B.7 Application of the monitoring methodology and description of the monitoring plan:

B.7.1 Data and parameters monitored:

Data to be monitored in tables below shall be archived for 2 years following the end of the crediting period.

Data / Parameter:	NCV_i
Data unit:	TJ/t
Description:	The net calorific value of biomass type i
Source of data to be used:	The project owner.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0.0148
Description of measurement methods and procedures to be applied:	The net caloric value will be measured separately when they are transported to the plant.
QA/QC procedures to be applied:	The net calorific value should be determined separately for all types of biomass. Net calorific values should be based on measurements or reliable local or national data.
Any comment:	---

Data / Parameter:	$BF_{i,y}$
Data unit:	tonne/year
Description:	the quantity of each kind of biomass used as fuel in the project
Source of data to be used:	Dispatch centre of the project plant
Value of data applied for the purpose of calculating expected emission reductions in section B.5	176000
Description of measurement methods and procedures to be applied:	The straw is to be weighted by the steelyard and to be recorded every time when transported into the project plant. Cross-check will be conducted based on the invoice for straw purchase
QA/QC procedures to be applied:	The direct measurement on the mass or volume will be cross-checked according to the energy balance, which is based on the quantity of purchase and storage.
Any comment:	Uncertainty level of data is low.

Data / Parameter:	AVD_y

Data unit:	km
Description:	The average return trip distance between biomass fuel supply sites and the project site
Source of data to be used:	Dispatch centre of the project plant
Value of data applied for the purpose of calculating expected emission reductions in section B.5	30
Description of measurement methods and procedures to be applied:	The distance for the return trip of trucks will be monitored and recorded. The data will be kept for 2 years after the end of the last crediting period.
QA/QC procedures to be applied:	Check consistency of distance records provided by the trucks by comparing recorded distances with information from other sources (e.g. maps).
Any comment:	Uncertainty level of data is low.

Data / Parameter:	N_y
Data unit:	---
Description:	Number of truck trips for the transportation of biomass
Source of data to be used:	Dispatch centre of the project plant
Value of data applied for the purpose of calculating expected emission reductions in section B.5	11733
Description of measurement methods and procedures to be applied:	This parameter will be monitored by the chief operator of the power plant for each truck when they arrive at the power plant. The data will be kept for 2 years after the end of the last crediting period.
QA/QC procedures to be applied:	---
Any comment:	Uncertainty level of data is low.

Data / Parameter:	$EF_{km,CO2}$
Data unit:	$kgCO_2/km$
Description:	Average CO_2 emission factor for transportation of biomass with trucks
Source of data to be used:	Dispatch centre of the project plant
Value of data applied for the purpose of calculating expected emission reductions in section B.5	1.011
Description of	The project proponent will calculate this parameter based on the

measurement methods and procedures to be applied:	information provided from the subcontractor of truck rental. If not possible, default values from the IPCC manual will be used. The data will be kept for 2 years after the end of the last crediting period.
QA/QC procedures to be applied:	The direct measurement on the mass or volume will be cross-checked according to the energy balance, which is based on the quantity of purchase and storage.
Any comment:	Uncertainty level of data is low.

Data / Parameter:	$COEF_{CO2,i}$
Data unit:	tC/TJ
Description:	CO_2 emission factor for the fuel type i
Source of data to be used:	IPCC
Value of data applied for the purpose of calculating expected emission reductions in section B.5	20.2
Description of measurement methods and procedures to be applied:	These emission factors will be applied to fuel consumption for transportation and on-site fuel consumption. If possible, measurements or local/national data is not available, so default IPCC values is used. The data will be kept for 2 years after the end of the last crediting period.
QA/QC procedures to be applied:	---
Any comment:	Uncertainty level of data is low.

Data / Parameter:	$FF_{project plant,\ y}$
Data unit:	Kg
Description:	the quantity of diesel oil to be used setups of the project
Source of data to be used:	Dispatch centre of the project plant
Value of data applied for the purpose of calculating expected emission reductions in section B.5	28000
Description of measurement methods and procedures to be applied:	The quantity of the diesel oil to be combusted in the proposed project will be monitored and recorded continually. The buyer will double-check these data.
QA/QC procedures to be applied:	The data measured by the meter will be double-checked according to the invoice
Any comment:	Uncertainty level of data is low.

Data / Parameter:	$EG_{project,y}$
Data unit:	MWh
Description:	the quantity of power electricity connected to the grid
Source of data to be used:	Feasibility study
Value of data applied for the purpose of calculating expected emission reductions in section B.5	132000
Description of measurement methods and procedures to be applied:	The quantity of the electricity will be measured by the meter. There are four meters to be installed for the proposed project. Two are in the transformation station and the other two are in the project plant. The meters installed by the grid company are the main meters and the meters installed by the project developer is just complementary to the main meters. The data from these two meters will be recorded in detail.
QA/QC procedures to be applied:	The electricity output will be monitored and recorded by using the computer system. There are permanent staffs responsible for this job. Annual electricity output will be clear by calculating on-line monitored data. Additionally, these data will be cross-checked according to invoice provided by the grid company.
Any comment:	Uncertainty level of data is low.

Data / Parameter:	Q_y
Data unit:	GJ
Description:	the net quality of heat generated from the combined heart and power
Source of data to be used:	Feasibility study
Value of data applied for the purpose of calculating expected emission reductions in section B.5	529920
Description of measurement methods and procedures to be applied:	The quantity of the heat will be measured by the meter. There are two meters to be installed in the project plant by the heat company and project developer. The meter installed by the project developer is just complementary to the meter installed by the heat company is the. The data from these two meters will be recorded in detail including the feed water temperature(℃), backwater temperature(℃) and the exchange volume(m^3). And then the amount of heat can be calculated accordingly.
QA/QC procedures to be applied:	The heat output will be monitored and recorded by using the computer system. There are permanent staffs responsible for this job. Annual heat output will be clear by calculating on-line monitored data. Additionally, these data will be cross-checked according to invoice provided by the heat company..
Any comment:	Uncertainty level of data is low.

Data / Parameter:	B_g
Data unit:	tonne
Description:	Amount of biomass of type i fired in all grid connected power plants in the defined geographical region.
Source of data to be used:	official statistics
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0
Description of measurement methods and procedures to be applied:	This will be obtained from official data. If it is not available, the data will be calculated or estimated based on available official information.
QA/QC procedures to be applied:	This data can be calculated in accordance with the planting area and output of the wheat and corn.
Any comment:	Uncertainty level of data is low.

Data / Parameter:	B_s
Data unit:	tonne
Description:	The quantity of biomass that is available in surplus in the defined geographical region
Source of data to be used:	Official information
Value of data applied for the purpose of calculating expected emission reductions in section B.5	124000
Description of measurement methods and procedures to be applied:	The data come from official information. If the data is not available, the calculation and evaluation can be based on official information. The quantity of surplus supply is the difference between available biomass and biomass used for other purposes than grid connected electricity generation.
QA/QC procedures to be applied:	Uncertainty level of data is low, which can be calculated in accordance with the planting area and output of the wheat and corn.
Any comment:	

B.7.2 Description of the monitoring plan:

The approved baseline methodology applied in the proposed project activity is ACM0006 (version 03)- "consolidated baseline methodology for grid-connected electricity generation from biomass residues". Therefore, the monitoring methodology applied for this project activity corresponds to the approved baseline methodology ACM0006. The name of the applied monitoring methodology is: "Consolidated monitoring methodology for grid-connected electricity generation from biomass residues."(Version 03)

1. The requirement of Monitoring

The proposed project owner must maintain credible, transparent, and adequate data estimation, measurement, collection, and tracking systems to maintain the information required for an audit of an emission reduction project. These records and monitoring systems are needed to allow the selected DOE to verify project performance as part of the verification and certification process. This process also reinforces that CO_2 reductions are real and credible to the buyers of the Certified Emission Reductions (CERs).

Emission reduction will be achieved through avoiding power generation and heating from fossil fuel due to the power generated by the proposed project. Therefore, the grid-connected power generation and the baseline emission factor are the most important data that need to be monitored. In addition, the heating area and heating standard is also necessary data.

2. The responsible person for monitoring

Hebei Jiantou Biomass Power Generation CO., Ltd is the project owner, as well as the responsible person for monitoring.

Ms. Peng Xiang is the director of Straw-fired Power Generation Project Management Office, Hebei Jiantou Biomass Power Generation Co., Ltd, who is responsible for the project operation and maintenance.

Mr. Yu Linfei is the project manager, who is responsible for monitoring and collecting the data.

Ms, Peng and Mr.Yu are responsible for the internal validation. They are responsible for validating the staff, data recording and keeping. The data should be adjusted and improve the accuracy of the data.

The staff will be changed in the crediting period, the relevant evidence is necessary. There should be training and the examination for the new staff.

3. Meters Installation

Two kWh meters need to be installed in the substation to monitor the net power generation of the proposed project. The North China Power Grid has the right to possess, operate and maintain the Main Meter System and Hebei Jiantou Biomass Power Generation Co., Ltd has the right to possess, operate and maintain the Backup Meter System. These two systems can be read remotely and also record the accumulative generation. Both of them have the right to read these two meters. The North China Power Grid should provide the data from the Main Meter System to Hebei Jiantou Biomass Power Generation Co., Ltd.

A heat monitored equipment should be installed in the project plant, which will be use to monitor the heat generated from the plant. The company who purchased the heat will possess, operate and maintain the Main Meter System. Hebei Jiantou Biomass Power Generation Co., Ltd will possess, operate and maintain the Backup Meter System. These two meters are the equipment to record the accumulative heat. Both of them have the right to read these two meters. The heat purchasing company should provide the data from the Main Meter System to Hebei Jiantou Biomass Power Generation Co., Ltd.

4. Calibration of Meters and Metering

The North Power Grid Company carries out calibration every year and provides the records to the proposed project owner. And the Heat Company carries out calibration every year and provides the records to the proposed project owner. The proposed project owner and the designated third party will maintain these records.

5. Monitoring

The data need to be monitored please refer to section B.7.2.

5.1 Monitoring of Grid-connected electricity generated by the proposed project

Grid-connected electricity generated by the proposed project will be monitored through metering equipment at the transformer substation (interconnection facility connecting the facility to the grid). The data can also be monitored and reordered at the on-site control centre using a computer system. A detailed monitoring procedure of grid-connected electricity generated by the proposed project will be established in accordance with the Grid Connection Agreement.

The meter reading will be readily accessible for DOE. Calibration test records will be maintained for verification**.**

5.2 Monitoring of the heat generated by the proposed project

The heat supply monitoring system includes an engineering controller, a flux sensor, a thermoscope and a signal wire.

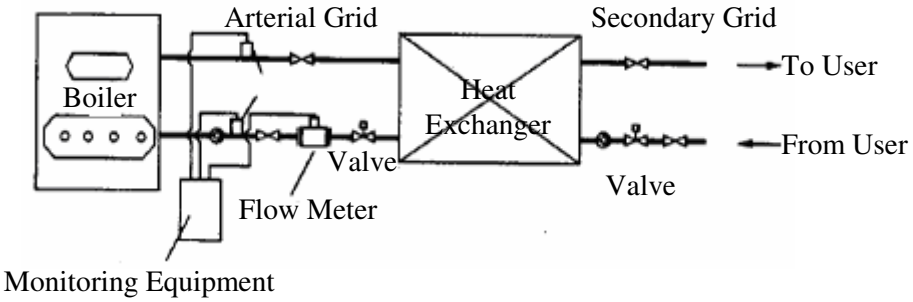

Figure5. Heat supply monitoring system of the boiler station

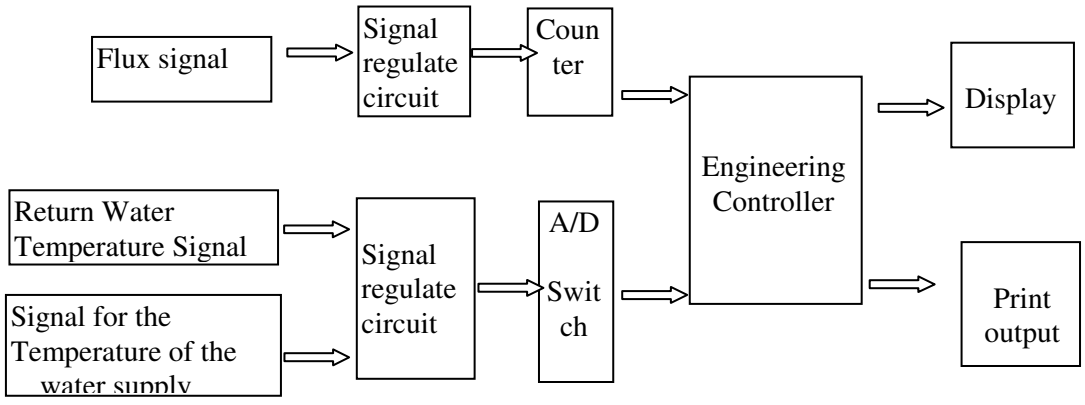

Table7. The circuit theory of the monitoring system

It should make sure that the verifiers from DOE obtain the metering record and the calibrated testing record of the instrument.

5.3 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, which will be ensured through the CDM mechanism in terms of the need for verification of the emission on an annual basis according to this PDD and the CDM manual. The proposed project developer is considering how to improve the proposed project on the basis of the cogeneration heat and power. This process is open to comments from the DOE.

6.Emergency treatment

Due to the shortage of the straw or its poor quality, the proposed project has to use the fossil fuels. In such case, the quantity of the fossil fuels should be recorded in detail and the leakage emission should be calculated in a transparent and accurate way accordingly.

7. Data Management System

This provides information on record keeping of the data collected during monitoring. Record keeping is the most import exercise in relation to the monitoring process. Without accurate and efficient data, the emission reduction from the proposed project cannot be verified.

Overall responsibility for monitoring of GHG emission reduction will rest with the CDM person responsible for the proposed project. The CDM manual sets out the procedures for tracking information from the primary source to the end-data calculations, in paper document format. If the data and information are from the Internet, the website must be provided. Moreover, the credibility and reliability of the data and information must be confirmed by the CDM developer or other qualified entities. It is the responsibility of the proposed project owner to provide additional necessary data and information for validation and verification requirement of the DOE.

Physical documentation such as paper-based maps, diagrams and environment assessment report will be collated in a central place with the monitoring plan. In order to facilitate auditor's reference, monitoring results will be indexed. All paper-based information will be stored by the technical department of company, and at least one copy will be kept.

The person responsible for the information management system for emissions reduction monitoring must qualified as a statistician.

8. Verification and Monitoring Results

The verification of the monitoring results of the project is a mandatory process required for all CDM projects. The main objective of the verification is to independently verify that the project has achieved the emission reductions as reported and projected in the PDD. It is expected that the verification will be done annually.

Main verification activities include:

- The proposed project owner should sign a verification service agreement with the DOE and abide by the time framework set by the EB for carrying out verification activities while taking into account the buyer's schedule. The project developer will make the arrangements for the verification and will prepare for the audit and verification process to the best of its abilities.

- The proposed project owner should complete necessary information for verification to the DOE before and during verification activities.

- The project developer will fully cooperate with the DOE and instruct its staff and management to be available for interviews and respond honestly to all questions from the DOE.

- If the proposed project deems the requirements of the DOE to be beyond the scope of the verification activities authorized by CDM EB, he should contact the CDM developer of the proposed project or other qualified entities to determine whether the requirements of the DOE are reasonable. If the requirements are considered unreasonable, a written rejection letter should be provided to the DOE with justifiable reasons. If the project owner and the DOE cannot reach an agreement on these requirements, the matter should be submitted to CDM EB or UNFCCC for arbitration.

- The proposed project will designate the responsible person for the monitoring and verification process and act as the focal point for DOE.

Annex 4

MONITORING INFORMATION

Data to be monitored is as follows:

ID number	Data Type	Data variable	Data unit	Measured (m), calculated (c) or estimated (e)	Comments	QA/QC Procedures
1.$BF_{i,y}$	Mass or volume	Quantity of biomass fuel combusted in the project plant	tonne	m and c	The quantity of biomass combusted will be collected separately for each fuel type of biomass.The data will be kept for 2 years after the end of the last crediting period.	Any direct measurement with mass or volume meters at the plant site should be crosschecked with an annual energy balance that is based on purchased quantities and stock changes.
4. AVD_y	Distance	The average return trip distance between biomass fuel supply sites and the project site	km	m	The distance for the return trip of trucks will be continuously monitored and recorded. The data will be kept for 2 years after the end of the last crediting period.	Check consistency of distance records provided by the trucks by comparing recorded distances with information from other sources (e.g. maps).
6. N_y	Number	Number of truck trips for the transportation of biomass	--	m	This parameter will be monitored by the chief operator of the power plant for each truck when they arrive at the power plant. The data will be kept for 2 years after the end of the last crediting period.	It can be crossed checked by total biomass and truckload.
7. $EF_{km,CO2}$	Emission factor	Average CO_2 emission factor for transportation of biomass with trucks	tCO_2/mass	m or c	The project proponent will calculate this parameter based on the information provided from the subcontractor of truck rental. If not possible, default values from the IPCC manual will be used.	Check consistency of measurement and local/ national data with default values by the IPCC. If the

					The data will be kept for 2 years after the end of the last crediting period.	values differ significantly from IPCC default values, collect additional information or conduct measurements is a feasible way.
9. $COEF_{CO2,i}$	Emission factors	CO_2 emission factor for the fuel type i	t CO_2 / mass or volume unit	m or c	These emission factors will be applied to fuel consumption for transportation and on-site fuel consumption. If possible, measurements or local/national data will be used. Otherwise, default IPCC values will be used. The data will be kept for 2 years after the end of the last crediting period.	---
10. $FF_{project\ plant,y}$	Mass or volume	Quantity of fossil fuels combusted in the boiler	kg	m and c	Any type of fossil fuel consumption in the power plant will be continuously monitored and recorded. Purchase receipts will check this data. The data will be kept for 2 years after the end of the last crediting period.	The consistency of metered fuel consumption should be crosschecked with purchase receipts
11. $EG_{project\ plant,y}$	Electricity quantity	Total quantity of electricity generated in the power plant during the year *y*	MWh	m	Data from the electricity buyer	The KWh output from the plants will be monitored and recorded at the on-site controlling centre using a computerized system. The project operator is responsible for recording this set of data. Measurement is being continuously recorded by the on-site computerized system, which will be aggregated so that monthly electricity outputs can be

						shown. This data will be crosschecked with the receipt from the power grid company.
14. $Q_{project\ plant,y}$	Heat quantity	Net quantity of heat generated from firing biomass in the project plant	GJ	m and c	Data will be collected from the heat supply monitoring system and will be crosschecked with the heat purchaser.	The data will be obtained from the heat supply monitoring system and will be crosschecked with the heat purchaser.
25. B_g	Mass or volume	Amount of biomass fired in all grid-connected power plants in Jinzhou	tonne	m and c	The data come from official information. If the data is not available, the calculation and evaluation can be based on official information. The quantity of surplus supply is the difference between available biomass and biomass used for other purposes than grid connected electricity generation.	These can be calculated based on the wheat and corn planting area and yield. Where possible, supplementary data sources and expert judgment should be used to support the findings.
26. B_s	Mass or volume	The quantity of biomass that is available in surplus in Jinzhou	tonne	m and c	Uncertainty level of data is low, which can be calculated in accordance with the planting area and output of the wheat and corn.	These can be calculated based on the wheat and corn planting area and yield. Where possible, supplementary data sources and expert judgment should be used to support the findings.

As for the meters installed, the uncertainty levels of them is $\pm$0.5%.

Detailed monitoring arrangements of emission reduction will be determined before the Project starts its operation, according to the monitoring plan.

Supported by the project owner, Hebei Jiantou Biomass Power Co. Ltd, CDM developer, Chinese Renewable Energy Industries Association, has completed a CDM manual serve as a guideline for the project owner to manage and monitor the Project during the Project implementation. In reference to the PDD of the other project, the table of contents of the manual is as follows:

1.0 Introduction

2.0 Overall Project Management

3.0 CDM Project Management and Calculations

3.1 Data to be monitored and recorded (as per the PDD)

3.2 Emissions Reduction Calculation for the Project

3.3 Monitoring Impact on Environment

4.0 Procedures to be followed

4.1 Monitoring Procedures

4.2 Calibration Procedures

4.3 Maintenance Procedures

4.4 Procedure for Training of Personnel engaged in this MVP

5.0 Records Keeping, Error Handling and Reporting Procedures

5.1 Records Keeping and Internal Reporting Procedure

5.2 Error Handling Procedure

5.3 External Reporting Procedure

5.4 Procedure for corrective actions arising

5.5 Change of CDM Responsible Person

6.0 Confirmation of the Adoption of these CDM Operating Procedures

The manual is available for validation by the DOE and will be updated and revised post-validation based on the comments from the DOE.

Annex 1. Project Operation Rule
Annex 2. Project Maintenance Items
Annex 3. Environment Monitoring Plan
Annex 4. List of data to be monitored

Apart from the monitoring plan the following revisions are also made.

1. The formula to calculate CO2 emissions from combustion of fossil fuels for transportation of biomass to the project plant. (in Page 18)

a). CO_2 emissions from combustion of fossil fuels for transportation of biomass to the project plant

The biomass used for the proposed project is not generated directly at the project site. Project participants shall determine CO_2 emissions resulting from transportation of the biomass to the project plant. The emission is calculated on the following equation:

$$PET_y = N_y \times AVD_y \times EF_{km,CO_2} \quad (2)$$

Where:

PET_y are CO_2 missions due to the biomass transportation from the biomass supply site to the project site in the year *y* in tons of CO_2 equivalents,

N_y is the number of truck trips during the period y.

AVD_y is the average return trip distance between the biomass fuel supply site and the site of the project plant in kilometers (km),

EF_{km,CO_2} is the average CO_2 emission factor for the trucks measured in t CO_2/km,

2. The note of NCV_i (Line 7, Page 23)

Emission Reductions due to displacement heat

There is no central heating system in the project site. The project site uses the coal-fired boiler or small stove for heat, which will cause the baseline emission. The equation for baseline emission calculation is as follows:

$$BL_{Heat,y} = \frac{Q_y \times COEF_i}{\varepsilon_{boiler} \times NCV_i} \quad (11)$$

Where:

$BL_{Heat,y}$ is emissions due to displacement heat during the year *y* in tons of CO_2e,

Q_y is the net quality of heat generated from the combined heat and power during the year *y* (GJ),

$COEF_i$ is CO_2 emission factor of the fossil fuel type *i* in tons of CO_2,

ε_{boiler} is the energy efficiency of the boiler that would be used in the absence of the project activity, and

NCV_i is the net calorific value of fossil fuel type i (GJ per volume or mass unit).

3. Emission factor(Line 10, Page 27)

Emission Reductions due to displacement of electricity are 125,004 tCO_2e/a

According to the above formula (6), the emission reductions are calculated and the calculation process and source of data are described as follows:

A	C	D	E
	Annual Power Generation (MWh)	Emission Factor (tCO_2/MWh)	Emission Reduction (tCO_2e/a)
Data source	Feasibility study	For calculation process, refer to Annex 3 Table A3	C=A*B
Amount	132,000	0.9421	125,004