Monitoring report form for CDM project activity (Version 09.0)

MONITORING REPORT			
Title of the project activity	A.T. Biopower Rice Husk Power Project in Pichit, Thailand		
UNFCCC reference number of the project activity	1026		
Version number of the PDD applicable to this monitoring report	03		
Version number of this monitoring report	01		
Completion date of this monitoring report	23/12/2021		
Monitoring period number	01		
Duration of this monitoring period	21/12/2012 - 31/03/2018 (Included first and last days)		
Monitoring report number for this monitoring period	NA		
Project participants	A.T. Biopower Co., Ltd (Thailand) Vert Conservation Pte Ltd (Sweden)		
Host Party	Thailand		
Applied methodologies and standardized baselines	ACM0018 “Electricity generation from biomass in power-only plants” (Version 03.0)		
Sectoral scopes	1: 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
	1,402 tCO_2e	3,37,336 tCO_2e	0
Amount of GHG emission reductions or net anthropogenic GHG removals estimated ex ante for this monitoring period in the PDD	287,762[1] tCO_2		

[1] Please refer section E.5 of MR & ER sheet for detailed calculation.

SECTION A. Description of project activity

A.1. General description of project activity

>>
The project activity "A.T. Biopower Rice Husk Power Project in Pichit, Thailand" has been registered as a CDM project since 18/06/2007 (UNFCCC Reference Number 1026)[2].

In general, the project activity is defined as a power-only plant which is a power plant applying all heat engines of the power plant produce only power and do not co-generate heat, and the thermal energy produced in equipment of the power plant is only used in heat engines and not for other processes. The project activity involves the installation of 22.5 MWe biomass power plant which is located in Pichit province, Thailand and 20 MWe net is sold to the national grid to replace the fossil base electricity in the grid system.

The biomass residues, rice husk, used as main fuel fed to the boiler generating heat and the heat is carried out by steam to the header and then is use in condensing turbine to generate the electricity sold to the grid. There are some amount of electricity generated is used for station service. In case of power plant shut down, the electricity from the national grid is requested for station service.

As electricity from the project activity is generated from renewable energy and it is replacing the fossil base electricity in the grid system, the estimate of annual average GHG emission reduction for the chosen crediting period (second crediting period from 21/12/2012 to 20/12/2019) is 54,506 tCO_2 and the total actual emission achieved during the current Monitoring Period (21/12/2012 to 31/03/2018) is 338,738 tCO_{2e}.

A.2. Location of project activity

>>
Country: Thailand
Province: Pichit province
City: Bang Moon Nak city/ Horkai sub-district
Address: 96 Moo 2, Horkai sub-district of Ampur Bang Moon Nak, Pichit province, Thailand

Geographical location:-

Latitude: 16° 04' 16.67" N;
Longitude: 100° 23' 47.73" E;

A.3. Parties and project participants

Parties involved	Project participants	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
Thailand	A.T. Biopower Co., Ltd	No
Sweden	Vert Conservation Pte Ltd	No

A.4. References to applied methodologies and standardized baselines

>>
The selected methodology for second crediting period is:
ACM0018 "Electricity generation from biomass residues in power-only plants" (Version 3.0).

[2] https://cdm.unfccc.int/Projects/DB/DNV-CUK1174909241.2/view

Tools referenced in this methodology:
“Tool to calculate project or leakage CO2 emissions from fossil fuel combustion” (Version 02);
“Emissions from solid waste disposal sites” (Version 06.0.1);
“Tool to calculate baseline, project and/or leakage emissions from electricity consumption” (Version 01);
“Tool to calculate the emission factor for an electricity system” (Version 04.0);
“Project and leakage emissions from road transportation of freight” (Version 01.0.0)

The selected methodology and tools referenced in this methodology can refer to the UNFCCC CDM website is:
http://cdm.unfccc.int/methodologies/DB/DAZTTA5JRVU3J4W4PEFMT4ZOQW0DFM.

A.5. Crediting period type and duration

>>
Type of crediting period: Renewable crediting period (7 years)
Starting date of the crediting period for this Monitoring Period: 21/12/2012 to 20/12/2019 (2nd crediting period).

First Crediting Period was 21/12/2005 - 20/12/2012.

SECTION B. Implementation of project activity

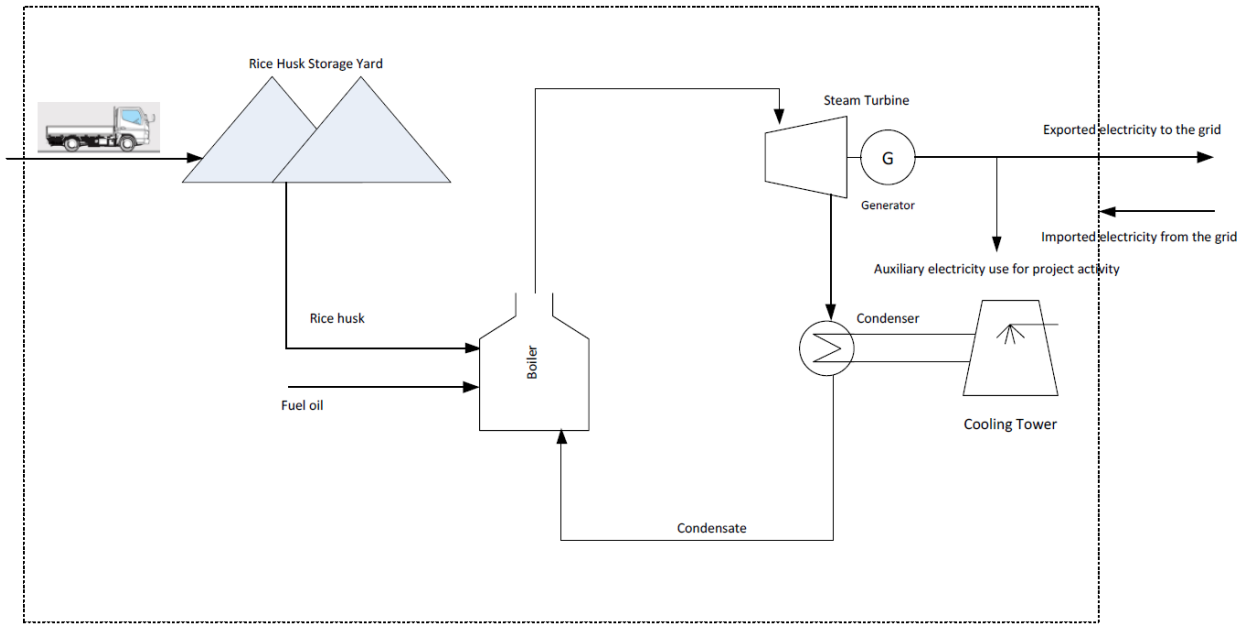
B.1. Description of implemented project activity

>>

The project involves the construction and operation of new rice husk power plant in Pichit province with gross generating capacity of generator at 22.5 MWe. The plant operates using suspension-fired boilers, design to burn ground rice husk in suspension. The main equipment has been installed provided in Table below

Main Equipment	Supplier	Specification
Boiler	Electrowatt-Ekono (Thailand) Ltd.	Design pressure = 76 bar Design temperature = 485^{0}C Capacity = 91 T/HR
Turbine	Electrowatt-Ekono (Thailand) Ltd.	Condensing turbine Inlet steam pressure 65 bar Inlet temperature 480^{0}C Speed (turbine/generator) 4900/1500 rpm Rated output (at generator terminal) 22.5 MW.
Generator	Electrowatt-Ekono (Thailand) Ltd.	Rated capacity 22.5 MW Rated Voltage 6.6 kV Rated current 260 A Rated power factor 0.8 Rated frequency 50 Hz Rated Speed 1500 rpm

The technology employed into the project activity is a simple power cycle consisting of boiler, turbine, and generator which can be presented as a diagram below.



The relevant dates for project activity are provided in table below:

Activity	**Relevant dates for project activity**
Commercial operation	21/12/2005

Renewal of Second CP	25/07/2014[3]
Pursuing Renewal of third CP	24/12/2021

The project activity has been continued in operation since commissioning. There were no events occurred which may impact the project activity baseline and its technological equipment's.

The total emission reduction from the project activity in this monitoring period is 338,738 tCO_2e

B.2. Post-registration changes

B.2.1. Temporary deviations from the registered monitoring plan, applied methodologies, standardized baselines or other methodological regulatory documents

>>
During this monitoring period, there are no any temporary deviations from registered monitoring plan or applied methodology has been identified.

B.2.2. Corrections

>>
During this monitoring period, there is no any correction to the project information or parameters fixed at validation has been identified.

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

>>
There is no any change to start date of crediting period.

B.2.4. Inclusion of monitoring plan

>>
During this monitoring period, there are no any permanent changes from registered monitoring plan or applied methodology.

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

>>
During this monitoring period, there are no any permanent changes from registered monitoring plan or applied methodology.

B.2.6. Changes to project design

>>
There is no Changes to project design of registered project activity

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

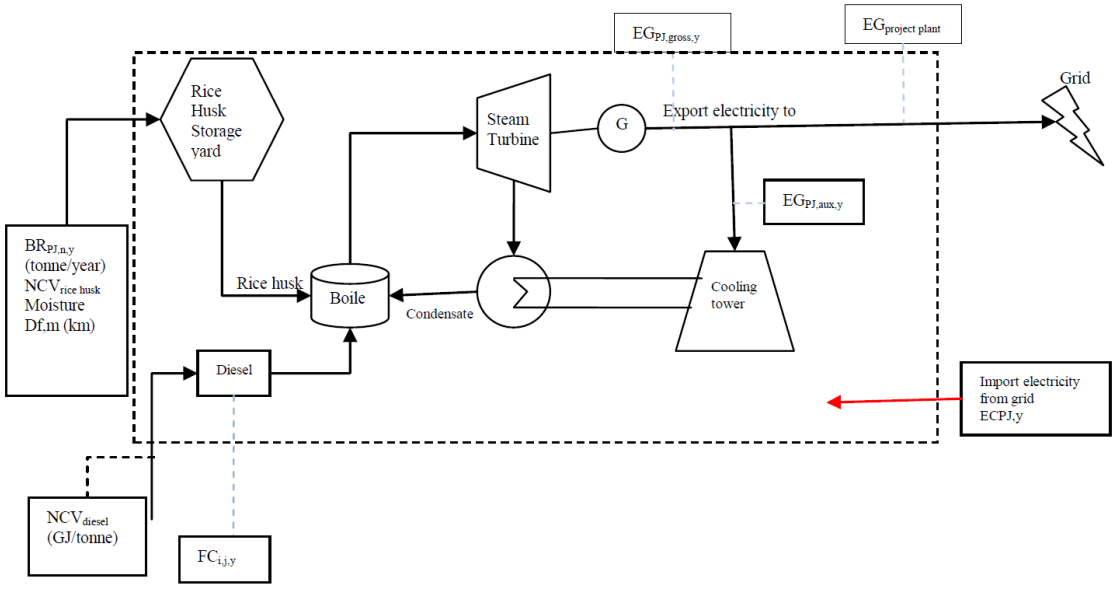
>>
N/A.

[3] https://cdm.unfccc.int/Projects/DB/DNV-CUK1174909241.2/view

SECTION C. Description of monitoring system

>>

The monitored parameters have been measured and monitored according to the diagram below.



Firstly, the quantity of rice husk (BR) is measured and recorded when it arrived to the power plant as same as moisture content, the number of truck and the average distance from rice mill to power plant. Also, the sample of rice husk will be taken for heating value measurement according to the method mention in section D.

The consumption of diesel oil using in the boiler and onsite transportation are separately measured as shown in the diagram; moreover, the heating value of diesel oil is measured follow the measurement method mention in section D. The electricity imported from the national grid and export to the national grid are also measured shown in the diagram.

In order to monitor emission reduction and any leakage effects generated by the project activity. The information flow has been set up a well-defined management and operational system. This system includes the operation and management of the monitoring plan, which specifies the requirements and procedures for parameters monitoring data recording and data archiving.

The plant manager and operators are responsible for the execution of the monitoring plan. Based on the modern system it intends to use for control and reporting, they collect and archive relevant data in a systematic and reliable way, evaluate them regularly, generate reports, and ensure the availability of pertinent information for verification. For the ease of understanding, ATB outlines the general guidance on performing the monitoring plan in the following areas:

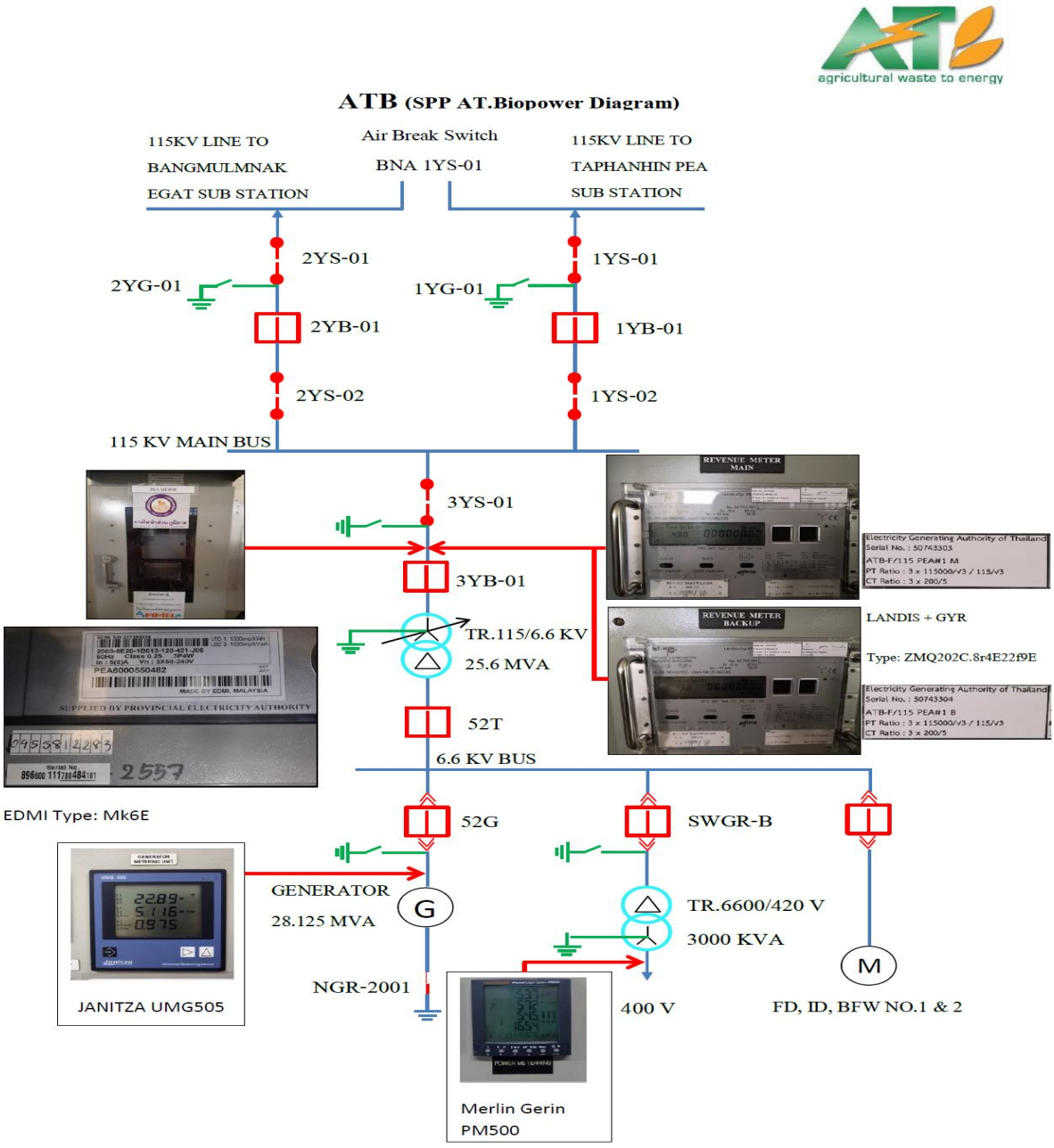
- Establishment of a transparent system for the data monitoring, collection, computation, and recording;
- Development of a protocols that provide routines procedures for electronic based data monitoring and record keeping processes, which must be fitting for independent auditing;
- Development of an “Equipment Calibration Procedures” booklet, which delineates the frequency and detail of each equipment calibration and maintenance; and
- Production and internal verification of monitoring are reported in a regular basis throughout the verification period.

Apart from internally verification done by the plant manager and ATB's board of directors, an independent verifier, DOE, also periodically audits the monitoring results and its management systems in order to ensure credibility and transparency of the reported emission reductions and other performance indicators of the ATB Project.

To ensure that the operators enable to undertake the tasks as per monitoring plan, internal on-the-job training is provided. The staff training programs are carried out before the initial verification with the supports of technical assistants, professionals and system contractors.

The description of the monitoring system which includes data collection procedure, organization structure, roles and responsibility of personnel, and emergency procedures for the monitoring system are provided in CDM manual which is controlled by ISO9001. The CDM manual can be provided during verification to DOE.

Electricity generation & Evacuation arrangement of the project plant:



SECTION D. Data and parameters

D.1. Data and parameters fixed ex ante

Data/Parameter	**GWP_{CH4}**
Unit	tCO_2e/tCH_4
Description	Global warming potential for methane valid for the relevant commitment Period
Source of data	IPCC
Value(s) applied	21 for period of 21/12/2012 – 31/12/2012 25 for period of 01/01/2013 – 20/12/2019
Choice of data or measurement methods and procedures	Recommended default value according to the latest version of IPCC or any international recommendation.
Purpose of data/parameter	(i) Calculation of baseline emissions; and (ii) Calculation of project emissions.
Additional comments	N/A

Data/Parameter	**$EF_{CO2,f}$**
Unit	gCO_2/t km
Description	Default CO_2 emission factor for freight transportation activity f
Source of data	Methodological Tool “Project and leakage emissions from road transportation of freight” (Version 01.0.0)
Value(s) applied	Vehicle class: Emission factor (gCO_2/t km) Light vehicles: 245 Heavy vehicles: 129
Choice of data or measurement methods and procedures	Default
Purpose of data/parameter	Calculation of project emissions
Additional comments	Applicable to Option B “Project and leakage emissions from road transportation of freight” (Version 01.0.0)

Data/Parameter	**$EF_{CO2,gird,CM,y}$**
Unit	tCO_2e/MWh
Description	CO_2 emission factor of the grid electricity in year y
Source of data	Calculated
Value(s) applied	0.5113
Choice of data or measurement methods and procedures	The Grid Emission Factor of Thai National Grid is calculated using the latest version 04.0 of “Tool to calculate the emission factor for an electricity system”, EB 75
Purpose of data/parameter	Used for baseline and project emission estimations
Additional comments	This value is used for the entire crediting period.

Data/Parameter	**$EF_{grid,OM,y}$**
Unit	tCO_2e/MWh
Description	Operating Margin Emission Factor
Source of data	Calculated
Value(s) applied	0.6

Choice of data or measurement methods and procedures	The Grid Emission Factor of Thai National Grid is calculated using the latest version 04.0 of "Tool to calculate the emission factor for an electricity system", EB 75.
Purpose of data/parameter	Used for baseline and project emission estimations
Additional comments	This value is used for the entire crediting period.

Data/Parameter	**$EF_{grid,BM,y}$**
Unit	tCO_2e/MWh
Description	Build Margin Emission Factor
Source of data	Calculated
Value(s) applied	0.42
Choice of data or measurement methods and procedures	The Grid Emission Factor of Thai National Grid is calculated using the latest version 04.0 of "Tool to calculate the emission factor for an electricity system", EB 75.
Purpose of data/parameter	Used for baseline and project emission estimations
Additional comments	This value is used for the entire crediting period.

Data/Parameter	**$TDL_{j,y}$**
Unit	-
Description	Average technical transmission and distribution losses for providing electricity to source j in year y.
Source of data	Reliable data available from DEDE
Value(s) applied	5.8%
Choice of data or measurement methods and procedures	$TDL_{j,y}$ has been chosen from DEDE under Ministry of Energy that is the recent, accurate and reliable data available within host country. In the absence of data from the relevant year, most recent figures should be used, but not older than 5 years.
Purpose of data/parameter	Used for project emission calculation
Additional comments	This value will be applied for entire of crediting period.

D.2. Data and parameters monitored

Data/Parameter	**Biomass residues categories and quantities used in the project activity**
Unit	Type (Rice husks); Source (Off-site) - Fate in the absence of the project activity (Scenario B1, B3); - Use in the project scenario (Scenario P5); Quantity (tonnes on dry-basis)

<table>
<tr><td>Description</td><td>
<table>
<tr><td>Biomass residues category (k)</td><td>Biomass residues type</td><td>Biomass residues source</td><td>Biomass residues fate in the absence of the project activity</td><td>Biomass residues use in project scenario</td><td>Biomass residues quantity (tonnes)</td></tr>
<tr><td></td><td>Rice husk</td><td>off-site from an identified rice mill</td><td>Dumping and decay of residues on fields (B1)

Burnt in an uncontrolled manner (B3)</td><td>Electricity generation on-site (P5)</td><td>Corresponds to the quantity of each biomass residues (tonnes)</td></tr>
</table>
</td></tr>
<tr><td>Measured/calculated/ default</td><td>Measured</td></tr>
<tr><td>Source of data</td><td>On-site measurement</td></tr>
<tr><td>Value(s) of monitored parameter</td><td>705878 ton (dry basis) for whole monitoring period</td></tr>
<tr><td>Monitoring equipment</td><td>
<table>
<tr><th>Equipment Name</th><th>Weigh Scale</th><th>Weigh Scale</th></tr>
<tr><td>S.No.</td><td>0000700</td><td>B311119902</td></tr>
<tr><td>Capacity</td><td>60000 kg</td><td>80000 kg</td></tr>
<tr><td>Make</td><td>Commandor</td><td>Mettler Toledo</td></tr>
<tr><td>Type/Model</td><td>HP 01</td><td>IND 560</td></tr>
<tr><td>Date of Calibration</td><td>04-Jul-13, 03-Jul-14</td><td>24-Mar-15, 29-Jan-16, 23-Jan-17, 22-Jan-18, 14-Jan-19</td></tr>
<tr><td>Due Date</td><td>02-Jul-15</td><td>13-Feb-20</td></tr>
</table>
</td></tr>
<tr><td>Measuring/reading/recording frequency</td><td>This parameter will be measured by a weighbridge (each time trucks arrive). Data is to be aggregated monthly and yearly and will be archived electronically. The figure will be adjusted with the accuracy of +20 kg for project emission and -20 kg for baseline emission when the calibration of equipment is delayed.

The archived data will be kept during the crediting period and two years after the end of the crediting period.</td></tr>
<tr><td>Calculation method (if applicable)</td><td>Use weighbridge. Adjust for the moisture content in order to determine the quantity of dry biomass.</td></tr>
<tr><td>QA/QC procedures</td><td>Cross-check the measurements with an annual energy balance that is based on purchased quantities and stock changes</td></tr>
<tr><td>Purpose of data/parameter</td><td>(i) Calculation of baseline emissions;
(ii) Calculation of project emissions</td></tr>
<tr><td>Additional comments</td><td>The amount of biomass residues combusted is estimated from the amount of rice husk delivered to the project site considering the stocks of biomass at the beginning and end of each verification period As per the methodology, an energy balance will be carried out annually, considering the stocks of rice husk at the beginning and end of each verification period.</td></tr>
</table>

Data/Parameter	**Moisture content of the biomass residue**
Unit	% Water content

<table>
<tr><td>Description</td><td>Moisture content of the each biomass combusted at ATB plant</td></tr>
<tr><td>Measured/calculated/ default</td><td>Measured</td></tr>
<tr><td>Source of data</td><td>On-site measurement</td></tr>
<tr><td>Value(s) of monitored parameter</td><td>8.92 % (Average)</td></tr>
<tr><td>Monitoring equipment</td><td>Moisture analyser (balance)

<table>
<tr><th>Equipment Name</th><th>Balance</th><th>Balance</th></tr>
<tr><td>S.No</td><td>1126433853</td><td>1123290318</td></tr>
<tr><td>Condition</td><td>In Condition</td><td>In Condition</td></tr>
<tr><td>Make</td><td>Mettler Toledo</td><td>Mettler Toledo</td></tr>
<tr><td>Type/Model</td><td>AB104-S</td><td>MS204 - S</td></tr>
<tr><td>Date of Calibration</td><td>24-Sep-13</td><td>24-Sep-13</td></tr>
<tr><td>Due Date</td><td>23-Sep-14</td><td>23-Sep-14</td></tr>
</table>

<table>
<tr><th>Equipment Name</th><th>Balance</th><th>Balance</th></tr>
<tr><td>S.No</td><td>B240379055</td><td>B240379055</td></tr>
<tr><td>Condition</td><td>In Condition</td><td>In Condition</td></tr>
<tr><td>Make</td><td>Mettler Toledo</td><td>Mettler Toledo</td></tr>
<tr><td>Type/Model</td><td>HB43-S</td><td>HB43-S</td></tr>
<tr><td>Date of Calibration</td><td>02-Sep-14,
22-Sep-15,
31-Aug-15,
28-Aug-17,
31-Aug-18,
28-Aug-19,</td><td>02-Sep-14
22-Sep-15,
31-Aug-15,
28-June-16
28-Aug-17
31-Aug-18,
28-Aug-19,</td></tr>
<tr><td>Due Date</td><td>27-Aug-20</td><td>27-Aug-20</td></tr>
</table>
</td></tr>
<tr><td>Measuring/reading/recording frequency</td><td>The parameter will be measured each time truck arrive the figure will be adjusted with the accuracy of -3% for project emission and +3 % for baseline emission when the calibration of equipment is delayed.</td></tr>
<tr><td>Calculation method (if applicable)</td><td>To measure moisture content, the measurement will be done for each truck that delivers rice husk to the site by moisture analyser. Data is kept electronically during the crediting period and two year after the end of the crediting period.</td></tr>
<tr><td>QA/QC procedures</td><td>Moisture content of the rice husk will be cross checked with the result from the external laboratory with international testing standard at least annually, taking at least three samples for each measurement. The moisture analyzer will be calibrated at least annually.</td></tr>
<tr><td>Purpose of data/parameter</td><td>(i) Calculation of baseline emission
(ii) Calculation of project emission</td></tr>
<tr><td>Additional comments</td><td>In case of dry biomass, monitoring of this parameter is not necessary</td></tr>
</table>

Data/Parameter	**$EG_{PJ,gross,y}$**
Unit	MWh
Description	Gross quantity of electricity generated in all power plants which are located at the project site and included in the project boundary in year y
Measured/calculated/ default	Measured
Source of data	On-site measurements
Value(s) of monitored parameter	752291.78

Monitoring equipment	Controller meters
Measuring/reading/recording frequency	Data monitored continuously and aggregated as appropriate, to calculate emissions reduction. The figure will be adjusted with the accuracy of ±0.2% when the calibration of equipment is delayed.
Calculation method (if applicable)	Measured Quantity
QA/QC procedures	The consistency of metered electricity generation should be cross-checked with receipts from electricity sales (if available) and the quantity of fuels fired (e.g check whether the electricity generation divided by the quantity of fuels fired results in a reasonable efficiency that is comparable to previous years)
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	It is to be noted that controller meter does not required to be calibrated as the meters will be functional or not functional that means plant is in stop position. Please refer the energy meter location & diagram given under section C of MR.

Data/Parameter	**$EG_{PJ,aux,y}$**
Unit	MWh
Description	Total auxiliary electricity consumption required for the operation of the power plants at the project site
Measured/calculated/ default	Calculated
Source of data	Calculation
Value(s) of monitored parameter	110,238
Monitoring equipment	Calculated
Measuring/reading/recording frequency	Calculation will be done based on monthly basis
Calculation method (if applicable)	$EG_{PJ,aux,y}$ will be calculated from Gross Electricity generation ($EG_{PJ,gross,y}$) and Net Electricity generation to grid ($EG_{project\ plant}$) as the following expression ; $EG_{PJ,aux,y} = EG_{PJ,gross,y} - EG_{project\ plant}$ Where; $EG_{PJ,gross,y}$ = Gross quantity of electricity generated from ATB plant $EG_{project\ plant}$ = Net quantity of electricity generated from the ATB plant
QA/QC procedures	-
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	$EG_{PJ,aux,y}$ shall include all electricity required for the operation of equipment related to the preparation, storage and transport of biomass residues (e.g. for mechanical treatment of the biomass, conveyor belts, driers, etc.) and electricity required for the operation of all power plants which are located at the project site and included in the project boundary (e.g. for pumps, fans, cooling towers, instrumentation and control, etc.). During shutdown of the power plant, electricity import from grid will be used for auxiliary consumption.

Data/Parameter	**$EG_{project\ plant}$**
Unit	MWh

<table>
<tr><td>Description</td><td>Net quantity of electricity generated from the ATB plant</td></tr>
<tr><td>Measured/calculated/ default</td><td>Measured</td></tr>
<tr><td>Source of data</td><td>On-site measurements</td></tr>
<tr><td>Value(s) of monitored parameter</td><td>631,855.59</td></tr>
<tr><td>Monitoring equipment</td><td>Calibrated electricity meters

<table>
<tr><th>Equipment Name</th><th colspan="2">Energy Meter</th></tr>
<tr><td></td><td>Main Meter</td><td>Back up meter</td></tr>
<tr><td>S.No</td><td>83448654</td><td>83448652</td></tr>
<tr><td>Make</td><td>LANDIS & GYR</td><td>LANDIS & GYR</td></tr>
<tr><td>Accuaracy class</td><td>0.2S</td><td>0.2S</td></tr>
<tr><td>Date of Calibration</td><td>18-Nov-13</td><td>18-Nov-13</td></tr>
<tr><td>Due Date</td><td>17-Nov-14</td><td>17-Nov-14</td></tr>
</table>

<table>
<tr><th>Equipment Name</th><th colspan="2">Energy Meter</th></tr>
<tr><td></td><td>Main Meter</td><td>Back up meter</td></tr>
<tr><td>S.No</td><td>50743303</td><td>50743304</td></tr>
<tr><td>Make</td><td>LANDIS & GYR</td><td>LANDIS & GYR</td></tr>
<tr><td>Accuaracy class</td><td>0.2S</td><td>0.2S</td></tr>
<tr><td>Date of Calibration</td><td>23-Dec-14,
09-Oct-15,
07-Oct-16,
11-Oct-17,
18-Oct-18,
17-Dec-19</td><td>23-Dec-14,
09-Oct-15,
07-Oct-16,
11-Oct-17,
18-Oct-18,
17-Dec-19</td></tr>
<tr><td>Due Date</td><td>16-Dec-20</td><td>16-Dec-20</td></tr>
</table>
</td></tr>
<tr><td>Measuring/reading/recording frequency</td><td>This parameter will be measured continuously by electricity meter. Data will be kept electronically in a systematic and transparent manner during the crediting period and two years after the end of the crediting period.</td></tr>
<tr><td>Calculation method (if applicable)</td><td>NA</td></tr>
<tr><td>QA/QC procedures</td><td>The amount of the electricity generated by the project will be monitored by electricity meter, which will be calibrated in accordance with the standards set by EGAT. Cross-checked with receipts from electricity sales (if available) and the quantity of fuels fired (e.g. check whether the electricity generation divided by the quantity of fuels fired results in a reasonable efficiency that is comparable to previous years).</td></tr>
<tr><td>Purpose of data/parameter</td><td>Calculation of baseline emissions</td></tr>
<tr><td>Additional comments</td><td>This is electricity export to the grid</td></tr>
</table>

Data/Parameter	**$EC_{PJ,y}$**
Unit	MWh
Description	On-site electricity imported attributable to the project activity
Measured/calculated/ default	Measured
Source of data	On-site measurements
Value(s) of monitored parameter	2799.01

Monitoring equipment	Electricity meters, PEA meter PEA Meter (Import Meters) **Equipment Name** / **Power meter** S.No: 23047080 Make: EDMI Type/Model: Mk6E Date of Calibration: 16-Aug-13, 22-Aug-14, 03-May-15, 19-Jan-16, 11-Jan-17, 12-Feb-18, 12-Jul-19, 09-Aug-20 Due Date: 08-Aug-21
Measuring/reading/recording frequency	Continuously measure, Monthly record, and Yearly aggregate for emission calculation
Calculation method (if applicable)	NA
QA/QC procedures	On-site electricity consumption will be monitored by electricity meter, which will undergo calibration annually by PEA. The consistency of the data will be checked against electricity receipt from PEA.
Purpose of data/parameter	Calculation of project emissions
Additional comments	This parameter is electricity imported from grid for using within the project activity only.

Data/Parameter	**$NCV_{n,y}$**
Unit	GJ/tonnes on dry-basis
Description	Net calorific value of biomass residues of category n in year y
Measured/calculated/ default	Calculated
Source of data	On-site measurement
Value(s) of monitored parameter	15.09 MJ/kg (dry basis)
Monitoring equipment	-
Measuring/reading/recording frequency	Third Party lab report, at least every six months, taking at least three samples for each measurement
Calculation method (if applicable)	NA
QA/QC procedures	Check the consistency of the measurement by comparing the measurement results with measurements from previous year, relevant data source (e.g. values in the literature, values used in the national GHG inventory) and default values by the IPCC. If the measurement results differ significantly from previous measurements or other relevant data sources, conduct additional measurements. Ensure that the NCV is determined on the basis of dry biomass.
Purpose of data/parameter	(i) Calculation of baseline emissions (ii) Calculation of project emissions
Additional comments	-

Data/Parameter	$EF_{BR,n,y}$
Unit	tCH_4/GJ

Description	CH_4 emission factor for uncontrolled burning of the biomass residues category n during the year y
Measured/calculated/ default	Calculated
Source of data	Conduct measurement or use reference default values
Value(s) of monitored parameter	0.00013 tCH4/GJ per year
Monitoring equipment	-
Measuring/reading/recording frequency	-
Calculation method (if applicable)	To determine the CH_4 emission factor, project participants may undertake measurement or use referenced default values. In the absence of more accurate information, it is recommended to use 0.0027 tCH_4 per ton of biomass as default value for the product of NCV_k and $EF_{burning,CH4,k,y}$
QA/QC procedures	-
Purpose of data/parameter	Calculation of baseline emissions
Additional comments	-

Data/Parameter	**$EF_{CH4,BR}$**
Unit	tCH_4/GJ
Description	CH_4 emission factor for the combustion of biomass residues in the project plant
Measured/calculated/ default	Default
Source of data	On-site measurement of default values, as provided in Table 5 in ACM0018 (Version 03.0)
Value(s) of monitored parameter	0.0000411 tCH4/GJ
Monitoring equipment	-
Measuring/reading/recording frequency	-
Calculation method (if applicable)	To determine the CH_4 emission factor, project participants may undertake measurement or use referenced default values. In the absence of more accurate information, it is recommended to 30 kg/TJ from Table 5 in ACM0018 (Version 03.0). The uncertainty is estimated to be 300%, resulting in a conservativeness factor of 1.37. Thus, in this case a CH_4 emission factor of 41.1 kg/TJ should be used which can converted to 0.0000411 t CH_4/GJ
QA/QC procedures	-
Purpose of data/parameter	Calculation of project emission
Additional comments	-

Data/Parameter	**$D_{f, m}$**
Unit	Kilometer
Description	Return trip road distance between the original and destination of freight transportation activity f in monitoring period m
Measured/calculated/ default	Measured
Source of data	Records of vehicle operator or records by project participants
Value(s) of monitored parameter	80.67

Monitoring equipment	-
Measuring/reading/recording frequency	To be update whenever the road distance changes
Calculation method (if applicable)	Determined once for each freight transportation activity f for a reference trip using the vehicle odometer or any other appropriate source (e.g on-line sources)
QA/QC procedures	-
Purpose of data/parameter	Calculation of project emissions
Additional comments	Applicable to Option B in Methodological Tool "Project and leakage emissions from road transportation of freight"

Data/Parameter	**$FR_{f,m}$**
Unit	Tonnes
Description	Total mass of freight transported in freight transportation activity f in monitoring period m
Measured/calculated/ default	Measured.
Source of data	Records by project participants or records by truck operators
Value(s) of monitored parameter	778566.15
Monitoring equipment	Use weighbridge. Adjust for the moisture content in order to determine the quantity of dry biomass.
Measuring/reading/recording frequency	This parameter will be measured by a weighbridge (each time trucks arrive). Data is to be aggregated monthly and yearly and will be archived electronically. The figure will be adjusted with the accuracy of ±20 kg when the calibration of equipment is delayed. The archived data will be kept during the crediting period and two years after the end of the crediting period.
Calculation method (if applicable)	-
QA/QC procedures	Cross-check the measurements with an annual energy balance that is based on purchased quantities and stock changes
Purpose of data/parameter	Calculation of project emissions
Additional comments	The biomass residue quantities used should be monitored separately for (a) each type of biomass residue (e.g) and each source (e.g. produced on-site, obtained from biomass residues suppliers, obtained from a biomass residues market, obtained from an identified biomass residues producer, etc.) In additional, type of vehicles: Light and Heavy will be monitor based on EB70 Annex23 Methodological tool: Project and leakage emissions from transportation of freight Version 01.1.0 para19.

Data/Parameter	**$FC_{i,j,y}$**
Unit	Tonne/yr
Description	Quantity of fuel type i combusted in process j during the year y
Measured/calculated/ default	Measured
Source of data	On-site measurements
Value(s) of monitored parameter	1160.62

<table>
<tr><td>Monitoring equipment</td><td>Calibrated flow meters

<table>
<tr><td colspan="2">Oil Flow Meter calibration</td></tr>
<tr><td>Equipment Name</td><td>Positive Displacement Flowmeter</td></tr>
<tr><td>S.No</td><td>78043</td></tr>
<tr><td>Make</td><td>Oval</td></tr>
<tr><td>Type/Model</td><td>LS5076-400A</td></tr>
<tr><td>Date of Calibration</td><td>20-Mar-13,
19-Mar-14,
30-Mar-15,
01-Apr-16,
22-Mar-17</td></tr>
<tr><td>Due Date</td><td>21-Mar-18</td></tr>
</table>

<table>
<tr><td colspan="2">Oil Flow Meter calibration</td></tr>
<tr><td>Equipment Name</td><td>Positive Displacement Flowmeter</td></tr>
<tr><td>S.No</td><td>178003</td></tr>
<tr><td>Make</td><td>Oval</td></tr>
<tr><td>Type/Model</td><td>LS5076-531A</td></tr>
<tr><td>Date of Calibration</td><td>01-Dec-18,
24-Sep-19</td></tr>
<tr><td>Due Date</td><td>22-Sep-20</td></tr>
</table>
</td></tr>
<tr><td>Measuring/reading/recording frequency</td><td>This parameter will be measured continuously. Data is to be aggregated monthly and yearly and will be archived electronically. The figure will be adjusted with the accuracy of +0.25% when the calibration of equipment is delayed. The archived data will be kept during the crediting period and two years after the end of the crediting period.</td></tr>
<tr><td>Calculation method
(if applicable)</td><td>-</td></tr>
<tr><td>QA/QC procedures</td><td>To consistency of metered fuel consumption quantities should be cross-checked by purchased quantities and stock changes.</td></tr>
<tr><td>Purpose of data/parameter</td><td>Calculation of project emissions</td></tr>
<tr><td>Additional comments</td><td>The project emission shall be caused by the onsite transportation of biomass is calculated based $PE_{FC,j,y} = \Sigma FC_{i,j,y} \times COEF_{i,y}$ where combustion process j is comprised of “Diesel consumption for startup process” and “Diesel consumption for onsite transportation”. Both process j are utilized same type of diesel i provided by the contract supplier.</td></tr>
</table>

Data/Parameter	$\mathbf{p_{i,y}}$
Unit	Mass unit/volume unit
Description	Weighted average density of fuel type i in year y
Measured/calculated/ default	Default
Source of data	Measurement done by Project Participant
Value(s) of monitored parameter	0.8358
Monitoring equipment	-
Measuring/reading/recording frequency	The density of the fuel should be obtained for each fuel delivery, from which weighted average annual values should be calculated
Calculation method (if applicable)	-
QA/QC procedures	-
Purpose of data/parameter	Calculation of project emissions
Additional comments	It is need to convert unit from volume to mass.

Data/Parameter	$NCV_{i,y}$
Unit	GJ/ton
Description	Weighted average net calorific value of fuel type i in year y
Measured/calculated/ default	Default
Source of data	Measurement done by Project Participant
Value(s) of monitored parameter	45.79
Monitoring equipment	-
Measuring/reading/recording frequency	-
Calculation method (if applicable)	-
QA/QC procedures	Verify if the value under a), b) and c) 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 measurements. The laboratories in a), b) or c) should have ISO17025 accreditation or justify that they can comply with similar quality standards.
Purpose of data/parameter	Calculation of project emission
Additional comments	Applicable where Option B in Methodological tool “Tool to calculate project or leakage CO2 emissions from fossil fuel combustion”

Data/Parameter	$EF_{CO2,i,y}$
Unit	tCO_2/GJ
Description	Weighted average CO2 emission factor of fuel type i in year y
Measured/calculated/ default	Default
Source of data	Use IPCC default emission factors
Value(s) of monitored parameter	0.0741 tCO_2/GJ
Monitoring equipment	-
Measuring/reading/recording frequency	This parameter has been reviewed yearly. Data has been kept electronically in a systematic and transparent manner during the crediting period and two years after the end of the crediting period.
Calculation method (if applicable)	-
QA/QC procedures	IPCC default value is used.
Purpose of data/parameter	Calculation of project emission
Additional comments	As local or national data is not available therefore IPCC default emission factor from Table 2.2 Volume 2: Energy has been reported in kg of CO2 per TJ has been used. The basic conversion factor has been used to convert the value to tCO2 per GJ according to Table 1-3 SI Prefixes, Perry’s Chemical Engineers’ Handbook 7th edition.

D.3. Implementation of sampling plan

>>

There are no any data and parameter monitored described in section D.2 are determined by a sampling approach. Then this section is not applicable for this project activity.

SECTION E. Calculation of emission reductions or net anthropogenic removals

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

>>

Baseline Emission

In term of baseline emission, the main sources are through the exported electricity to the national grid and CH4 emission from uncontrolled burning of rice husk. The y subscripted in below formulae is just to represent a time period and considered values are of specific current monitoring period.

$BE_y = BE_{EL, y} + BE_{BR, y}$

$BE_{EL,y}$ = Baseline emission due to generation of electricity in year y
$BE_{BR,y}$ = Baseline emission due to uncontrolled burning or decay
BE_y = Baseline emission during year

I. Emission reductions due to displacement of electricity:

Monitoring Period	$BE_{EL, y}$	=	$EG_{PJ, y}$	X	$EF_{BL, EL, y}$
21/12/2012 - 31/03/2018 (Included first and last days)	$BE_{EL, y}$	=	6,42,053	X	0.5113
	$BE_{EL, y}$	=	3,28,278 tCO_2e		

II. Emission of methane emissions, from uncontrolled burning or aerobic decay of the biomass residues:

Baseline emissions are calculated by multiplying the quantity of biomass residues that would not be used in the absence of the project activity with the net calorific value and an appropriate emission factor, as follows:

$BE_{BR, y} = BE_{BR, B1/B3, y} + BE_{BR, B2, y}$

Since in this project activity, the biomass residues categories for which scenario B2 i.e $BE_{BR, B2, y}$ (anaerobic decay) is not apply.

Calculating $BE_{BR, B1/B3, y}$ for Baseline emissions are calculated by multiplying the quantity of biomass residues that would not be used in the absence of the project activity with the net calorific value and an appropriate emission factor, as follows:

$$BE_{BR, B1/B3, y} = GWP_{CH4} \cdot \sum_{n} BR_{n, B1/B3, y} \cdot NCV_{n, y} \cdot EF_{BR, n, y}$$

Monitoring Period	$BE_{BR, B1/B3, y}$	=	GWP_{CH4}	$\sum BR_{n, B1/B3, y}$	$NCV_{n, y}$	$EF_{BR, n, y}$
21/12/2012 - 31/03/2018 (Included first and last days)	$BE_{BR, B1/B3, y}$	=	122 + 34,633 = 34,755.00			

Step 1: Determination of $BE_{EL,y}$

$BE_{EL, y}$ = $EG_{PJ, y}$ X $EF_{BL, EL, y}$

$EG_{PJ, y}$ = Net quantity of electricity generated in all power plant which are located at the project site
$EF_{BL, EL, y}$ = Emission factor for electricity generation in the baseline
$BE_{EL, y}$ = Baseline emission due to generation of electricity in year

Parameter	Unit	2012	2013	2014	2015	2016	2017	2018	Total
$EG_{PJ,y}$	MWh	2,808	1,31,955	1,09,103	1,13,960	1,30,985	1,31,512	21,730	6,42,053
$EF_{BL,EL,y}$	tCO_2/MWh	0.5113	0.5113	0.5113	0.5113	0.5113	0.5113	0.5113	
$BE_{EL,y}$	tCO_2	1,435	67,468	55,784	58,267	66,972	67,242	11,110	3,28,278

Step 1.1: Determination of $EG_{PJ,y}$

$EG_{PJ, y}$ = $EG_{PJ, gross, y}$ - $EG_{PJ,aux\ y}$

$EG_{PJ,gross,y}$ = Gross quantity of electricity generated in all power plant which are located at the project site
$EG_{PJ,aux,y}$ = Total auxiliary electricity consumption required for the operation of the power plant at the project site
$EG_{PJ,y}$ = Net quantity of electricity generated in all power plant which arelocated at the project site

Parameter	Unit	Value (2012)	2013	2014	2015	2016	2017	2018	Total
$EG_{PJ,gross,y}$	MWh	3,297	1,54,663	1,26,987	1,33,434	1,53,145	1,55,268	25,498	7,52,292
$EG_{PJ,aux,y}$	MWh	489	22,708	17,884	19,475	22,160	23,756	3,768	1,10,238
$EG_{PJ,y}$	MWh	2,808	1,31,955	1,09,103	1,13,960	1,30,985	1,31,512	21,730	6,42,053

Step 1.2: Determination of $EF_{BL,EL,y}$

$$EF_{BL,EL,y} = \frac{EG_{BL,FF,y} \cdot EF_{BL,FF,y} + EG_{BL,grid,y} \cdot EF_{grid,CM,y} + EG_{BL,FF/grid,y} \cdot MIN(EF_{BL,FF,y}; EF_{grid,CM,y})}{EG_{BL,BR,y} + EG_{BL,FF,y} + EG_{BL,grid,y} + EG_{BL,FF/grid,y}}$$

$EG_{BL,FF,y}$ = Minimum amount of electricity that would be generated with fossil fuels at the project site in the baseline.
$EF_{BL,FF,y}$ = CO2 emission factor for electricity generation with fossil fuel in power plant(s) at the project site in the baseline
$EG_{BL,grid,y}$ = Mininmum amount of electricity that would be gnerated by power plants in the electricity grid in the baseline
$EF_{grid,CM,y}$ = Combined margin CO2 emission factor for grid-connected electricity generation
$EG_{BL,FF/grid,y}$ = Amount of electricity that could be gnerated in the baseline either by power plants in the elctricity grid or by power plnats at the project site using fossil fuels
$EG_{BL,BR,y}$ = Amount of electricity that would be generated with biomass residues in power-only plants operated at the project site in the baseline
$EF_{BL,EL,y}$ = Emission factor for electricity generation in the baseline

Step 2: Determination of baseline emission due to uncontrolled burning or decay of biomass residues; $BE_{BR,y}$

$BE_{BR,y} = BE_{BR,B1/B3,y} + BE_{BR,B2,y}$

Since in the project activity, the biomass residues categories for which secnario B2 (anaerobic decay) is not apply, Step 2.1 is only determined.

Step 2.1: Determination of $BE_{BR,B1/B3,y}$

$$BE_{BR,B1/B3,y} = GWP_{CH4} \cdot \sum_{n} BR_{n,B1/B3,y} \cdot NCV_{n,y} \cdot EF_{BR,n,y}$$

GWP_{CH4} = Global Warming Potential of methane until 2012 = 21
Global Warming Potential of methane after 2012 = 25

$BR_{n,B1/B3,y}$ = Amount of biomass residues category n used in the project plant included in the project boundary for which B1 or B3 has been identified as baseline scenario

$NCV_{n,y}$ = Net calorific value of the biomass residues category n

$EF_{BR,n,y}$ = CH4 emission factor for uncontrolled burning of the biomass residues category n

$BE_{BR,B1/B3,y}$ = Baseline emissions due to uncontrolled burning of biomass residues per year y
Baseline emissions due to uncontrolled burning of biomass residues per year y

Parameter	Unit	2012	2013	2014	2015	2016	2017	2018	Total
GWP_{CH4}	tCO_2/tCH_4	21	0	0	0	0	0	0	
	tCO_2/tCH_4	-	25	25	25	25	25	25	
$BR_{n,B1/B3,y}$	tonnes on dry basis	2,962.48	1,46,497.98	1,20,623.80	1,28,271.27	1,38,820.86	1,44,192.17	24,509.57	7,05,878.14
$NCV_{n,y}$	GJ/tonnes on dry basis	15.10	15.09	15.25	15.47	14.70	15.47	14.70	
$EF_{BR,n,y}$	tCH_4/GJ	0.000131	0.000131	0.000129	0.000127	0.000134	0.000127	0.000134	
$BE_{BR,B1/B3,y}$	tCO_2	122	-	-	-	-	-	-	34,755.00
	tCO_2	-	7,218	5,943	6,320	6,840	7,105	1,207	

Total Baseline emission

$BE_y = BE_{EL,y} + BE_{BR,y}$

Monitoring Period	**BE_y (tCO_2e)**	**=**	**$BE_{EL,y}$ (tCO_2e)**	**+**	**$BE_{BR,y}$ (tCO_2e)**
21/12/2012 – 31/12/2012 (Included first and last days)	1,557	=	1,435	+	122

01/01/2013 - 31/03/2018 (Included first and last days)	3,61,476	=	3,26,843	+	34,633
21/12/2012 – 31/03/2018 (Included first and last days)	**3,63,033**	**=**	**3,28,278**	**+**	**34,755**

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

>>

Project Emission

The project emission of the project activity consists of component below; The Y subscripted in below formula is just to represent a time period and considered values are of specific current monitoring period.

$$PE_y = PE_{FF,y} + PE_{EL,y} + PE_{TR,y} + PE_{BR,y} + PE_{WW,y}$$

PE_y = Project emissions
$PE_{FF,y}$ = Emissions due to fossil fuel consumption
$PE_{EL,y}$ = Emissions due to electricity use off-site for processing of biomass
$PE_{TR,y}$ = Emissions due to transport of the biomass residues
$PE_{BR,y}$ = Emissions from the combustion of biomass residues
$PE_{WW,y}$ = Emissions from waste water generated from the treatment of biomass residues.

According to project activity description in Section B.4, there is no electricity use off-site for the processing of biomass and waste water generated from the treatment of biomass residues. Then, $PE_{EL,y}$ and $PE_{WW,y}$ can be excluded.

Therefore, the Project emissions as calculated as follows:

$$PE_y = PE_{FF,y} + PE_{TR,y} + PE_{BR,y}$$

A) Determination of $PE_{FF,y}$

The latest approved version of the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion" (Version 02) is applied.

$$PE_{FF,j,y} = \sum_i FC_{i,j,y} \times COEF_{i,y}$$

$FC_{i,j,y}$	=	The quantity of fossil fuel
$COEF_{i,y}$	=	The CO2 emission coefficient of diesel
PEFF,i,y	=	The CO2 emission from fossil fuel combustion

Parameter	Unit	2012	2013	2014	2015	2016	2017	2018	Total
$FC_{i,j,y}$	tonne/yr	11.97	231.36	229.18	208.61	197.79	234.24	47.46	1,160.62
$CO_{EFi,y}$	tCO2/t diesel	3.3745	3.3745	3.3745	3.3745	3.3745	3.3745	3.3745	
$PE_{FF,i,y}$	tCO2/yr	41	781	774	704	668	791	161	3,920.00

$COEF_{i, y} = NCV_i + EF_{CO2, i, y}$

NCV_i	=	The weighted average net calorific value of the fuel type i
$EF_{CO2,i,y}$	=	the weighted average CO_2 emissions factor of fuel type i
$COEF_{i,y}$	=	The CO_2 emission coefficient of diesel

Parameter	Unit	2012	2013	2014	2015	2016	2017	2018
NCV_i	GJ/ton diesel	45.54	45.54	45.54	45.54	45.54	45.54	45.54
$EF_{CO2,i,y}$	tCO2/GJ	0.0741	0.0741	0.0741	0.0741	0.0741	0.0741	0.0741
$COEF_{i,y}$	tCO2/t diesel	3.3745	3.3745	3.3745	3.3745	3.3745	3.3745	3.3745

B) Determination of $PE_{EL, Y}$

$PE_{EL, Y} = EC_{PJ, J, Y} \text{ X } FE_{EL, J, Y} \text{ X } (1+TDL_{j,Y})$

$EC_{PJ,y}$	=	Quantity of electricity consumed by the project activity consumption
$EF_{EL,y}$	=	Grid carbon emission factor
$TDL_{j,y}$	=	Average technical transmission and distribution losses for providing electricity to source in year
$PE_{EL,y}$	=	Emission from electricity consumption

Parameter	Unit	Value (2012)	2013	2014	2015	2016	2017	2018	Total
$EC_{PJ,y}$	MWh	50.69	416.45	635.059	598.396	486.39	492.805	165.34	2,845.13
$EF_{EL,y}$	tCO_2/MWh	0.5113	0.5113	0.5113	0.5113	0.5113	0.5113	0.5113	
$TDL_{j,y}$	%	5.8%	5.8%	5.8%	5.8%	5.8%	5.8%	5.8%	
$PE_{EL,y}$	tCO_2/yr	26	214	325	307	249	253	85	1,459.00

C) Determination of $PE_{TR, Y}$

The latest approved version of the "Project and leakage emissions from road transportation of freight" (Version 01.0.0) is applied.

Using conservative default values is chosen for determination of $PE_{BR,y}$

$PE_{TR, m} = \sum D_{f,m} \cdot FR_{f, m} \cdot EF_{CO2, f} \cdot 10^{-6}$

$D_{f,m}$	=	Return trip road distance between the origin and destination of freight transportation activity
$FR_{f,m}$	=	Total mass of freight transported in freight transportation activity
$EF_{CO2,f}$	=	Default CO2 emission factor for freight transportation activty
$PE_{TR,m}$	=	Project emissions from road transportation of freight

Parameter	Unit	Value (2012)	2013	2014	2015	2016	2017	2018	Total
$D_{f,m}$	km	78.46	73.83	70.53	80.45	90.36	84.82	86.26	
$FR_{f,m}$	t	4,816.11	1,36,581.87	1,41,095.89	1,44,983.20	1,34,607.59	1,69,103.63	31,990.33	
$EF_{CO2,f}$	gCO_2/t km	129.00	129.00	129.00	129.00	129.00	129.00	129.00	
$PE_{TR,m}$	tCO_2	49	1,301	1,284	1,505	1,570	1,851	356	7,916.00

D) Determination of $PE_{BR, Y}$

$PE_{BR, y} = GWP_{CH4} \cdot EF_{CH4, BR} \cdot \sum BR_{PJ, n, y} \cdot NCV_{n,y}$

GWP_{CH4}	=	Global Warming Potential of methane until 2012
	=	Global Warming Potential of methane until 2013
$EF_{CH4,BR}$	=	CH4 emission factor for the combustion of biomass residues in the project plant
$BR_{PJ,n,y}$	=	Quantity of biomass residues of category n used in power plant which located at the project site
$NCV_{n,y}$	=	Net calorific value of the biomass residues category n

$PE_{BR,y}$ = Emissions from the combustion of biomass residues per year (until 2012)
= Emissions from the combustion of biomass residues per year (after 2012)

Parameter	Unit	Value (2012)	2013	2014	2015	2016	2017	2018	Total
GWP_{CH4}	tCO_2/tCH_4	21	0	0	0	0	0	0	
	tCO_2/tCH_4	-	25	25	25	25	25	25	
$EF_{CH4,BR}$	tCH_4/GJ	0.0000411	0.0000411	0.0000411	0.0000411	0.0000411	0.0000411	0.0000411	
$BR_{PJ,n,y}$	tonnes on dry-basis	2,962	1,46,498	1,20,624	1,28,271	1,38,821	1,44,192	24,510	7,05,878
$NCV_{n,y}$	GJ/tonnes on dry-basis	15.10	15.09	15.25	15.47	14.70	15.47	14.70	
$PE_{BR,y}$	tCO_2	39	-	-	-	-	-	-	39
	tCO_2	-	2,272	1,890	2,039	2,097	2,292	371	10,961

Total Project Emission

Monitoring Period	PE_y	=	$PE_{FF,y}$	+	$PE_{EL,y}$	+	$PE_{TR,y}$	+	$PE_{BR,y}$
21/12/2012 – 31/12/2012 (Included first and last days)	155	=	41	+	26		49		39
01/01/2013 - 31/03/2018 (Included first and last days)	24140	=	3879	+	1433	+	7867	+	10961
21/12/2012 – 31/03/2018 (Included first and last days)	24,295	=	3,920	+	1,459	+	7,916	+	11,000

E.3. Calculation of leakage emissions

>>
N/A

E.4. Calculation of emission reductions or net anthropogenic removals

	Baseline GHG emissions or baseline net GHG removals (t CO_2e)	**Project GHG emissions or actual net GHG removals (t CO_2e)**	**Leakage GHG emissions (t CO_2e)**	**GHG emission reductions or net anthropogenic GHG removals (t CO_2e)**			
				Before 01/01/ 2013	**From 01/01/ 2013 until 31/12/ 2020**	**From 01/01/ 2021**	**Total amount**
Total	3,63,033	24,295	0	1402	3,37,336		3,38,738

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_2e)	**Amount estimated ex ante for this monitoring period in the PDD (t CO_2e)**
3,38,738	2,87,762

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

>>
As per the CDM registered PDD, the amount of CERs generated annually is 54,506 tCO_2e.

Therefore, the amount of estimated ex ante for this monitoring period is identified as explained below:

The total number of days in this monitoring period is 1927 days. Hence, the amount of estimated ex ante for this monitoring period = 54,506 * (1927/365) = 287,762 tCO_2e

The actual emission reduction achieved during the monitoring period is 338,738 tCO_2e.

E.6. Remarks on increase in achieved emission reductions

>>

The actual emission reductions achieved during the current monitoring period is 338,738 tCO2e which is 17.71% higher than the estimated emission reduction.

This is not an abnormal situation because during the renewal of CP2 the expected generation was considered based on the first CP performance not on the available potential of the plant i.e. the Capacity of the plant. Due to which possibility of the plant to perform as per its capacity was left unconsidered which was assumed initially at the time project registration.

It is to be noted that the electricity generation capacity of the project activity is 20 MWe (Net) & 22.5 MWe (Gross).

So, the potential of project to deliver the Net Electricity can be reasoned as follows:
In line with the registered PDD, the, ATB plan to operate the plant for 346 days, 24 hrs per annum which will lead to the gross generation 166,080 MWh (20 * 364 * 24 = 166080 MWh/yr) and the Auxiliary station energy consumption was assumed 10% in the registered PDD earlier but on actual during the second CP it was calculated as 15 %, so considering the 15% Auxiliary Consumption deduction from the gross generation (i.e. $EG_{PJ,y} = EG_{gross,y} – EG_{Aux,y}$) Net Electricity potential available to deliver is **141,926 MWh/yr.**

Hence, the project activity is not delivering the higher generation than the expected or higher emission reduction annually with respect to the registered PDD (approved at the time of registration) where “Annual Net Electricity” exported was considered as 132,864 MWh/annum & “Annual average Emission Reduction” estimated in the registered PDD was 70,508 tCO2e/annum.

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

>> Not applicable.

-

Document information

Version	*Date*	*Description*
09.0	8 October 2021	Revision to: • Ensure consistency with version 03.0 of the “CDM project standard for project activities” (CDM-EB93-A04-STAN).
08.0	6 April 2021	Revision to: • Reflect the “Clarification: Regulatory requirements under temporary measures for post-2020 cases” (CDM-EB109-A01-CLAR).

Version	*Date*	*Description*
07.0	31 May 2019	Revision to: • 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: • 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: • 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: • 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 *F-CDM-MR* to *CDM-MR-FORM*; • 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 Document Business	Class: Type: Function:	Regulatory Form Issuance
Keywords: monitoring report		