



Monitoring report form for CDM project activity
(Version 06.0)

MONITORING REPORT

Title of the project activity	Biomass based power generation project in Maharashtra, India	
UNFCCC reference number of the project activity	4078	
Version number of the PDD applicable to this monitoring report	5.5	
Version number of this monitoring report	1.0	
Completion date of this monitoring report	05/07/2018	
Monitoring period number	07	
Duration of this monitoring period	01/04/2017 – 31/03/2018 (First and last day included)	
Monitoring report number for this monitoring report	N/A	
Project participants	M/s. A.A. Energy Limited (Private Entity) Eneco Energy Trade B.V.	
Host Party	India	
Sectoral scopes	Sectoral scope 1 : Energy industries (renewable - / non-renewable sources)	
Applied methodologies and standardized baselines	Applied Methodology: AMS-I.D. ver. 15 – “Grid connected renewable electricity generation” Standardized baselines: N/A	
Amount of GHG emission reductions or net anthropogenic GHG removals achieved by the project activity in this monitoring period	Amount achieved before 1 January 2013	Amount achieved from 1 January 2013
	Nil	31,595 tCO ₂ e
Amount of GHG emission reductions or net anthropogenic GHG removals estimated ex ante for this monitoring period in the PDD	49,766 tCO ₂ e	

SECTION A. Description of project activity

A.1. 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/cm² and temperature of 490°C is supplied to an extraction cum condensing turbine generator (TG) set at around 64 kg/cm² and 480°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.

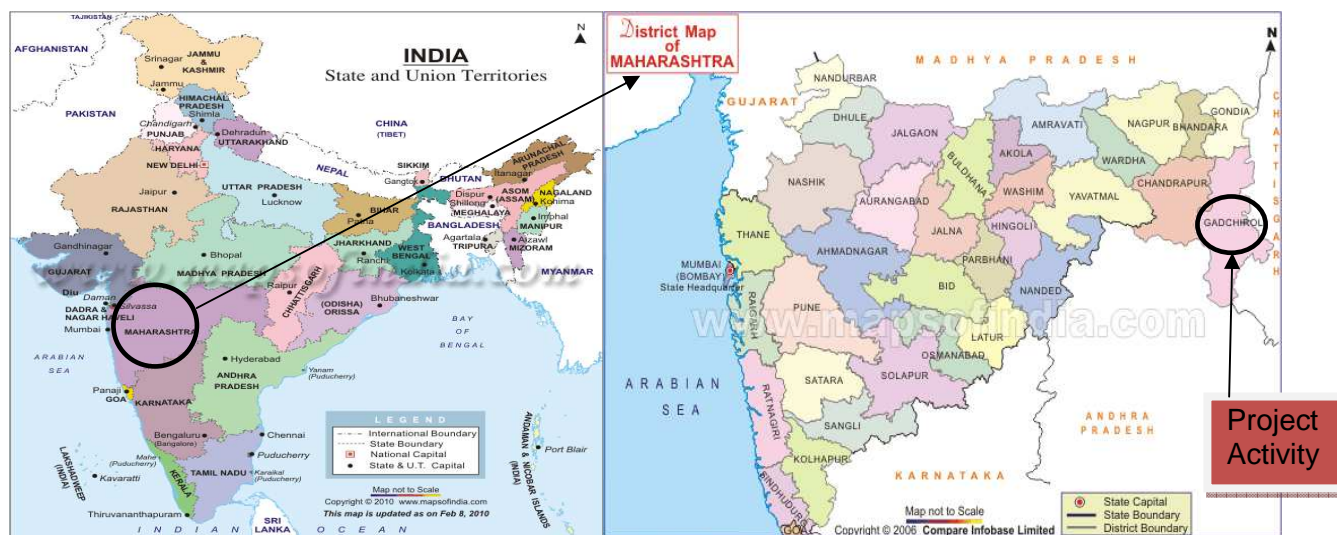
Plant Outage details are mentioned in Emission Reduction Spread Sheet.

The monitored electricity generation (EG_{BL,y}) is compared with its corresponding value of SFC of fuel used and the lowest of two is considered for the calculation of emission reduction. The total emission reductions achieved in this monitoring period accounts to 31,595 tCO₂e.

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°37'22" North to 79°57'32" East.



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

A.3. Parties and project participants

Parties involved	Project participants	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. (Private Entity)	No

A.4. Reference to applied methodologies and standardized baselines

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AMS ID – Grid connected renewable electricity generation, Version 15¹Tool to calculate the emission factor for an electricity system' version 01.1 Annex 12 EB 35²Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion", version-02, EB41,annex 11³**A.5. Crediting period type and duration**

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Start date of crediting period: 26/01/2011

Choice of crediting period: 10 years (Fixed)

Crediting period: 26/01/2011 – 25/01/2021

SECTION B. Implementation of project activity**B.1. Description of implemented 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/cm² and 490°C is supplied to an extraction cum condensing turbine generator (TG) set at around 64 kg/cm² and 480°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.(The generated power, after meeting the auxiliary power requirements, is sold to Tata Power Trading Company Limited (TPTCL) through grid.)

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.

¹ <http://cdm.unfccc.int/UserManagement/FileStorage/7QXAZ5036WN8BEYKUDFRPJGL21V4I9>

² <http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v1.1.pdf>

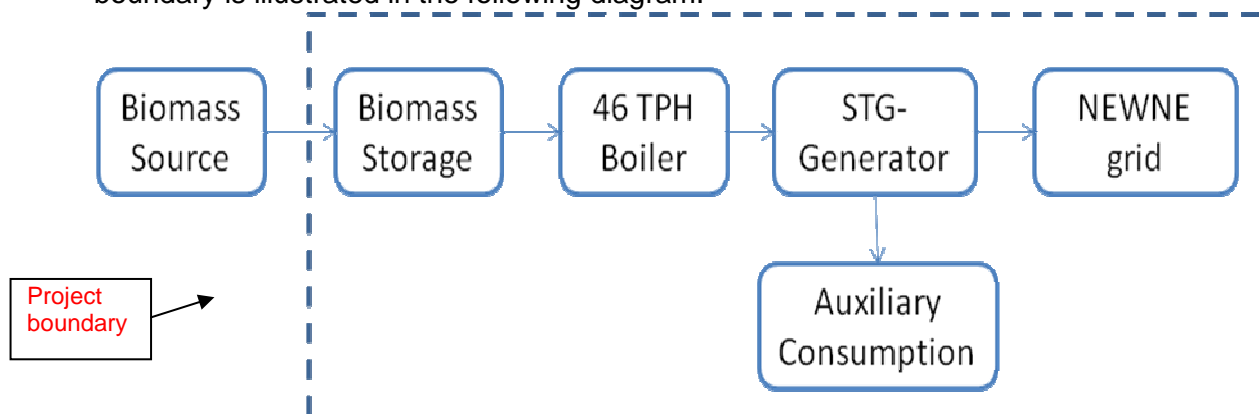
³ http://cdm.unfccc.int/EB/041/eb41_repan11.pdf

The 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 during the current monitoring period with rice husk and fossil fuel. 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/Nm³, 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°C
Turbo Generator	
Type	Extraction cum Condensing
Steam pressure at the TG inlet	64 kg/cm ²
Steam temperature at the TG inlet	480°C
Frequency	50 Hz
Power Evacuation	
Grid Voltage	132 kV
MSEDCL 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. However there are regular maintenance schedule was recorded during current monitoring period.

B.2. Post-registration changes**B.2.1. Temporary deviations from the registered monitoring plan, applied methodologies or standardized baselines**

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This section is left blank intentionally as not applicable.x

B.2.2. Corrections

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Corrections in revised PDD version 05.5 dated 06/05/2014 has been approved by UNFCCC on 14/08/2014.

B.2.3. Changes to the start date of the crediting period

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This section is left blank intentionally as not applicable.

B.2.4. Inclusion of monitoring plan

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This section is left blank intentionally as not applicable.

B.2.5. Permanent changes to the registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines, or other applied standards or tools

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Monitoring plan of the project activity has been revised and revised PDD version 05.5 was approved by UNFCCC on 14/08/2014.

<http://cdm.unfccc.int/Projects/DB/SGS-UKL1288172340.56/view>

B.2.6. Changes to project design

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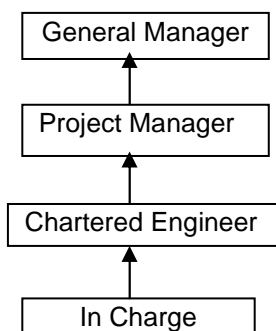
This section is left blank intentionally as not applicable.

SECTION C. Description of monitoring system

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AAEL has implemented the following structure for data monitoring, collection, data archiving and calibration of equipments for this project activity.

Organization chart:-



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

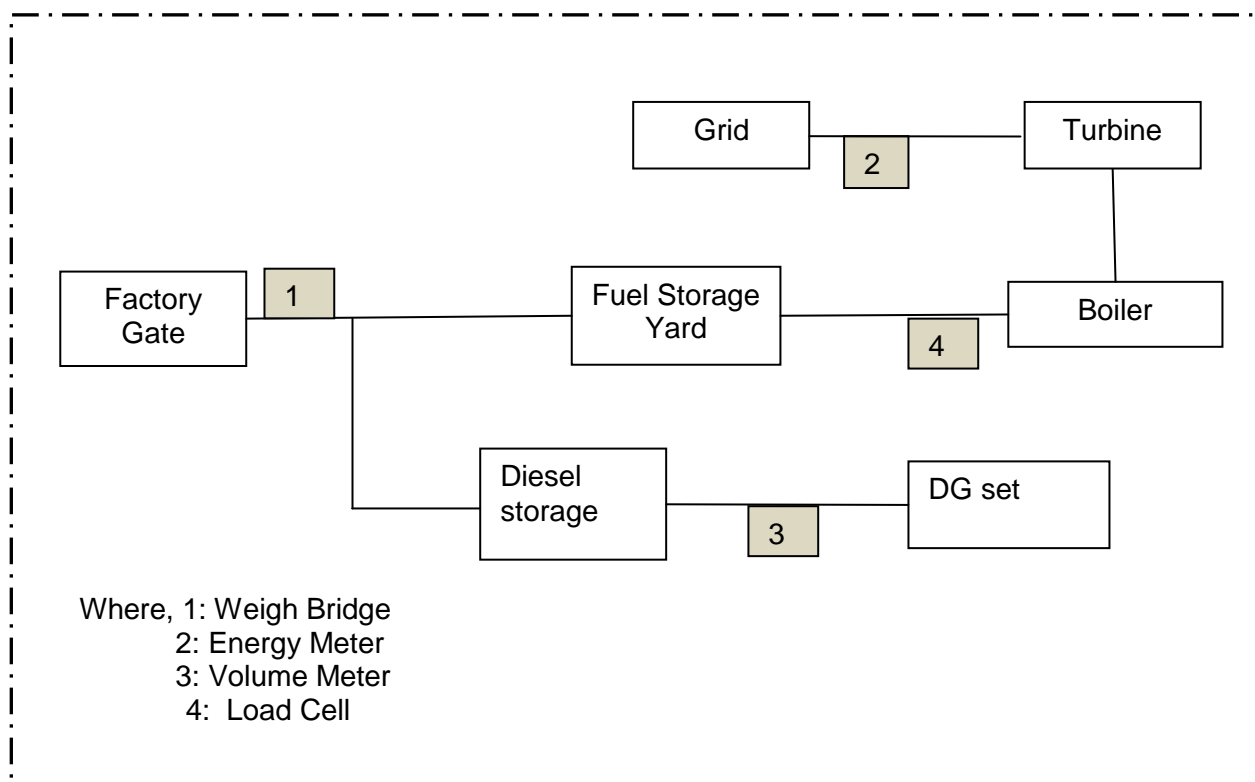
At the project site the in-charge maintains the data records, ensures completeness of data, and reliability of data (calibration of equipments). Wherein even day to day data of electricity generation is collected and maintained through a log book for data to be monitored. These reports are checked periodically 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 can be referred as below:



SECTION D. Data and parameters

D.1. Data and parameters fixed ex ante

Data/parameter	EF_{CO_2}
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
Choice of data or measurement methods and procedures	The fixed ex-ante combined margin emission factor is used in the calculation of emission reductions.
Purpose of data	Calculation of baseline emissions
Additional comments	As per revised approved 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

Choice of data or measurement methods and procedures	The calculation is based on specific fuel consumption in boiler for steam generation and specific steam consumption in turbine for electricity generation.		
	Parameter	Value	Unit
	Specific fuel consumption in boiler	0.27	Tonne of Rice husk/Tonne of steam
	Specific steam consumption	4.07	Tonne of steam/MWh
	Specific fuel consumption of power plant	1.1089	Tonne of Rice husk/MWh
Purpose of data	To cross check the calculation of baseline emissions		
Additional comments	As per revised approved PDD.		

Data/parameter	SFC_{FF}		
Unit	Tonnes of fossil fuel/MWh		
Description	Specific fuel consumption of fossil fuel		
Source of data	Calculated based on NCV of coal and design data of the boiler and turbine		
Value(s) applied)	0.839		
Choice of data or measurement methods and procedures	The calculation is based on specific fuel consumption in boiler for steam generation and specific steam consumption in turbine for electricity generation.		
	Parameter	Value	Unit
	Specific fuel consumption in boiler	0.21	Tonne of coal/Tonne of steam
	Specific steam consumption	4.07	Tonne of steam/MWh
	Specific fuel consumption of power plant	0.839	Tonne of coal/MWh
Purpose of data	Calculation of Baseline emissions		
Additional comments	Specific fuel consumption has been specified ex ante based on designed data and this will be ex ante fixed for the crediting period.		

D.2. Data and parameters monitored

Data/parameter	EG_{BL,y}
Unit	MWh
Description	Net electricity exported to the grid from this project activity
Measured/calculated/default	Measured & calculated
Source of data	Monthly energy meter reading records issued by the TPTCL/sales invoice raised by AAEL.

Value(s) of monitored parameter		Month	Option 1 (MWh)	Option 2 (MWh)	
		01/04/2017 - 30/04/2017	5,451.87	5,451.30	
		01/05/2017 - 31/05/2017	4,379.00	4,378.74	
		01/06/2017 - 30/06/2017	1,964.36	6,219.63	
		01/07/2017 - 31/07/2017	814.09	5,667.69	
		01/08/2017 - 31/08/2017	4,745.15	4,744.76	
		01/09/2017 - 30/09/2017	4,047.51	4,047.03	
		01/10/2017 - 31/10/2017	4,655.67	4,655.49	
		01/11/2017 - 30/11/2017	5,274.10	5,273.79	
		01/12/2017 - 31/12/2017	6,180.01	6,179.72	
		01/01/2018 - 31/01/2018	6,384.91	6,391.66	
		01/02/2018 - 28/02/2018	-491.13	4,705.47	
		01/03/2018 - 31/03/2018	3,482.08	4,030.10	
		Total	46,887.61	61,745.38	
Monitoring equipment	Monitoring Equipment: Energy meter Main Meter: Accuracy class: 0.2 S Main meter: Serial number: MSB09097 Make: Secure Calibration frequency: annually Date of calibration: 29/03/2017 Validity: one year Check Meter: Make: Secure Check meter: Serial number: MSB09096 Accuracy class: 0.2 S Calibration frequency: annually Date of calibration: 29/03/2017 Validity: one year				
Measuring/reading/recording frequency	Measuring: Continuously Reading: Hourly Recording: Monthly				
Calculation method (if applicable)	The energy meter installed at the site is a two-way metering system, which directly measures the exported and imported electricity. $EG_{BL,y}$, net electricity exported to the grid, is the simple difference of these two directly measured values with no other data/ value/ procedure being involved. $EG_{BL,y}$ = (Electricity exported to the grid – Electricity imported from grid) Option 1: Net electricity exported to the grid is calculated as per Para 22 of applicable methodology (AMS-I.D. ver. 15) Option 2: Considering project emissions from coal				
QA/QC procedures	The meter is calibrated annually. Measurement results can be cross-checked with records for sold electricity - Invoices raised by AAEL.				
Purpose of data/parameter	Calculation of baseline emissions				
Additional comments:	-				

Data/parameter	Q_{biomass}																																										
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	<table border="1"> <thead> <tr> <th>Month</th><th>Q_{biomass} (consumed) (Tonnes)*</th><th>Q_{biomass} (Procured) (Tonnes)</th></tr> </thead> <tbody> <tr> <td>01/04/2017 - 30/04/2017</td><td>9,409.00</td><td>7,211.00</td></tr> <tr> <td>01/05/2017 - 31/05/2017</td><td>6,878.84</td><td>5,859.45</td></tr> <tr> <td>01/06/2017 - 30/06/2017</td><td>6,354.83</td><td>4,310.78</td></tr> <tr> <td>01/07/2017 - 31/07/2017</td><td>3,387.32</td><td>2,922.66</td></tr> <tr> <td>01/08/2017 - 31/08/2017</td><td>4,139.32</td><td>6,724.87</td></tr> <tr> <td>01/09/2017 - 30/09/2017</td><td>6,389.05</td><td>5,765.23</td></tr> <tr> <td>01/10/2017 - 31/10/2017</td><td>6,698.50</td><td>6,650.46</td></tr> <tr> <td>01/11/2017 - 30/11/2017</td><td>8,893.62</td><td>7,447.49</td></tr> <tr> <td>01/12/2017 - 31/12/2017</td><td>7,545.73</td><td>8,938.37</td></tr> <tr> <td>01/01/2018 - 31/01/2018</td><td>6,092.39</td><td>8,167.70</td></tr> <tr> <td>01/02/2018 - 28/02/2018</td><td>4,635.30</td><td>1,548.89</td></tr> <tr> <td>01/03/2018 - 31/03/2018</td><td>4,034.47</td><td>5,174.31</td></tr> <tr> <td>Total</td><td>74,458.37</td><td>70,721.21</td></tr> </tbody> </table> <p>* Actual quantity of biomass used in boiler measured through load cell on the conveyor.</p>	Month	Q _{biomass} (consumed) (Tonnes)*	Q _{biomass} (Procured) (Tonnes)	01/04/2017 - 30/04/2017	9,409.00	7,211.00	01/05/2017 - 31/05/2017	6,878.84	5,859.45	01/06/2017 - 30/06/2017	6,354.83	4,310.78	01/07/2017 - 31/07/2017	3,387.32	2,922.66	01/08/2017 - 31/08/2017	4,139.32	6,724.87	01/09/2017 - 30/09/2017	6,389.05	5,765.23	01/10/2017 - 31/10/2017	6,698.50	6,650.46	01/11/2017 - 30/11/2017	8,893.62	7,447.49	01/12/2017 - 31/12/2017	7,545.73	8,938.37	01/01/2018 - 31/01/2018	6,092.39	8,167.70	01/02/2018 - 28/02/2018	4,635.30	1,548.89	01/03/2018 - 31/03/2018	4,034.47	5,174.31	Total	74,458.37	70,721.21
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Total	74,458.37	70,721.21																																									
Monitoring equipment	<p>Monitoring Equipment: Weigh Bridge Accuracy class: Class III Serial number: 149/08 Total capacity: 60 T Least count: 10 kg Calibration frequency: annually Date of last calibration: 27/03/2017 Validity: one year</p> <p>Monitoring equipment: Load cell Type: Belt mounted Nominal load: 6.33 kg IC Number: 6111000597-2-2-001-01 Serial number: 6111-597-001 Load cell Type: S Calibration frequency: annually Date of calibration: 25/06/2017 Validity: one year</p>																																										
Measuring/reading/recording frequency	<p>Measuring: Continuously Reading: Daily Recording: Daily</p>																																										

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/parameter	Calculation of baseline emissions
Additional comments	-

Data/parameter	FC_{Coal,i,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	Month	FC_{Coal,i,y} (consumed) * (Tonnes)	FC_{Coal,i,y} (procured) (Tonnes)
	01/04/2017 - 30/04/2017	-	-
	01/05/2017 - 31/05/2017	157.14	-
	01/06/2017 - 30/06/2017	3,286.76	3,570.20
	01/07/2017 - 31/07/2017	781.49	4,072.40
	01/08/2017 - 31/08/2017	2,623.25	-
	01/09/2017 - 30/09/2017	1,148.16	-
	01/10/2017 - 31/10/2017	-	-
	01/11/2017 - 30/11/2017	724.04	-
	01/12/2017 - 31/12/2017	1,275.96	-
	01/01/2018 - 31/01/2018	2,080.75	-
	01/02/2018 - 28/02/2018	629.84	4,359.98
	01/03/2018 - 31/03/2018	-	459.86
	Total	12,707.39	12,462.44
	* Actual quantity of coal combusted in the power plant measured through load cell on the conveyor.		

Monitoring equipment	<p>Monitoring Equipment: Weigh Bridge Accuracy class: Class III Serial number: 149/08 Total capacity: 60 T Least count: 10 kg. Calibration frequency: annually</p> <p>Date of last calibration: 27/03/2017</p> <p>Validity: one year Monitoring equipment: Load cell Type: Belt mounted Nominal load: 6.33 kg IC number : 6111000597-2-2-001-01 Serial Number: 6111-597-001 Load cell Type: S Calibration frequency: annually Date of last calibration: 25/06/2017 Validity: one year</p>
Measuring/reading/recording frequency	<p>Measuring: Continuously Reading: Daily Recording: Daily</p>
Calculation method (if applicable)	NA
QA/QC procedures	The weigh 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/parameter	Calculation of baseline emissions & project emissions
Additional comments:	In option 1 , coal data is used for baseline emissions but in option 2, it is used for project emissions,

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	Month	FC _{diesel,j,y} (Procured) Litres	FC _{diesel,j,y} (Consumed) Litres
	01/04/2017 - 30/04/2017	5,000	3,408
	01/05/2017 - 31/05/2017	8,000	10,461
	01/06/2017 - 30/06/2017	1,000	170
	01/07/2017 - 31/07/2017	1,000	795
	01/08/2017 - 31/08/2017	6,000	1,753
	01/09/2017 - 30/09/2017	7,000	1,436
	01/10/2017 - 31/10/2017	4,000	2,603
	01/11/2017 - 30/11/2017	3,000	1,165
	01/12/2017 - 31/12/2017	2,000	1,795
	01/01/2018 - 31/01/2018	3,000	1,170
	01/02/2018 - 28/02/2018	3,000	3,039
	01/03/2018 - 31/03/2018	5,000	593
	Total	48,000	28,388
Monitoring equipment	Monitoring Equipment: Volume meter Type: Jar (neck type) Capacity: 01, 02, 03, 05 & 10 litres Date of Calibration :09/06/2017 Validity :09/06/2019		
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/parameter	Calculation of project emissions		
Additional comments	-		

Data/parameter	NCV _{coal,y}
Unit	TJ/tonne
Description	Net calorific value of coal in year y
Measured/calculated/default	Measured
Source of data	NCV values provided by the fuel supplier in invoices. The maximum value of NCV of coal provided by the supplier is considered for the project emission calculation. This is conservative.
Value(s) of monitored parameter	0.014470
Monitoring equipment	Not applicable as the NCV values provided by the fuel supplier are being considered.
Measuring/reading/recording frequency	Measuring: NCV is obtained for each fuel delivery (from fuel supplier) Recording: Monthly
Calculation method (if applicable)	Not applicable since the NCV values supplied by the fuel supplier are considered for the emission reduction calculation.

QA/QC procedures	<p>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.</p> <table><tr><td>Lower range (on 95 % confidence level) TJ/Gg</td><td>NCV (TJ/Gg)</td><td>Upper range (on 95 % confidence level) TJ/Gg</td></tr><tr><td>11.5</td><td>18.9</td><td>26</td></tr></table> <p>The average Value of NCV during the monitoring period =3,462 kcal/kg =(3,462 *4.18)*10⁶/10⁹ =14.470 TJ/Gg = 0.014470 TJ/tonne</p> <p>Conversion factor: 1 kCal/kg= 4.18 kJ/kg Since the monitored value is within the uncertainty range of the IPCC values so no additional information is required to be collected .</p>	Lower range (on 95 % confidence level) TJ/Gg	NCV (TJ/Gg)	Upper range (on 95 % confidence level) TJ/Gg	11.5	18.9	26
Lower range (on 95 % confidence level) TJ/Gg	NCV (TJ/Gg)	Upper range (on 95 % confidence level) TJ/Gg					
11.5	18.9	26					
Purpose of data/parameter	Data is used for Project emission calculation.						
Additional comments	-						

Data/parameter	NCV _{diesel,y}						
Unit	TJ/litre						
Description	Net calorific value of diesel in year y						
Measured/calculated/default	Monitored/Recorded value The Average value of NCV of diesel provided by the supplier is considered for the project emission calculation. This is conservative.						
Source of data	Values provided by the fuel supplier in invoices.						
Value(s) of monitored parameter	0.00003526						
Monitoring equipment	Not applicable						
Measuring/reading/recording frequency	NCV is obtained for each fuel delivery (from fuel supplier)						
Calculation method (if applicable)	NA						
QA/QC procedures	<p>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.</p> <table><tr><td>Lower range (on 95 % confidence level) TJ/Gg</td><td>NCV (TJ/Gg)</td><td>Upper range (on 95 % confidence level) TJ/Gg</td></tr><tr><td>41.4</td><td>43</td><td>43.3</td></tr></table> <p>The average Value of NCV during the monitoring period =10,360 kcal/kg =(10,360*0.82*4.18*10⁻⁹) = 0.00003551TJ/lt</p> <p>Since the monitored value is within the uncertainty range of the IPCC values so no additional information is required to be collected .</p>	Lower range (on 95 % confidence level) TJ/Gg	NCV (TJ/Gg)	Upper range (on 95 % confidence level) TJ/Gg	41.4	43	43.3
Lower range (on 95 % confidence level) TJ/Gg	NCV (TJ/Gg)	Upper range (on 95 % confidence level) TJ/Gg					
41.4	43	43.3					
Purpose of data/parameter	Data is used for Project emission calculation.						
Additional comments	-						

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 recorded in log book at the factory gate.																												
Value(s) of monitored parameter	<table border="1"> <thead> <tr> <th>Month</th><th>Numbers of Trucks</th></tr> </thead> <tbody> <tr> <td>01/04/2017 - 30/04/2017</td><td>346</td></tr> <tr> <td>01/05/2017 - 31/05/2017</td><td>199</td></tr> <tr> <td>01/06/2017 - 30/06/2017</td><td>309</td></tr> <tr> <td>01/07/2017 - 31/07/2017</td><td>684</td></tr> <tr> <td>01/08/2017 - 31/08/2017</td><td>759</td></tr> <tr> <td>01/09/2017 - 30/09/2017</td><td>965</td></tr> <tr> <td>01/10/2017 - 31/10/2017</td><td>889</td></tr> <tr> <td>01/11/2017 - 30/11/2017</td><td>407</td></tr> <tr> <td>01/12/2017 - 31/12/2017</td><td>571</td></tr> <tr> <td>01/01/2018 - 31/01/2018</td><td>1,019</td></tr> <tr> <td>01/02/2018 - 28/02/2018</td><td>915</td></tr> <tr> <td>01/03/2018 - 31/03/2018</td><td>644</td></tr> <tr> <td>Total</td><td>7,707</td></tr> </tbody> </table>	Month	Numbers of Trucks	01/04/2017 - 30/04/2017	346	01/05/2017 - 31/05/2017	199	01/06/2017 - 30/06/2017	309	01/07/2017 - 31/07/2017	684	01/08/2017 - 31/08/2017	759	01/09/2017 - 30/09/2017	965	01/10/2017 - 31/10/2017	889	01/11/2017 - 30/11/2017	407	01/12/2017 - 31/12/2017	571	01/01/2018 - 31/01/2018	1,019	01/02/2018 - 28/02/2018	915	01/03/2018 - 31/03/2018	644	Total	7,707
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01/03/2018 - 31/03/2018	644																												
Total	7,707																												
Monitoring equipment	Not applicable																												
Measuring/reading/recording frequency	Measuring: Daily Reading: Daily Recording: monthly																												
Calculation method (if applicable)	NA																												
QA/QC procedures	<p>This can be cross-checked with average carrying capacity of vehicle and quantity of rice husk consumed in that period.</p> <p>Quantity of rice husk = 76,955.02 tonne Average load /trip = 9.98 tonne No. of trucks = $76,955.02 / 9.98$ = 7710.92</p>																												
Purpose of data/parameter	Data is used for leakage emission calculation.																												
Additional comments	-																												

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	Month	Maximum distance in km
	01/04/2017 - 30/04/2017	48.00
	01/05/2017 - 31/05/2017	40.00
	01/06/2017 - 30/06/2017	50.00
	01/07/2017 - 31/07/2017	50.00
	01/08/2017 - 31/08/2017	50.00
	01/09/2017 - 30/09/2017	50.00
	01/10/2017 - 31/10/2017	48.00
	01/11/2017 - 30/11/2017	47.00
	01/12/2017 - 31/12/2017	48.00
	01/01/2018 - 31/01/2018	46.00
	01/02/2018 - 28/02/2018	49.00
	01/03/2018 - 31/03/2018	44.00
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 is considered for calculation of leakage due to transportation. Maximum distance is 50 km for the current monitoring period.	
Purpose of data/parameter	Data is used for leakage emission calculation.	
Additional comments	-	

D.3. Implementation of sampling plan

>>

This section is left blank intentionally as not applicable.

SECTION E. Calculation of emission reductions or net anthropogenic removals

E.1. Calculation of baseline emissions or baseline net removals

>>

Sample calculation for the baseline emissions calculation for the month of **June 2017**:

Option 1: As per the paragraph 20 of the applicable methodology AMS.I.D version 15:

“if fossil fuel is used, the electricity generation metered should be adjusted by deducting the electricity generation from fossil fuels using the specific fuel consumption and the quantity of the fossil fuel consumed”

Metered electricity generation for the month of **June 2017** = 7,018.80 MWh

Power Gen using coal SFC based estimation = $FC_{coal,j,y} / SFC_{coal}$
= 3,570.20 tonne/0.839 tonnes of coal/ MWh
= 4255.30 MWh

Power Gen using rice husk - estimated based on SFC coal = 7,018.80 – 4255.30
= 2,763.50 MWh

Paragraph 22 of the applicable methodology AMS.I.D version 15:

“The amount of electricity generated using biomass fuels calculated as per paragraph 20 shall be compared with the amount of electricity generated calculated using specific fuel consumption and amount of each type of biomass fuel used. The lower of the two values should be used to calculate emission reductions.”

$$\begin{aligned}\text{Power Gen using rice husk (based on SFC rice husk)} &= Q_{\text{biomass,y}} / \text{SFC}_{\text{rice husk}} \\ &= 4,310.78 \text{ tonne} / 1.1089 \text{ tonnes of rice} \\ &\text{husk/MWh} \\ &= 3,887.44 \text{ MWh}\end{aligned}$$

Baseline emission reduction calculation:

$$\begin{aligned}\text{Gross electricity generated} &= \text{Min [Power Gen using rice husk: estimated based on SFC} \\ &\text{coal (MWh), Power Gen using rice husk: based on SFC rice husk (MWh)]} \\ &= \text{Min [2,763.50, 3,887.44 MWh]} \\ &= 2,763.50 \text{ MWh}\end{aligned}$$

$$\begin{aligned}\text{Aux electricity} &= \text{Gross electricity generated} - \text{electricity exported to grid} + \text{electricity} \\ &\text{imported from grid} \\ &= 7,018.80 - 4255.30 + 2,763.50 \\ &= 799.14 \text{ MWh}\end{aligned}$$

$$\begin{aligned}\text{EG}_{\text{BL,y}} &= \text{Gross electricity exported to the grid} - \text{Aux electricity} \\ &= 2,763.50 \text{ MWh} - 799.14 \text{ MWh} \\ &= 1,964.36 \text{ MWh}\end{aligned}$$

$$\text{BE}_y = \text{EG}_{\text{BL,y}} * \text{EF}_y$$

Where,

BE_y : Baseline emissions due to displacement of electricity during the year y in tons of CO₂
 $\text{EG}_{\text{BL,y}}$: 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.

$$\text{Grid Emission Factor} = 0.805 \text{ tCO}_2/\text{MWh}$$

$$\begin{aligned}\text{BE}_y &= 1,964.36 \text{ MWh} * 0.805 \text{ tCO}_2/\text{MWh} \\ &= 1,581.31 \text{ tCO}_2\text{e}\end{aligned}$$

Option 2: Considering project emissions from coal

$$\begin{aligned}\text{EG}_{\text{BL,y}} &= \text{Gross electricity generated} - \text{Aux electricity} - \text{Imported electricity} \\ &= 7,018.80 - 799.14 - 0.03 \\ &= 6,219.63 \text{ MWh}\end{aligned}$$

$$\begin{aligned}\text{BE}_y &= \text{EG}_{\text{BL,y}} * \text{EF}_y \\ &= 6,219.63 * 0.805 \text{ tCO}_2/\text{MWh} \\ &= 5,006.80 \text{ tCO}_2\text{e}\end{aligned}$$

Baseline emission calculations for the complete monitoring period, 01/04/2017 – 31/03/2018 can be referred from Emission Reduction sheet.

E.2. Calculation of project emissions or actual net removals

>>

Project Emissions due to Auxiliary Fuel (e.g. Diesel 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 CO₂ emissions from fossil fuel combustion in process j during the year y (tCO₂/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 CO₂ emission coefficient of fuel type i in year y (tCO₂/mass or volume unit)

i = Are the fuel type (diesel) combusted in process j during the year y

The CO₂ 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 CO₂ emission coefficient $COEF_{i,y}$ is calculated based on net calorific value and CO₂ 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 diesel = 0.00003551 TJ/litre (Monitored Value: Average of the NCV values supplied by the fuel supplier)

Net calorific value of coal = 0.014470 TJ/tonne (The maximum value of NCV of coal provided by the supplier is considered for the project emission calculation)

Emission factor of diesel = 74.8 tCO₂/TJ (2006 IPCC maximum value)

Emission factor of coal = 100 tCO₂/TJ (2006 IPCC maximum value)

Project emission due to Diesel:

Month	Quantity of diesel used in the plant ⁴ (litres)	Project emissions (tCO ₂ e)
01/04/2017 - 30/04/2017	3,408	9.05
01/05/2017 - 31/05/2017	10,461	27.79
01/06/2017 - 30/06/2017	170	0.45
01/07/2017 - 31/07/2017	795	2.11
01/08/2017 - 31/08/2017	1,753	4.66

⁴ Since the procured Diesel quantity is less than the combusted Diesel quantity so for project emission calculation combusted quantity is considered. This is conservative.

01/09/2017 - 30/09/2017	1,436	3.81
01/10/2017 - 31/10/2017	2,603	6.91
01/11/2017 - 30/11/2017	1,165	3.09
01/12/2017 - 31/12/2017	1,795	4.77
01/01/2018 - 31/01/2018	1,170	3.11
01/02/2018 - 28/02/2018	3,039	8.07
01/03/2018 - 31/03/2018	539	1.58
Total	28,388	76

Project emission due to Coal:

Month	Quantity of coal used in the plant (tonnes)	Project emissions (tCO ₂ e)
01/04/2017 - 30/04/2017	-	-
01/05/2017 - 31/05/2017	-	-
01/06/2017 - 30/06/2017	3,570.20	5,165.91
01/07/2017 - 31/07/2017	4,072.40	5,892.57
01/08/2017 - 31/08/2017	-	-
01/09/2017 - 30/09/2017	-	-
01/10/2017 - 31/10/2017	-	-
01/11/2017 - 30/11/2017	-	-
01/12/2017 - 31/12/2017	-	-
01/01/2018 - 31/01/2018	-	-
01/02/2018 - 28/02/2018	4,359.98	6,308.69
01/03/2018 - 31/03/2018	459.86	665.40
Total	12,462.44	18,033

E.3. Calculation of leakage emissions

>>

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

- 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. Calculation of emission reductions or net anthropogenic removals

	Baseline GHG emission	Project GHG emissions or actual net	Leakage GHG emissions	GHG emission reductions or net anthropogenic GHG removals (t CO ₂ e)
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				Before 01/01/2013	From 01/01/2013	Total amount
Option 1: As per Para 22 of the applicable methodolog y AMS I.D. Version 15:	37,744	76	0	0	37,664	37,664 ⁵
Option 2: Considerin g project emissions from coal:	49,705	18,033 + 76 = 18,109	0	0	31,595	31,595 ⁶

E.5. Comparison of emission reductions or net anthropogenic removals achieved with estimates in the registered PDD

Amount achieved during this monitoring period (t CO ₂ e)	Amount estimated ex ante (t CO ₂ e)
31,595	49,766

E.6. Remarks on increase in achieved emission reductions

>>

Emission reductions for the considered period (366 days) as per estimates in the PDD(tCO ₂ e)	Actual Emission Reduction for the monitoring period (tCO ₂ e)	Variation
49,766	31,595	-36.51%

There is decrease of 36.51 % in the actual emission reductions achieved during the current monitoring period from that stated in the revised approved CDM-PDD because of breakdown and outage of the plant.

⁵ The ER value 37,664 derived from option 1, is not equal to the resulted value 37,668 (Baseline Emission – Project Emissions 37,744 – 76 = 37,668) because PP has conservatively considered the rounded down value of emission reduction for each month for the complete monitoring period. This is the most conservative approach to estimate the emission reduction.

⁶ The ER value 31,595 derived from option 2, is not equal to the value 31,596 (Baseline Emission – Project Emissions 49,705 – 18,109 = 31,596) because PP has conservatively considered the rounded down value of emission reduction for each month for the complete monitoring period. This is the most conservative approach to estimate the emission reduction.

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Document information

<i>Version</i>	<i>Date</i>	<i>Description</i>
06.0	7 June 2017	Revision to: <ul style="list-style-type: none"> • Ensure consistency with version 01.0 of the "CDM project standard for project activities" (CDM-EB93-A04-STAN); • Make editorial improvements.
05.1	4 May 2015	Editorial revision to correct version numbering.
05.0	1 April 2015	Revisions to: <ul style="list-style-type: none"> • Include provisions related to delayed submission of a monitoring plan; • Provisions related to the Host Party; • Remove reference to programme of activities; • Overall editorial improvement.
04.0	25 June 2014	Revisions to: <ul style="list-style-type: none"> • Include the Attachment: Instructions for filling out the monitoring report form (these instructions supersede the "Guideline: Completing the monitoring report form" (Version 04.0)); • Include provisions related to standardized baselines; • Add contact information on a responsible person(s)/ entity(ies) for completing the CDM-MR-FORM in A.6 and Appendix 1; • Change the reference number from <i>F-CDM-MR</i> to <i>CDM-MR-FORM</i>; • Editorial improvement.
03.2	5 November 2013	Editorial revision to correct table in page 1.
03.1	2 January 2013	Editorial revision to correct table in section E.5.
03.0	3 December 2012	Revision required to introduce a provision on reporting actual emission reductions or net GHG removals by sinks for the period up to 31 December 2012 and the period from 1 January 2013 onwards (EB 70, Annex 11).
02.0	13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the monitoring report form" (EB 66, Annex 20).
01.0	28 May 2010	EB 54, Annex 34. Initial adoption.
Decision Class: Regulatory Document Type: Form Business Function: Issuance Keywords: monitoring report		