



Monitoring report form for CDM project activity
(Version 08.0)

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	Revised approved PDD Version 5.5 (Dated 06/05/2014)		
Version number of this monitoring report	01		
Completion date of this monitoring report	01/09/2021		
Monitoring period number	08		
Duration of this monitoring period	01/04/2018 – 31/12/2020 (First and last day included)		
Monitoring report number for this monitoring report	NA		
Project participants	M/s. A.A. Energy Limited (Private Entity) Eneco Energy Trade B.V.		
Host Party	India		
Applied methodologies and standardized baselines	Applied Methodology: AMS-I.D. version 15.0 – Grid connected renewable electricity generation Selected standardized baseline: N/A		
Sectoral scopes	01: Energy industries (renewable -/ non-renewable sources)		
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 until 31 December 2020	Amount achieved from 1 January 2021
	NA	44,626 ¹ tCO ₂ e	0 tCO ₂ e
Amount of GHG emission reductions or net anthropogenic GHG removals estimated ex ante for this monitoring period in the PDD	137,163 ² tCO ₂ e		

¹ Please refer ER calculation sheet for detailed calculation.

² Please refer section E.5.1 of MR, the calculation of “amount estimated ex ante for this monitoring period in the PDD” is given transparently. Please refer ER calculation sheet for detailed calculation.

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.

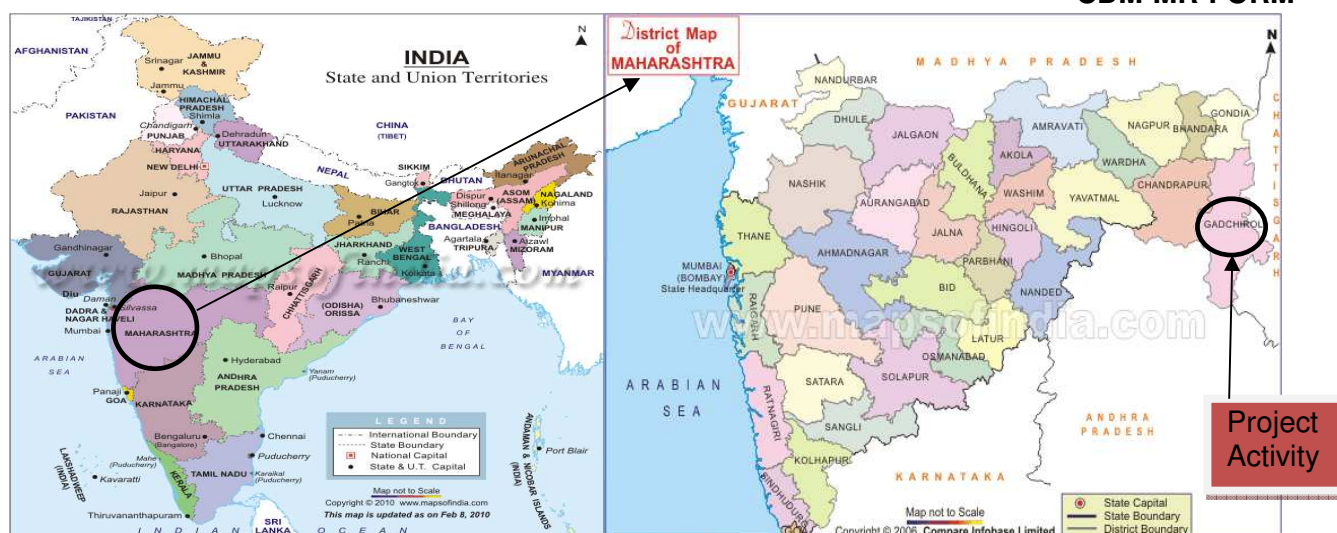
The monitored electricity generation ($EG_{BL,y}$) is compared with its corresponding value of SFC of fuel used and the lowest of two is considered for the calculation of emission reduction. The total emission reductions achieved in this monitoring period 01/04/2018 – 31/12/2020 (First and last day included) accounts to 44,626 tCO_{2e}

A.2. Location of project activity

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1. Host Party (ies) : India
2. Region/ State/ Province, etc. : Maharashtra
3. City/ Town/ Community, etc. : Village Desaiganj Wadsa, District Gadchiroli
4. Physical/ Geographical location : 20°37'22" N and 79°57'32" E

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 physical location is shown in the figure below:



(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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Methodology:

“Grid connected renewable electricity generation” AMS-I.D.
Version 15.

Tool:

“Tool to calculate the emission factor for an electricity system, version 07”
“Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion, version 03”

Reference: <https://cdm.unfccc.int/methodologies/DB/W3TINZ7KKWCK7L8WTXFQQOFQQH4SBK>

A.5. Crediting period type and duration

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Crediting period Type : Fixed Crediting Period

Crediting period Duration : 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

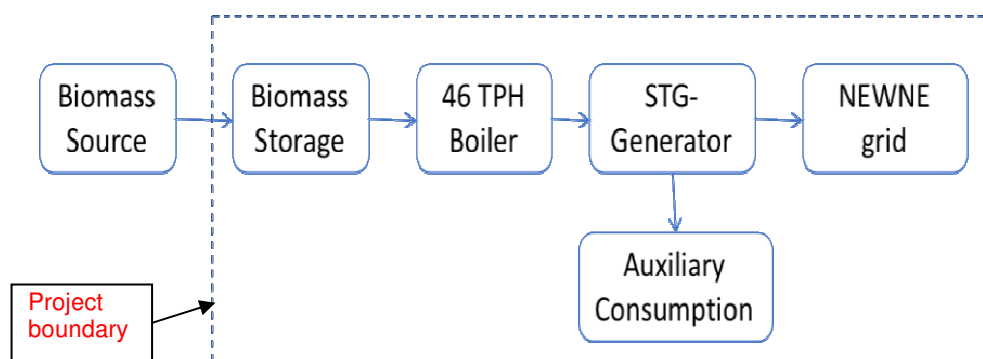
The process of power generation is by Rankine cycle. Steam generated at high a pressure of 66 kg/cm² and 490°C is supplied to an extraction cum condensing turbine generator (TG) set at around 64 kg/cm² and 480°C. Fuel is supplied to boiler and entire steam generated is passed through the 10 MW steam 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. 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. However there are regular maintenance schedule that 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.

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 methodological regulatory documents

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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.

B.2.7. Changes specific to afforestation or reforestation project activity

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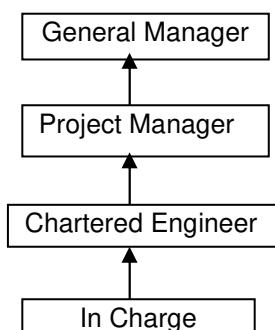
This section is left blank intentionally as not applicable.

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:-

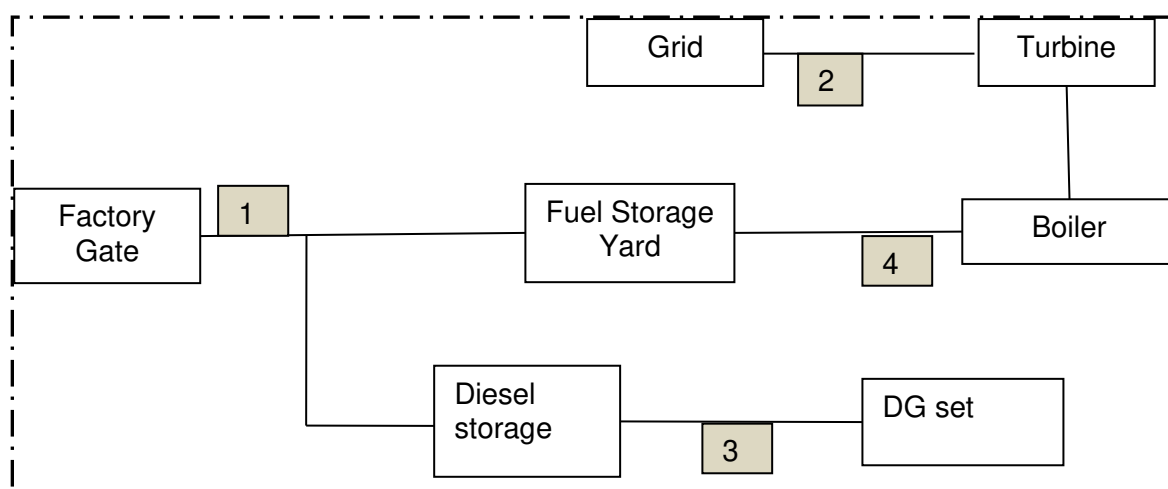


The General Manager oversees the overall functioning and maintenance of the project activity, the dedicated team formed under his supervision will work on specified tasks.

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:



Where, 1: Weigh Bridge, 2: Energy Meter, 3: Volume Meter, 4: Load Cell

SECTION D. Data and parameters

D.1. Data and parameters fixed ex ante

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
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/parameter	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	<table><tr><td>Duration</td><td>Option 1 (MWh)</td><td>Option 2 (MWh)</td></tr><tr><td>Total (01/04/2018 - 31/12/2020)</td><td>86,859</td><td>105,418</td></tr></table> <p>Monthly Values are reported in ER sheet submitted to DOE.</p>			Duration	Option 1 (MWh)	Option 2 (MWh)	Total (01/04/2018 - 31/12/2020)	86,859	105,418
Duration	Option 1 (MWh)	Option 2 (MWh)							
Total (01/04/2018 - 31/12/2020)	86,859	105,418							
Monitoring equipment	<p>Monitoring Equipment: Energy meter</p> <p>Main Meter:</p> <p>Accuracy class: 0.2 S Main meter: Serial number: MSB09096 Make: Secure Calibration frequency: annually Date of calibration: 08/03/2018 Validity: one year</p> <p>New Main Meter: Serial number: XE479723 Make: Secure Calibration frequency: annually Date of calibration: 25/01/2019 Validity: one year</p> <p>Check Meter:</p> <p>Make: Secure Check meter: Serial number: MSB09097 Accuracy class: 0.2 S Calibration frequency: annually Date of calibration: 08/03/2018 Validity: one year</p> <p>New Check Meter: Serial number: XE479724 Make: Secure Calibration frequency: annually Date of calibration: 25/01/2019 Validity: one year</p>								
Measuring/reading/recording frequency	Measuring: Continuously Reading: Hourly Recording: Monthly								

Calculation method (if applicable)	<p>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.</p> <p>$EG_{BL,y} = (\text{Electricity exported to the grid} - \text{Electricity imported from grid})$</p> <p>Option 1: Net electricity exported to the grid is calculated as per Para 22 of applicable methodology (AMS-I.D. ver. 15)</p> <p>Option 2: Considering project emissions from coal</p>
QA/QC procedures	<p>The meter is calibrated annually.</p> <p>Measurement results can be cross-checked with records for sold electricity - Invoices raised by AAEL.</p>
Purpose of data/parameter	Calculation of baseline emissions
Additional comments:	-

Data/parameter	Q _{biomass}														
Unit	Tonnes/annum														
Description	Quantity of biomass (including rice husk and bamboo dust) 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><tr><th>Duration</th><th>Q_{biomass} (Procured) (Tonnes)</th><th>Q_{biomass} (Consumed) (Tonnes)*</th></tr><tr><td>Total (01/04/2018 - 31/03/2019)</td><td>58,834.73</td><td>53,794.88</td></tr><tr><td>Total (01/04/2019 - 31/03/2020)</td><td>63,255.00</td><td>69,699.00</td></tr><tr><td>Total (01/04/2020 - 31/12/2020)</td><td>15,042.00</td><td>36,722.00</td></tr></table> <p>* Actual quantity of biomass used in boiler measured through load cell on the conveyor. Monthly Values are reported in ER sheet submitted to DOE.</p>			Duration	Q _{biomass} (Procured) (Tonnes)	Q _{biomass} (Consumed) (Tonnes)*	Total (01/04/2018 - 31/03/2019)	58,834.73	53,794.88	Total (01/04/2019 - 31/03/2020)	63,255.00	69,699.00	Total (01/04/2020 - 31/12/2020)	15,042.00	36,722.00
Duration	Q _{biomass} (Procured) (Tonnes)	Q _{biomass} (Consumed) (Tonnes)*													
Total (01/04/2018 - 31/03/2019)	58,834.73	53,794.88													
Total (01/04/2019 - 31/03/2020)	63,255.00	69,699.00													
Total (01/04/2020 - 31/12/2020)	15,042.00	36,722.00													

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: 19/03/2018 & 27/03/2019 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, 13/06/2018 & 15/07/2018 Validity: one year</p>
Measuring/reading/recording frequency	<p>Measuring: Continuously Reading: Daily Recording: Daily</p>
Calculation method (if applicable)	NA
QA/QC procedures	<p>The weigh scale used for measuring fuels is calibrated annually. The data can be cross checked with the biomass procurement data.</p>
Purpose of data/parameter	Calculation of baseline emissions
Additional comments:	-

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			
	Duration	FC _{Coal,j,y} (procured) (Tonnes)	FC _{Coal,j,y} (consumed)* (Tonnes)
	Total (01/04/2018 - 31/03/2019)	13,793.11	9,755.26
	Total (01/04/2019 - 31/03/2020)	25,378.00	12,610.00
	Total (01/04/2020 - 31/12/2020)	10,454.00	6,391.00
* Actual quantity of coal combusted in the power plant measured through load cell on the conveyor. Monthly Values are reported in ER sheet submitted to DOE.			

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: 19/03/2018 & 27/03/2019 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 last calibration: 25/06/2017, 13/06/2018 & 15/07/2018 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			
	Duration	FC _{diesel,j,y} (Procured) Litres	FC _{diesel,j,y} (Consumed) Litres
	Total (01/04/2018 - 31/03/2019)	0	0
	Total (01/04/2019 - 31/03/2020)	0	0
	Total (01/04/2020 - 31/12/2020)	0	0
	Monthly Values are reported in ER sheet submitted to DOE.		
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	0.013992								
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	<div>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.</div> <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> <div>The average Value of NCV during the monitoring period =3,347 kcal/kg =(3,347 *4.18)*10⁶/10⁹ =13.992 TJ/Gg = 0.013992TJ/tonne</div> <div>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 .</div>			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	0.00003551								
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 number of deliveries/vehicles recorded in log book at the factory gate.								
Value(s) of monitored parameter	<table border="1"> <tr> <th>Duration</th><th>Numbers of Trucks</th></tr> <tr> <td>Total (01/04/2018 - 31/03/2019)</td><td>386</td></tr> <tr> <td>Total (01/04/2019 - 31/03/2020)</td><td>377</td></tr> <tr> <td>Total (01/04/2020 - 31/12/2020)</td><td>235</td></tr> </table> <p>Monthly Values are reported in ER sheet submitted to DOE.</p>	Duration	Numbers of Trucks	Total (01/04/2018 - 31/03/2019)	386	Total (01/04/2019 - 31/03/2020)	377	Total (01/04/2020 - 31/12/2020)	235
Duration	Numbers of Trucks								
Total (01/04/2018 - 31/03/2019)	386								
Total (01/04/2019 - 31/03/2020)	377								
Total (01/04/2020 - 31/12/2020)	235								
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 and bamboo dust consumed in that period.</p> <p>Quantity of rice husk and bamboo dust = 60322.24 tonne Average load /trip = 70.55 tonne No. of trucks = $60322.24 / 70.55$ = 855.03</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 Biomass (Rice husk and bamboo dust) source in year y								
Measured/calculated/default	Estimated								
Source of data	Log book at the factory gate								
Value(s) of monitored parameter	<table border="1"> <thead> <tr> <th>Duration</th><th>Maximum distance in km</th></tr> </thead> <tbody> <tr> <td>Total (01/04/2018 - 31/03/2019)</td><td>47.00</td></tr> <tr> <td>Total (01/04/2019 - 31/03/2020)</td><td>50.00</td></tr> <tr> <td>Total (01/04/2020 - 31/12/2020)</td><td>49.00</td></tr> </tbody> </table> <p>Monthly Values are reported in ER sheet submitted to DOE.</p>	Duration	Maximum distance in km	Total (01/04/2018 - 31/03/2019)	47.00	Total (01/04/2019 - 31/03/2020)	50.00	Total (01/04/2020 - 31/12/2020)	49.00
Duration	Maximum distance in km								
Total (01/04/2018 - 31/03/2019)	47.00								
Total (01/04/2019 - 31/03/2020)	50.00								
Total (01/04/2020 - 31/12/2020)	49.00								
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	<p>No QA/QC is required as the maximum distance is considered for calculation of leakage due to transportation.</p> <p>Maximum distance is 50 km for the current monitoring period.</p>								
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 **Jan 2019**:

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 **Jan 2019** = 5,194.60 MWh

Power Gen using coal SFC based estimation = $FC_{coal,j,y} / SFC_{coal}$
 = 1,138.18 tonne/0.839 tonnes of coal/ MWh
 = 1,356.59 MWh

Power Gen using rice husk - estimated based on SFC coal = 5,194.60 – 1,356.59
 = 3,838.01 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.”

Power Gen using rice husk (based on SFC rice husk) = $Q_{biomass,y} / SFC_{rice\ husk}$
 = 5,536.19 tonne / 1.1089 tonnes of rice
 husk/MWh
 = 4,992.51 MWh

Baseline emission reduction calculation:

Gross electricity generated = Min [Power Gen using rice husk: estimated based on SFC coal (MWh), Power Gen using rice husk: based on SFC rice husk (MWh)]
 = Min [3,838.01, 4,992.51 MWh]
 = 3,838.01 MWh

Aux electricity = Gross electricity generated – electricity exported to grid + electricity imported from grid
 = 5,194.60 – 1,356.59 + 3,838.01
 = 971.60 MWh

$EG_{BL,y}$ = Gross electricity exported to the grid – Aux electricity
 = 3,838.01 MWh – 971.60 MWh
 = 2,866.41 MWh

$BE_y = EG_{BL,y} * EF_y$

Where,

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

Grid Emission Factor = 0.805 tCO₂/MWh

$BE_y = 2,866.41 \text{ MWh} * 0.805 \text{ tCO}_2/\text{MWh}$
 = 2,307.46 tCO₂e

Option 2: Considering project emissions from coal

$EG_{BL,y}$ = Gross electricity generated – Aux electricity - Imported electricity

$$= 5,194.60 - 971.60 - 485.80$$

$$= 3,737.20 \text{ MWh}$$

$BE_y = EG_{BL,y} * EF_y$

$$= 3,737.20 * 0.805 \text{ tCO}_2/\text{MWh}$$

$$= 3,008.45 \text{ tCO}_2\text{e}$$

Baseline emission calculations for the complete monitoring period, 01/04/2018 – 31/12/2020 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 = 0.013992 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:

Duration	Quantity of diesel used in the plant (litres)	Project emissions (tCO ₂ e)
Total (01/04/2018 - 31/12/2020)	0	0

Project emission due to Coal:

Month	Quantity of coal used in the plant (tonnes)	Project emissions (tCO ₂ e)
Total (01/04/2018 - 31/12/2020)	29,690.26	44,626

E.3. Calculation of leakage emissions

>>

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

- The Biomass (rice husk and bamboo dust) used for the project activity is available within 50 km radial distance from the project site and the Biomass (rice husk and bamboo dust) is transported within a distance of 50 km from the project site. Biomass (Rice husk and Bamboo Dust) 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 emissions or baseline net GHG removals (t CO ₂ e)	Project GHG emissions or actual net GHG removals (t CO ₂ e)	Leakage GHG emissions (t CO ₂ e)	GHG emission reductions or net anthropogenic GHG removals (t CO ₂ e)			
				Before 01/01/2013	From 01/01/2013 until 31/12/2020	From 01/01/2021	Total amount
Total (Option 1)	69,921	0	0	0	69,921	0	69,921
Total (Option 2)	84,861	40,235	0	0	44,626	0	44,626
Most Conservative Total (Between Option 1 & 2)	84,861	40,235	0	0	44,626	0	44,626

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 for this monitoring period in the PDD (t CO ₂ e)
44,626	137,163

E.5.1. Explanation of calculation of “amount estimated ex ante for this monitoring period in the PDD”

>>

The annual estimated volume of CERs as per registered PDD is 49,766 tCO₂e. The total nos. of days included in this monitoring period (i.e. 01/04/2018 to 31/12/2020, inclusive of both the days) = 1006. Thus, to calculate the ex-ante estimated value corresponds to this monitoring period, the value has been extrapolated and made equivalent to 1006 days, which results in 137,163³ tCO₂e. The detailed calculation has been provided in ER calculation sheet.

E.6. Remarks on increase in achieved emission reductions

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There is no increase in the emission reduction during the current monitoring period as compared to the estimated ER in the registered CDM-PDD for the equivalent period. However, it has been observed that there is decrease of 68.49% in emission reduction relative to the estimation in the registered CDM-PDD. This is due to less electricity supplied to DISCOM due to the shutdown periods of the plant.

E.7. Remarks on scale of small-scale project activity

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The project activity is a Type-I category small scale 10 MW biomass-based power project and there is no change in the rated capacity of project activity has happened during this monitoring period and crediting period which may lead to the change in the scale of project activity. This can be further verified from the monthly generation statements and existing power purchase agreement.

³Ex-ante estimated value corresponds to this monitoring period = $49,766/365 * 1006 = 137,163$ tCO₂e

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Document information

<i>Version</i>	<i>Date</i>	<i>Description</i>
08.0	6 April 2021	Revision to: <ul style="list-style-type: none"> • Reflect the “Clarification: Regulatory requirements under temporary measures for post-2020 cases” (CDM-EB109-A01-CLAR).
07.0	31 May 2019	Revision to: <ul style="list-style-type: none"> • Ensure consistency with version 02.0 of the “CDM project standard for project activities” (CDM-EB93-A04-STAN); • Add a section on remarks on the observance of the scale limit of small-scale project activity during the crediting period; • Add "changes specific to afforestation or reforestation project activity" as a possible post-registration changes; • Clarify the reporting of net anthropogenic GHG removals for A/R project activities between two commitment periods; • Make editorial improvements.
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.

<i>Version</i>	<i>Date</i>	<i>Description</i>
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.
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