

 Monitoring report form for CDM project activity (Version 09.0)			
MONITORING REPORT			
Title of the project activity	Hebei ChengAn Biomass Cogeneration Project		
UNFCCC reference number of the project activity	3797		
Version number of the PDD applicable to this monitoring report	03		
Version number of this monitoring report	01		
Completion date of this monitoring report	07/05/2022		
Monitoring period number	01		
Duration of this monitoring period	05/12/2010-04/12/2017		
Monitoring report number for this monitoring period	/		
Project participants	National Bio Energy Co., Ltd. (project owner)		
Host Party	People's Republic of China		
Applied methodologies and standardized baselines	ACM0006 "Consolidated Baseline Methodology for grid-connected electricity generation from biomass residues" (Version 09)		
Sectoral scopes	Sectoral scope 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
	269,511	676,069	/
Amount of GHG emission reductions or net anthropogenic GHG removals estimated ex ante for this monitoring period in the PDD	1,020,026		

SECTION A. Description of project activity

A.1. General description of project activity

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The Hebei ChengAn Biomass Cogeneration Project (hereafter refers to the project) is a biomass utilization project located in ChengAn County, Hebei Province, P.R.China, which is to use local straw from cotton for electricity generation. The project is constructed and operated by National Bio Energy Co., Ltd. (hereafter refers to NBE). The project involves the installation of a 130t/h boiler fired with local straws and a 30MW power generator driven by steam turbine. The installed capacity of the project is 30MW and the annual straws' consumption is about 170,000 t, and the power supply is 158,400MWh per year. The electricity generated by the project will be sold to Hebei Provincial Power Grid that is a part of the North China Power Grid to replace the capacity of coal-fired power plants. The on-grid coal-fired power plant is dominated in North China Power Grid.

For the project,

(a) Prior to the start of implementation of the project activity, there is no power generation unit at the site of the project, and the electricity was supplied by the North China Power Grid which is dominated by fossil fuel-fired power plants. And the biomass residues utilized by the project would be dumped or left to decay under mainly aerobic conditions.

(b) The project scenario is the implementation of the project, involves the installation of a 130t/h boiler fired with local straws and a 30MW power generator driven by steam turbine, which will supply an average annual generation of 158,400MWh to the North China Power Grid and replace the same amount of electricity generated by fossil fuel-fired power plants connected to the North China Power Grid. The implementation of the project needs a supply of 170,000 tonnes of straw per year.

(c) Prior to the start of the implementation of the project, equivalent electricity was provided by the North China Power Grid. The baseline scenario of the project is the same as the scenario prior to the start of the implementation of the project activity.

The project accomplishes greenhouse gas (GHG) mitigation by replacing the capacity of coal-fired power plants. Moreover, the project will utilize biomass residues for energy purpose in high efficiency, which will reduce CH₄ emissions because the biomass residues is dumped or left to decay under mainly aerobic conditions in the absent of the project. The estimated emission reduction is 145,604tCO₂e per year in the first crediting period.

In this monitoring period (05/12/2010-04/12/2017), the total emission reductions achieved are 945,580tCO₂e.

A.2. Location of project activity

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The project is located in the economical developing region of Shanxian Town, Heze City, Shandong Province, People's Republic of China. The project is 3 km to the east of the Shanxian downtown area. The geographical coordinates of the project are east longitude 116°36'and north latitude 34°49'12".

A.3. Parties and project participants

Parties involved	Project participants	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
People's Republic of China (host Party)	National Bio Energy Co., Ltd	No

A.4. References to applied methodologies and standardized baselines

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ACM0006 "Consolidated Baseline Methodology for grid-connected electricity generation from biomass residues" (Version 09)

A.5. Crediting period type and duration

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The renewable crediting period (7yrs*3) is adopted. The first crediting period of the Project is from 05/12/2010 to 04/12/2017.

SECTION B. Implementation of project activity

B.1. Description of implemented project activity

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The project is to utilize local straw from cotton for electricity generation. The project located in ChengAn County, Hebei Province, P.R.China. The project is a grid-connected renewable energy project. The project achieve obvious greenhouse gas (GHG) emission reductions through the replacement of mainly fossil-fuel dominated grid connected power generation in the North China Power Grid. Moreover, the project utilizes biomass residues for energy purpose in high efficiency, which will reduce CH₄ emissions because the biomass residues is dumped or left to decay under mainly aerobic conditions in the absent of the project.

For the project,

(a) Prior to the start of implementation of the project activity, there is no power generation unit at the site of the project, and the electricity was supplied by the North China Power Grid which was dominated by fossil fuel-fired power plants. And the biomass residues utilized by the project would be dumped or left to decay under mainly aerobic conditions.

(b) The project scenario is the implementation of the project (with CDM as an indispensable consideration), i.e., the installation and operation of a 130t/h boiler fired with local straw and a 30MW power generator driven by steam turbine, which supplies an average annual generation of 158,400MWh to the North China Power Grid and replace the same amount of electricity generated by fossil fuel-fired power plants connected to the North China Power Grid. The electricity output is transmitted through an 110kV transformer at the project site to Chengdong 110kV substation and connected to Hebei Provincial Power Grid that is an integral part of North China Power Grid. The implementation of the project needs a supply of 170,000 tonnes of straw per year.

The plant load factor of the roject is 68.5% according to the Supplement Report for 30 MW scheme, which is determined by the accredited designing institute Hebei Electric Power Design & Research Institute, which is the third party contracted by the project participants.

Then the residues will be sent to the plant according to dispatch scheme. The steam generated by firing will be used for the power generation. At the same time, the soot and smog are captured by the hop-pocket dust catcher, and then carried into ash storeroom. The dregs are discharged and carried into the dregs storeroom. The equipments used in the project are specified as follow:

Boiler	
Rated steam capacity	130t/h
Rated vapour pressure	9.2MPa
Rated vapour temperature	540℃
Water supply temperature	210℃
Steam Turbine	
Rated power	30MW
Rated steam capacity	109.9t/h
Rated rotation speed	3000r/min
Generator	
Rated power	30MW
Rated rotation speed	3000r/min

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

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There is no temporary deviation from registered monitoring plan or applied methodology during this monitoring period.

B.2.2. Corrections

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There is no correction during this monitoring period.

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

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There is no change to the start date the crediting period.

B.2.4. Inclusion of monitoring plan

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N/A

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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There is no permanent change to the registered monitoring plant, permanent deviation of monitoring.

B.2.6. Changes to project design

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There was no change to project design

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

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N/A

SECTION C. Description of monitoring system

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1. Introduction of Monitoring Plan

This Monitoring plan will set out a number of monitoring tasks in order to ensure that all aspects of projected greenhouse gas (GHG) emission reductions for the project are controlled and reported. This requires an on going monitoring of the project to ensure performance according to its design and that claimed Certified Emission Reductions (CERs) are actually achieved.

The monitoring plan of the project is a guidance document that provides the set of procedures for preparing key project indicators, tracking and monitoring the impacts of the project. The monitoring plan will be used throughout the defined crediting period for the project to determine and provide documentation of GHG emission impacts from the project. This monitoring plan fulfils the requirement set out by the Kyoto Protocol that emission reductions projects under the CDM have real, measurable and long-term benefits and that the reductions in emissions are additional to any that would occur in the absence of the certified project activity.

The monitoring plan provides the requirements and instructions for:

- Establishing and maintaining the appropriate monitoring systems for electricity generated by the project;
- Quality control of the measurements;
- Procedures for the periodic calculation of GHG emission reductions;
- Assigning monitoring responsibilities to personnel;

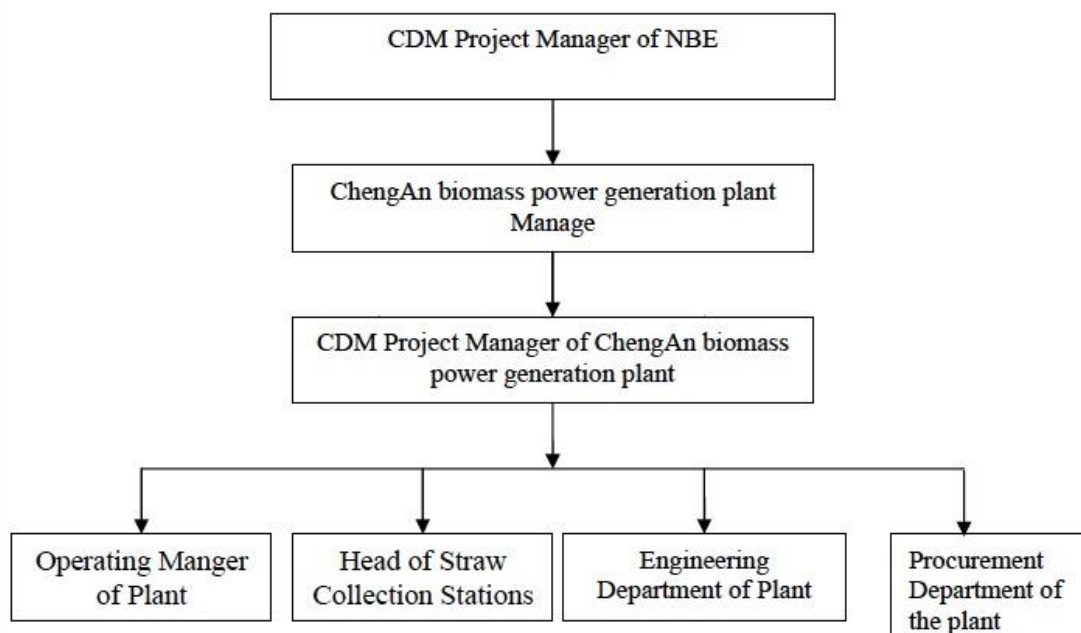
- Data storage and filing system;
- Preparing for the requirements of an independent, third party auditor or verifier.

2. Users of the Monitoring Plan & Procedure

The staffs of ChengAn biomass power generation plant at the biomass residues collection sites will record the data to be monitored concerning with information of biomass residues purchased from local area. The manager of the collection sites will be responsible for quality control and summary of this information. The summary of biomass consumption by the power plant will be calculated by the CDM Project Manager of the project monthly. Another data to be recorded is the fossil fuel consumption by the power plant and on-site electricity consumption. The related responsible operators will record this data, and the CDM manager will collect the data monthly. Other related data need to be monitored are described in Section B.7.1.

The CDM manager will in charge of the implementation of this Monitoring Plan and summarizing the results. The results will be checked by the General Manager of ChengAn biomass power generation plant, ensuring the quality and accuracy of the data monitored. The monthly summary will be reported to the headquarter of National Bio Energy Co., Ltd (NBE). The CDM Manager NBE will calculate the emission reductions of the project and develop reports with the support from Easy Carbon Consultancy Co. Ltd.

The responsibilities for carrying out these tasks are broadly elaborated below.



Responsibilities of departments at power plant:

Operation Manager of the plant: overall management of the implementation of the monitoring plan and quality control of data and records.

Head of Straws Collection Stations: Straws collection and summarizing the data collected at the collection stations in terms of types, amount, and transportation record, etc of straws. Ensuring the biomass at the sites will not be stored over half year.

Engineering Department of the plant: in charge of the monitoring of electricity meters and calibration, biomass consumption and NCV of each kind of biomass, fossil fuel consumption within the power plant including boilers, crushing machines, etc, as well as maintenance of equipments.

Procurement Department of the plant: cross checking the monitoring records with receipt and procurement records.

3. Key definitions

The monitoring plan will use the following definitions of monitoring and verification.

Monitoring: the systematic surveillance of the project's performance by measuring and recording performance-related indicators relevant in the context of GHG emission reductions.

Verification: the periodic ex-post auditing of monitoring results, the assessment of achieved emission reductions and of the project's continued conformance with all relevant project criteria by a selected Designated Operational Entity (DOE).

4. Monitoring

All relevant parameters listed in Section B 7.1 will be monitored according to the methodology requirements and description of measurement methods and procedures to be applied. The results and data will be recorded and well documented. Calibration tests records will be maintained for verification.

5. Quality Assurance and Quality Control

The quality assurance and quality control procedures for recording, maintaining and archiving data shall be improved as part of this CDM project activity. This is an on-going process that will be ensured through the CDM in terms of the need for verification of the emissions on an annual basis according to this PDD and the CDM manual.

6. Data Management System

This provides information on record keeping of the data collected during monitoring. Record keeping is the most important exercise in relation to the monitoring process. Without accurate and efficient record keeping, project emission reductions cannot be verified. Below follows an outline of how project related records would be managed.

The general manager has the overall responsibility of checking data for its completeness and correctness. The data collected from daily logs will be forwarded to the central registry after verification from respective departments. CDM audits shall be carried out to check the correctness of procedures and data monitored by the internal auditing team entrusted for the work.

Overall responsibility for monitoring of GHG emissions reduction will rest with the CDM responsible person of the project. The CDM manual sets out the procedures for tracking information from the primary source to the end-data calculations in paper document format. It is the responsibility of the project owner to provide additional necessary data and information for validation and verification requirements of respective DOE. Physical documentation such as paper-based maps, diagrams and environmental assessment will be collated in a central place, together with this monitoring plan. All paper-based information will be stored by the project owner and kept at least one copy.

SECTION D. Data and parameters

D.1. Data and parameters fixed ex ante

Data/Parameter	GWP_{CH4}
Unit	tCO ₂ e/tCH ₄
Description	Global Warming Potential for CH ₄
Source of data	AR5
Value(s) applied	28
Choice of data or measurement methods and procedures	Default value
Purpose of data/parameter	Baseline emissions (BE _y)
Additional comments	/

Data/Parameter	EF_{grid,CM,y}
Unit	tCO ₂ e/MWh
Description	Baseline combined emission factor of the North China Power Grid
Source of data	National public data
Value(s) applied	0.89353

Choice of data or measurement methods and procedures	Default value
Purpose of data/parameter	Baseline emissions (BE _y)
Additional comments	/

D.2. Data and parameters monitored

Data/Parameter	EG _{project plant,y}
Unit	MWh
Description	Net electricity delivered to the grid by the project during the year y
Measured/calculated/default	Measured
Source of data	Monitored by electricity meter
Value(s) of monitored parameter	The biomass consumption is shown in table E.2 of section E.
Monitoring equipment	electricity meter
Measuring/reading/recording frequency	Measured continuously and aggregated monthly
Calculation method (if applicable)	/
QA/QC procedures	The electricity meter is calibrated according to national standard.
Purpose of data/parameter	Baseline emission calculations
Additional comments	/

Data/Parameter	EC _{PJ,y}
Unit	MWh
Description	On-site electricity consumption attributable to the project activity during the year y.
Measured/calculated/default	Measured
Source of data	Electricity meter
Value(s) of monitored parameter	The data is shown in section E.
Monitoring equipment	Electricity meter
Measuring/reading/recording frequency	Measured continuously and aggregated monthly
Calculation method (if applicable)	/
QA/QC procedures	The electricity meter is calibrated according to national standard.
Purpose of data/parameter	Baseline emission calculations
Additional comments	/

Data/Parameter	BF _{k,y}
Unit	tonne of dry matter
Description	Quantity of biomass fuel type k combusted in the project plant during the year y
Measured/calculated/default	Measured
Source of data	Weight meter

Value(s) of monitored parameter	The data is shown in section E.
Monitoring equipment	Weight meter
Measuring/reading/recording frequency	/
Calculation method (if applicable)	/
QA/QC procedures	The metering equipment will be properly calibrated and checked annually.
Purpose of data/parameter	Baseline emission
Additional comments	/

Data/Parameter	NCV _k
Unit	TJ/ton of dry matter
Description	Net calorie value of biomass residue type <i>k</i>
Measured/calculated/default	Measured
Source of data	Measured at reputed laboratory
Value(s) of monitored parameter	The value is shown in section E
Monitoring equipment	/
Measuring/reading/recording frequency	at least once every six months
Calculation method (if applicable)	/
QA/QC procedures	Check the consistency of the measurements by comparing the measurement result with measurements from previous years, relevant data sources (e.g. values in the literature, values used in the national GHG inventory) and default values by 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	Project emission calculations
Additional comments	/

Data/Parameter	NCV _i
Unit	GJ / tonne
Description	Net Calorific Value of fossil fuel type <i>i</i> consumed by the power plant
Measured/calculated/default	Default
Source of data	China Energy Statistical Yearbook
Value(s) of monitored parameter	42.652
Monitoring equipment	/
Measuring/reading/recording frequency	/
Calculation method (if applicable)	/
QA/QC procedures	The appropriateness of the data will be reviewed annually
Purpose of data/parameter	Project emission calculations
Additional comments	/

Data/Parameter	EF _{CO₂, FF, i}
Unit	tCO ₂ /GJ
Description	CO ₂ Emission Factor of fossil fuel type <i>i</i>
Measured/calculated/default	Default
Source of data	IPCC default emission factors at the upper limit of the uncertainty at a 95% confidence interval as accurate and reliable local or national data is unavailable
Value(s) of monitored parameter	0.0748 for diesel
Monitoring equipment	/
Measuring/reading/recording frequency	Review the appropriateness of the data annually
Calculation method (if applicable)	/
QA/QC procedures	/
Purpose of data/parameter	Project emission calculations
Additional comments	/

Data/Parameter	EF _{burning, CH₄, k, y}
Unit	tCH ₄ /ton biomass
Description	CH ₄ emission factor for uncontrolled burning of the biomass residue type <i>k</i> during the year <i>y</i>
Measured/calculated/default	Default
Source of data	2006 IPCC
Value(s) of monitored parameter	0.0027 from 2006 IPCC
Monitoring equipment	/
Measuring/reading/recording frequency	Review of default values annually.
Calculation method (if applicable)	/
QA/QC procedures	/
Purpose of data/parameter	Project emission calculations
Additional comments	/

Data/Parameter	EF _{CH₄, BF}
Unit	tCH ₄ /TJ
Description	CH ₄ emission factor for combustion of biomass in the project plant
Measured/calculated/default	Default
Source of data	2006 IPCC
Value(s) of monitored parameter	30
Monitoring equipment	/
Measuring/reading/recording frequency	/
Calculation method (if applicable)	/
QA/QC procedures	The appropriateness of the data will be reviewed annually.

Purpose of data/parameter	Project emission calculations
Additional comments	Conservativeness factors provided in Table 5 of the methodology ACM0006 will also be applied.

Data/Parameter	FF _{project plant,i,y}
Unit	tonne/year
Description	Quantity of fossil fuel type <i>i</i> combusted in the biomass residue fired power plant during the <i>y</i> year
Measured/calculated/default	measured
Source of data	Measurement meter.
Value(s) of monitored parameter	0
Monitoring equipment	Measurement meter
Measuring/reading/recording frequency	Monitored continuously and aggregated annually
Calculation method (if applicable)	/
QA/QC procedures	
Purpose of data/parameter	Project emission
Additional comments	/

Data/Parameter	FF _{project site,i,y}
Unit	tonne/year
Description	Quantity of fossil fuel type <i>i</i> combusted at the project site for other purposes that are attributable to the project activity during the <i>y</i> year
Measured/calculated/default	Measured
Source of data	On-site measurements
Value(s) of monitored parameter	The value is shown in section E
Monitoring equipment	/
Measuring/reading/recording frequency	Measured continuously and aggregated monthly
Calculation method (if applicable)	/
QA/QC procedures	/
Purpose of data/parameter	Leakage emission calculations
Additional comments	/

Data/Parameter	Moisture content of the biomass residues
Unit	% Water content
Description	Moisture content of each biomass residue type <i>k</i>
Measured/calculated/default	Measured
Source of data	On-site measurements
Value(s) of monitored parameter	The value is shown in section E

Monitoring equipment	/
Measuring/reading/recording frequency	Measured continuously and aggregated monthly
Calculation method (if applicable)	/
QA/QC procedures	/
Purpose of data/parameter	Project emission calculations
Additional comments	/

Data/Parameter	AVD _y
Unit	km
Description	Average return trip distance between biomass fuel supply sites and the project site
Measured/calculated/default	Measured
Source of data	Procurement Department of the power plant
Value(s) of monitored parameter	The value is shown in section E
Monitoring equipment	/
Measuring/reading/recording frequency	Measured continuously and aggregated monthly
Calculation method (if applicable)	/
QA/QC procedures	/
Purpose of data/parameter	Project emission calculations
Additional comments	/

Data/Parameter	N _y
Unit	Number
Description	Number of trucks that transport the biomass
Measured/calculated/default	Measured
Source of data	Procurement Department of the power plant
Value(s) of monitored parameter	The value is shown in section E
Monitoring equipment	/
Measuring/reading/recording frequency	Measured continuously and aggregated monthly
Calculation method (if applicable)	/
QA/QC procedures	/
Purpose of data/parameter	Project emission calculations
Additional comments	/

Data/Parameter	EF _{km,CO2}
Unit	tCO ₂ /km
Description	Average CO ₂ Emission Factor for transportation of biomass with trucks

Measured/calculated/default	Default
Source of data	IPCC default value
Value(s) of monitored parameter	0.001011
Monitoring equipment	/
Measuring/reading/recording frequency	The appropriateness of the data will be reviewed annually
Calculation method (if applicable)	/
QA/QC procedures	/
Purpose of data/parameter	Project emission calculations
Additional comments	/

Data/Parameter	TDL _y
Unit	%
Description	Average technical transmission and distribution losses in the grid in year y for the voltage level at which electricity is obtained from the grid at the project site.
Measured/calculated/default	Default
Source of data	Default value of from tool to calculate baseline, project and/or leakage emissions from electricity consumption (version 01)
Value(s) of monitored parameter	20
Monitoring equipment	/
Measuring/reading/recording frequency	The appropriateness of the data will be reviewed annually
Calculation method (if applicable)	/
QA/QC procedures	/
Purpose of data/parameter	Project emission calculations
Additional comments	/

D.3. Implementation of sampling plan

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N/A

SECTION E. Calculation of emission reductions or net anthropogenic removals

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

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According to the approved change PDD, the emissions are calculated as follows:

$$ER = ER_{\text{electricity},y} + BE_{\text{biomass},y} - PE_y - L_y$$

Where:

ER_y: Emission reductions due to displacement of electricity during the chosen monitoring period (tCO_{2e})

ER_{electricity,y}: Emission reductions due to displacement of electricity during the chosen monitoring period

(tCO₂e)

BE_{biomass,y}: Baseline emissions due to natural decay or burning of anthropogenic sources of biomass residues during the chosen monitoring period (tCO₂e)

PE_y: Project emissions during the chosen monitoring period (tCO₂e)

L_y: Leakage emissions during the chosen monitoring period (tCO₂e)

$$ER_{\text{electricity},y} = EG_y * EF_{\text{electricity},y}$$

EF_{electricity,y}: the CO₂ emission factor for the electricity displaced due to the project activity during the year y in tons CO₂/MWh

$$EG_y = EG_{\text{export},y} - EG_{\text{import},y}$$

Where:

EG_{export,y}: electricity exported to the grid (MWh)

EG_{import,y}: electricity imported from the grid (MWh)

Table E.1. Monitored data for ER_{electricity,y}

Monitoring Period	Net quantity of electricity generated in the project plant (EG _y)	Baseline Emissions Factor (EF _{electricity,y})	Electricity generation baseline emissions (ER _{electricity,y})
05/12/2010-31/12/2012	287,049	0.89353	256,487
01/01/2013-04/12/2017	719,449	0.89353	642,849
Total in this MP			899,336

Table E.2. Monitored data for BE_{biomass,y}

Monitoring Period	Biomass consumption (BF _{i,y})	Biomass Net calorific Factor (NCV)*Methane emission factor in agriculture or forestry (EF _{burning,CH4,i})	Global Warming Potential of CH ₄ (GWP _{CH4})	Unused biomass baseline emission (BE _{biomass,y})
05/12/2010-31/12/2012	393237	0.001971	28	21,701
01/01/2013-04/12/2017	992,734	0.001971	28	54,787
Total in this MP				76,488

Table E.3. Baseline emissions

Monitoring period	ER _{electricity,y} (tCO ₂ e)	BE _{biomass,y} (tCO ₂ e)	BE _y (tCO ₂ e)
05/12/2010-31/12/2012	256,487	21,701	278,188
01/01/2013-04/12/2017	642,849	54,787	697,636
Total in this MP	899,336	76,488	975,824

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

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According to the approved PDD, project emissions GHG emissions from the project activity in year y are calculated on the following equation:

$$PE_y = PET_y + PE_{FF,y} + PE_{EC,y} + GWP_{CH4} * (PE_{biomassCH4,y} + PE_{ww,CH4,y})$$

Where :

PE_y: Total project CO₂ emissions during the year y (tCO₂/yr);

PET_y: Project emissions from biomass transportation from collection points to the power plant (tCO₂/year)

PE_{FF,y}: Project emissions from fossil fuels combusted in the biomass residue fired power Plant and combusted at the project site for other purposes that are attributable to project activity during the year y.

$PE_{EC,y}$: CO₂ emissions during the year y due to electricity consumption at the project site that is attributable to the project activity (tCO₂/yr).

$PE_{Biomass,CH_4,y}$: CH₄ emissions from the combustion of biomass residues during the year y (tCH₄/yr)

$PE_{ww, CH_4,y}$: CH₄ emissions from waste water generated from the treatment of biomass residues in year y (tCH₄/yr)

a) Carbon dioxide emissions from combustion of fossil fuels for transportation of biomass residues to the project plant (PE_T)

$$PE_T = \frac{BF_{T,k,y}}{TL_y} * AVD_y * EF_{km,CO_2,y}$$

$$= N_y * AVD_y * EF_{km,CO_2,y}$$

Where:

PE_T : CO₂ emissions during the year y due to transport of the biomass residues to the project plant (tCO₂/yr)

N_y : Number of truck trips during the year y

AVD_y : Average round trip distance (from and to) between the biomass residue fuel supply sites and the site of the project plant during the year y (km).

$EF_{km,CO_2,y}$: Average CO₂ emission factor for the trucks measured during the year y (tCO₂/km).

K : Types of biomass residues used in the project plant and that have been transported to the project plant in year y

Table E.4 Monitoring data for PE_T

Period	EF_{km,CO_2} (tCO ₂ /km)	PE_T (tCO ₂ e)
05/12/2010-31/12/2012	0.001011	2,127
01/01/2013-04/12/2017	0.001011	4832
Total in this MP	0.001011	6,959

b) Carbon dioxide emissions from on-site consumption of fossil fuels ($PE_{FF,y}$)

According to the registered PDD,

$$PE_{FF,y} = \sum FC_{i,j,y} * COEF_i$$

where:

$PE_{FF,y}$: CO₂ emissions during the year y due to fossil fuels co-fired by the generation facility or other fossil fuel consumption at the project site that is attributable to the project activity (tCO₂/yr)

$FC_{i,j,y}$: the quantity of fuel type i combusted in process j during the year y

$COEF_{CO_2,i,y}$: CO₂ emissions from type i fossil fuels utilized in power plant (tCO₂/GJ) ,

$$COEF_{i,y} = NCV_{i,y} * EF_{CO_2,i,y}$$

$NCV_{i,y}$: Is the weighted average net calorific value of the fuel type i in year y (GJ/mass or volume unit),

$EF_{CO_2,i,y}$: is the weighted average CO₂ emission factor of fuel type i in year y (tCO₂/GJ);

Please refer to Table E.3 for annual data of $FF_{project,site,i,y}$

Table E.5 Monitored data for $PE_{FF,y}$

Period	$FC_{i,j,y}$ (liter)	$NCV_{i,y}$ (TJ/ton)	$EF_{CO_2,i,y}$ (tCO ₂ /GJ)	$PE_{FF,y}$ (tCO ₂ e)
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05/12/2010-31/12/2012	366	0.042652	0.0748	1,168
01/01/2013-04/12/2017	766	0.042652	0.0748	2,443
Total in this MP	1132			3,611

c) Carbon dioxide emissions from electricity consumption ($PE_{EC,y}$)

$$PE_{EC,y} = EC_{PJ,y} \times EF_{grid,y} \times (1 + TDL_y)$$

As the The electricity consumed in the project site is deducted from the exported electricity when calculate the baseline emissions of electricity ($ER_{electricity,y}$) . Therefore, $PE_{EC,y}=0$

d) CH₄ emissions from the combustion of biomass ($PE_{biomassCH_4,y}$)

$$PE_{biomassCH_4,y} = EF_{CH_4,BF} \times \sum BF_{k,y} \times NCV_k$$

Where

EF_{CH_4} is the CH₄ emission factor for controlled burning of the straw (tCH₄/TJ)

$BF_{i,y}$ = Quantity of biomass residue type k combusted in the project plant during the year y (tons of dry matter).

NCV_k =Net calorific value of the straw type k (GJ/ton of dry matter)

Table E.6 Monitored data for ($PE_{biomass,y}$)

Period	$BF_{i,y}$ (t)	Methane Emission Factor (controlled burning)	Conservativen ess factor	GWP_{CH_4}	$PE_{biomass,CH_4,y}$ (tCO ₂)
05/12/2010-31/12/2012	4677	0.0300	1.37	28	5382
01/01/2013-04/12/2017	12419	0.0300	1.37	28	14292
Total in this MP				28	19674

e) Methane emissions from waste water treatment ($PE_{WW,CH_4,y}$)

The biomass residue utilized by the project do not need to be treated under anaerobic conditions, therefore there is no methane emissions from waste water treatment.

Table E.7 Project emissions (PE_y)

Monitoring period	GHG emissin from biomass combustion ($PE_{biomass,CH_4,y}$) (tCO ₂)	GHG emissin from biomass transportation(PET_y) (tCO ₂)	GHG emissin from fossil fuel combustion ($PE_{FF,y}$) (tCO ₂)	Carbon dioxide emissions from electricity consumption ($PE_{EC,y}$) (tCO ₂)	Total Project emissions (tCO ₂)
05/12/2010- 31/12/2012	5,382	2,127	1,168	0	8696
01/01/2013- 04/12/2017	14,292	4,832	2,443	0	21567
Total in this MP	19,674	6,9759	3,611	0	30,244

E.3. Calculation of leakage emissions

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The research of the biomass supply / demand situation in Chengan County was carried out by third party the biomass resource availability within 50 kilometers around the site of the Project.

According to the research, the quantity of available residue in the region is far over 25% larger than the quantity of residues that is utilized. Therefore, no leakage emissions would occur due to the implementation of project activity. Hence, the leakage emissions due to implementation of project activity would be negligible and not considered: LEy= 0

According to "General guidance on leakage in biomass project activities", the availability /utilization status within the project influence area is monitored once at the beginning of each crediting period as indicated in the chosen baseline and monitoring methodologies applied to this project activity.

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	975,824	30,244	0	269,511	676,069	0	945,580

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)
945,580	1,020,026

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

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This monitoring period is from 05/12/2010 to 04/12/2017, including 2556days. The ex-ante emission reductions for this monitoring period are $145,604 \times 2,556 / 365 = 1,020,026 \text{ tCO}_2$. The actual emission reductions in this monitoring period are 945,580 tCO₂/yr, which are less than the ex-ante estimation.

E.6. Remarks on increase in achieved emission reductions

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N/A

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

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N/A.

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Document information

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

<i>Version</i>	<i>Date</i>	<i>Description</i>
03.1	2 January 2013	Editorial revision to correct table in section E.5.
03.0	3 December 2012	Revision required to introduce a provision on reporting actual emission reductions or net GHG removals by sinks for the period up to 31 December 2012 and the period from 1 January 2013 onwards (EB 70, Annex 11).
02.0	13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the monitoring report form" (EB 66, Annex 20).
01.0	28 May 2010	EB 54, Annex 34. Initial adoption.
Decision Class: Regulatory Document Type: Form Business Function: Issuance Keywords: monitoring report		