01/03/2012 - 31/03/2012	2000.00	3255.00
Total	**40400.00**	**40372.00**

Data/Parameter	**$NCV_{coal,y}$**
Unit	TJ/tone
Description	Net calorific value of coal in year y
Measured/Calculated	Measured.

[6] Since the procured Diesel quantity is more than the combusted Diesel quantity so for project emission calculation procured quantity is considered. This is conservative.

/Default	
Source of data	The following data source may be used if the relevant conditions apply: a) Values provided by the fuel supplier in invoices. b) Measurement by the project participants (if a) is not available.
Value(s) of monitored parameter	0.0170
Monitoring equipment	Equipment used: Bomb calorimeter Range: 0 to 250 deg C Serial no: 9K1073892 Calibration frequency: annually Date of last calibration: 24/03/2012 26/03/2011 Validity: One year **Date of calibrated** | **Validity date of calibration** 24/03/2012 | 23/03/2013 26/03/2011 | 25/03/2012
Measuring/Reading/ Recording frequency	Measuring: The NCV should be obtained for each fuel delivery Recording: Monthly
Calculation method (if applicable)	The coal sample obtained for each fuel delivery is taken and fired in muffle furnace to get the moisture and silica content. After measuring the same, the NCV of the coal is being calculated using the formula provided by Coal India.
QA/QC procedures	Verify if the values under NCVs are within the uncertainty range of the IPCC default values as provided in Table 1.2, Vol. 2 of the 2006 IPCC Guidelines. If the values fall below this range collect additional information from the testing laboratory to justify the outcome or conduct additional measurements. The laboratories in a) or b) should have ISO17025 accreditation or justify that they can comply with similar quality standards.
Purpose of data	Data is used for Project emission calculation.
Additional comment	-

Data/Parameter	**$NCV_{diesel,y}$**
Unit	TJ/litre
Description	Net calorific value of diesel in year y
Measured/Calculated /Default	Measured.
Source of data	Values provided by the fuel supplier in invoices.
Value(s) of monitored parameter	0.000036
Monitoring equipment	Not applicable
Measuring/Reading/ Recording frequency	Measuring: The NCV has been provided by supplier for each delivery of fuel. PP has also conducted lab test on diesel from independent agency to cross check the value of NCV. Higher of these two have been considered for calculation of project emission. Recording: Monthly
Calculation method	NA

(if applicable)	
QA/QC procedures	Verify if the values under NCVs are within the uncertainty range of the IPCC default values as provided in Table 1.2, Vol. 2 of the 2006 IPCC Guidelines. If the values fall below this range collect additional information from the testing laboratory to justify the outcome or conduct additional measurements.
Purpose of data	Data is used for Project emission calculation.
Additional comment	-

Data/Parameter	$N_{truck,y}$
Unit	-
Description	Number of truck/vehicle trips from the biomass source to the power plant in year y
Measured/Calculated /Default	Measured.
Source of data	The no of deliveries/vehicles will be recorded in log book at the factory gate.
Value(s) of monitored parameter	
Monitoring equipment	Not applicable
Measuring/Reading/ Recording frequency	Measuring: Daily Reading: Daily Recording: Daily
Calculation method (if applicable)	NA
QA/QC procedures	This can be cross-checked with average carrying capacity of vehicle and quantity of rice husk consumed in that period.
Purpose of data	Data is used for Project emission calculation.
Additional comment	-

Month	Numbers of Trucks
01/04/2011 - 30/04/2011	1306
01/05/2011 - 31/05/2011	1353
01/06/2011 - 30/06/2011	1326
01/07/2011 - 31/07/2011	1463
01/08/2011 - 31/08/2011	1024
01/09/2011 - 30/09/2011	507
01/10/2011 - 31/10/2011	1437
01/11/2011 - 30/11/2011	1550
01/12/2011 - 31/12/2011	1232
01/01/2012 - 31/01/2012	1358
01/02/2012 - 29/02/2012	1306
01/03/2012 - 31/03/2012	1463
Total	**15,325**

Data/Parameter	$AVD_{max,y}$

Unit	km
Description	Max distance of the Power plant from the Rice husk source in year y
Measured/Calculated /Default	Estimated
Source of data	Log book at the factory gate
Value(s) of monitored parameter	
Monitoring equipment	Not applicable
Measuring/Reading/ Recording frequency	Measuring: At each delivery Reading: At each delivery Recording: At each delivery
Calculation method (if applicable)	NA
QA/QC procedures	No QA/QC is required as the maximum distance will be considered for calculation of leakage due to transportation.
Purpose of data	Data is used for Project emission calculation.
Additional comment	-

Month	Maximum distance in km
01/04/2011 - 30/04/2011	25
01/05/2011 - 31/05/2011	27
01/06/2011 - 30/06/2011	27
01/07/2011 - 31/07/2011	28
01/08/2011 - 31/08/2011	29
01/09/2011 - 30/09/2011	29
01/10/2011 - 31/10/2011	29
01/11/2011 - 30/11/2011	29
01/12/2011 - 31/12/2011	29
01/01/2012 - 31/01/2012	29
01/02/2012 - 29/02/2012	29
01/03/2012 - 31/03/2012	29

D.3. Implementation of sampling plan

>>

Not applicable

SECTION E. Calculation of emission reductions or GHG removals by sinks

E.1. Calculation of baseline emissions or baseline net GHG removals by sinks

>>

Baseline emissions are calculated as:

$$BE_y = EG_y * EF_y$$

Where,

BE_y: Baseline emissions due to displacement of electricity during the year y in tons of CO_2
EG_y: Net electricity exported to the grid by the project activity during the year y in MWh,
EF_y: The emission factor of the grid to which the project activity exports electricity.

Grid Emission Factor = 0.805 tCO_2/MWh

Sample calculation for month of month of January 2012:

BE_y = 6696.13 * 0.805
= 5390.38 tCO_2e

Baseline emission calculation (for complete monitoring period):

Month	EG_y (Net power exported to grid) (MWh)	Emission factor (tCO_2 / MWh)	Baseline emissions (tCO_2e)
01/04/2011 - 30/04/2011	5611.08	0.805	4516.92
01/05/2011 - 31/05/2011	6659.43	0.805	5360.84
01/06/2011 - 30/06/2011	6645.40	0.805	5349.55
01/07/2011 - 31/07/2011	6631.44	0.805	5338.31
01/08/2011 - 31/08/2011	4324.00	0.805	3480.82
01/09/2011 - 30/09/2011	5024.78	0.805	4044.95
01/10/2011 - 31/10/2011	6680.10	0.805	5377.48
01/11/2011 - 30/11/2011	6480.72	0.805	5216.98
01/12/2011 - 31/12/2011	6253.19	0.805	5033.82
01/01/2012 - 31/01/2012	6696.13	0.805	5390.38
01/02/2012 - 29/02/2012	6218.97	0.805	5006.27
01/03/2012 - 31/03/2012	6690.20	0.805	5385.61
Total	**73915.44**		**59,501 (Rounded down value)**

E.2. Calculation of project emissions or actual net GHG removals by sinks
>>

Project Emissions due to Auxiliary Fuel (e.g. Coal, F.O. etc) consumption is estimated as per the following equation:

$$PE_{FC,j,y} = \sum FC_{i.j,y} \times COEF_{i,y}$$

Where
$PE_{FC,j,y}$ = Are the CO_2 emissions from fossil fuel combustion in process j during the year y (tCO_2/yr);

$FC_{i,j,y}$ = Is the quantity of fuel type i combusted in process j during the year y (mass or volume unit/yr);
$COEF_{i,y}$ = Is the CO_2 emission coefficient of fuel type i in year y (tCO_2/mass or volume unit)
i = Are the fuel types combusted in process j during the year y

The CO_2 emission coefficient $COEF_{i,y}$ can be calculated using Option B (Option A is not followed as the chemical composition of fossil fuel type i is not available with PP) as follows:

Option B: The CO_2 emission coefficient $COEF_{i,y}$ is calculated based on net calorific value and CO_2 emission factor of the fuel type i, as follows:

$$COEF_{i,y} = NCV_{i,y} \times EF_{CO2,i,y}$$

Where:

$COEF_{i,y}$	=	Is the CO_2 emission coefficient of fuel type i in year y (tCO_2/mass or volume unit)
$NCV_{i,y}$	=	Is the weighted average net calorific value of the fuel type i in year y (GJ/mass or volume unit)
$EF_{CO2,i,y}$	=	Is the weighted average CO_2 emission factor of fuel type i in year y (tCO_2/GJ)
i	=	Are the fuel types combusted in process j during the year y

Net calorific value of coal[7] = 0.0170 TJ/tonne (Monitored Value)
Net calorific value of diesel[8] = 0.000036 TJ/litre (Monitored Value)
Emission factor of coal = 96.1 tCO2/TJ (2006 IPCC Default Value)
Emission factor of diesel = 74.1tCO2/TJ (2006 IPCC Default value)

Month	Quantity of coal used in the plant (tonnes)	Quantity of diesel used in the plant[9] (litres)	Total project emissions (tCO2e)
01/04/2011 - 30/04/2011	0.00	4400.00	11.62
01/05/2011 - 31/05/2011	0.00	2000.00	5.28
01/06/2011 - 30/06/2011	0.00	1000.00	2.64
01/07/2011 - 31/07/2011	0.00	2000.00	5.28
01/08/2011 - 31/08/2011	1529.00	11000.00	2522.68
01/09/2011 - 30/09/2011	273.00	5000.00	458.43
01/10/2011 - 31/10/2011	0.00	2000.00	5.28
01/11/2011 - 30/11/2011	0.00	2000.00	5.28
01/12/2011 - 31/12/2011	0.00	4000.00	10.56
01/01/2012 - 31/01/2012	0.00	2000.00	5.28
01/02/2012 - 29/02/2012	0.00	3000.00	7.92
01/03/2012 - 31/03/2012	0.00	2000.00	5.28
Total	**1802.00**	**40400**	**3,046 (Rounded up value)**

E.3. Calculation of leakage

>>

The biomass assessment study carried out for the project activity revealed that:

[7] Maximum value from the data provided by the supplier
[8] Maximum value from the data provided by the supplier
[9] Since the procured Diesel quantity is more than the combusted Diesel quantity so for project emission calculation procured quantity is considered. This is conservative.

- The rice husk used for the project activity is available within 50 km radial distance from the project site and the rice husk is transported within a distance of 50 km from the project site. Rice husk doesn't require any processing which results in significant emission.
- The quantity of biomass available in the region is more than 25% of the biomass utilized in the project activity.

Hence leakage has been neglected.

Therefore, **Leakage, LE_y =0.**

E.4. Summary of calculation of emission reductions or net anthropogenic GHG removals by sinks

Time Period	Baseline emissions or baseline net GHG removals by sinks (tCO_2e)	Project emissions or actual net GHG removals by sinks (tCO_{2e})	Leakage (tCO_2e)	Emission reductions or net anthropogenic GHG removals by sinks (tCO_2e)
01/04/2011 - 30/04/2011	4516.92	11.62	0	4505.30
01/05/2011 - 31/05/2011	5360.84	5.28	0	5355.56
01/06/2011 - 30/06/2011	5349.55	2.64	0	5346.91
01/07/2011 - 31/07/2011	5338.31	5.28	0	5333.03
01/08/2011 - 31/08/2011	3480.82	2522.68	0	958.14
01/09/2011 - 30/09/2011	4044.95	458.43	0	3586.51
01/10/2011 - 31/10/2011	5377.48	5.28	0	5372.20
01/11/2011 - 30/11/2011	5216.98	5.28	0	5211.70
01/12/2011 - 31/12/2011	5033.82	10.56	0	5023.26
01/01/2012 - 31/01/2012	5390.38	5.28	0	5385.10
01/02/2012 - 29/02/2012	5006.27	7.92	0	4998.35
01/03/2012 - 31/03/2012	5385.61	5.28	0	5380.33
Total	**59,501 (Round down)**	**3,046 (Rounded up)**	**0**	**56,456 (Rounded down)**

E.5. Comparison of actual emission reductions or net anthropogenic GHG removals by sinks with estimates in registered PDD

Item	Values estimated in ex-ante calculation of registered PDD	Actual values achieved during this monitoring period
Emission reductions or GHG removals by sinks (tCO_2e)	55,195	56,456

There are 366 days in this monitoring period (01/04/2011 – 31/03/2012)
The actual emission reductions achieved during the monitoring period: 56,456 tCO_2e

E.6. Remarks on difference from estimated value in registered PDD
>>

Emission reductions for the considered	Actual Emission Reduction for the	Variation

period (349 days) as per estimates in the PDD	monitoring period	
55,195	56,456	2.3 %

There is an increase of 2.3% in the actual emission reductions achieved during the current monitoring period from that stated in the registered CDM-PDD. This is because of higher PLF achieved owing to better plant availability of 343 days (23 days down time) against the assumed plant availability of 335 days (30 days down time).

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History of the document

Version	Date	Nature of revision
02.0	EB 66 13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the monitoring report form" (EB 66, Annex 20).
01	EB 54, Annex 34 28 May 2010	Initial adoption.
Decision Class: Regulatory **Document Type**: Form **Business Function**: Issuance		