MONITORING REPORT FORM (CDM-MR) *
Version 01 - in effect as of: 28/09/2010

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* as contained within the document entitled "Guidelines for completing the monitoring report form (CDM-MR)" (EB 54 meeting report, annex 34).

MONITORING REPORT
Version 4.0
Date 08/08/2012

Shandong Gaotang 30MW Biomass Power Generation Project
UN Ref No.: 1375
1st monitoring period: 20/03/2008~25/03/2009 (first and last days included)

SECTION A. General description of the project activity

A.1. Brief description of the project activity: >>

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The Shandong Gaotang 30MW Biomass Power Generation Project (hereafter referred to as the project), developed by National Bio Energy Co., Ltd, is located in Gaotang County which is one of the biggest agriculture bases in the northwest of Shandong Province, P.R.China. The project activity collects and utilizes biomass residues (cotton straw, wood residues and wheat bran) to generate electricity and realizes biomass comprehensive utilization in the province served as a demonstration project in China.

The total installed capacity of this biomass fired power plant is 30MW. And the straw-faired boiler is imported from Demark BWE Company, which is a world leading company in biomass boilers production and biomass cogeneration. So the project has also assisted in transferring advanced biomass technology to China. Electricity generated by the project is exported into the Shandong provincial power grid that is a part of the North China Grid (NCG) to replace the capacity of coal-fired power plants and help reduce greenhouse gas (GHG) emission from the high-growth, coal-dominated power generation of NCG. Furthermore, the project also accomplishes an extra benefit of GHG mitigation derived from a reduction of methane emission from biomass dumping or uncontrolled burning. The estimate annual GHG emission reductions are 180,881tCO_2e by the approved changed PDD version 07.

This project was constructed since 01/04/2006. It was put into trial operation on 29/01/2007 and in full operation since April 2008. It is estimated that the project can deliver 187,626 MWh/y of electricity to NCG with a biomass residues consumption of 247,506 ton per year (on wet base). In this monitoring period, the total emission reductions achieved are 177,513 tCO_2e. However, according to the requirement by EB 66th meeting, the annual amount of CERs to be issued to this project activity shall be capped at the average annual emissions reductions estimated in the original registered PDD, i.e. 140,695tCO_2 per year. So the amount of emission reductions which could be claimed during this monitoring period should be 143,007[1] tCO_2.

Further information on this project can be found in the approved changed PDD and associated documents, which are available on the UNFCCC website:

http://cdm.unfccc.int/Projects/DB/TUEV-SUED1191857086.36/view

A.2. Project Participants

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Name of Party involved (*)(host) indicates a host Party	Private and/or public entity(ies) project participants(*) (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant

[1] 143,007 tCO_2=140,695 tCO_2/365*371

		(Yes/No)
People's Republic of China (host)	National Bio Energy Co., Ltd.	No
United Kingdom of Great Britain and Northern Ireland	EDF Trading Limited	No
(*) In accordance with the CDM modalities and procedures, at the time of making the CDM-PDD public at the stage of validation, a Party involved may or may not have provided its approval. At the time of requesting registration, the approval by the Party(ies) involved is required.		

A.3. Location of the project activity:

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The project site is located in Gaotang Economic Development Zone, which is 5 kilometres to the northwest of Gaotang county seat. The project has geographical coordinates with east longitude of 116°10′39″ and north latitude of 36°54′36″. Geographical location of the project is shown in Figure1 and Figure 2.

Figure 1: Location of the Shandong Province in China

Figure2: Location of the project

A.4. Technical description of the project

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The project activity collects and utilizes biomass residues (cotton straw, wood residues and wheat bran) to generate electricity.

The total installed capacity of the project is 30MW. The technology employed by the project is from domestic and international advanced technologies. One straw direct burning boiler of 130t/h with high temperature and high pressure is imported from Denmark BWE Company, with burning completely and no knotting residue. One 30MW steam turbines and one suited generator of 30MW have been applied in the project. Key technical specifications of them are listed as follows:

Table 1: Key Technical Specifications of BWE boiler

Parameters Name	Unit	Value
boiler maximum continuous rating	t/h	130
Superheated Steam pressure	MPa	9.2
Superheated Steam temperature	°C	540
Boiler feed-water temperature	°C	210
Boiler Exhaust Temperature	°C	130 °C
Boiler Efficiency	%	≥92
Boiler Dirt-discharge Rate	%	2%

Table 2: Key Technical Specifications of turbine

Parameters Name	Unit	Data
Model	/	N30-8.83/535
Rated Output	MW	30
Rated Rotation Speed	r/min	3000
Rated Flow	t/h	120
Rated Pressure	Mpa	8.83
Rated Temperature	^{o}C	535

Table 3: Key Technical Specifications of generator

Parameters Name	Unit	Data
Model	/	QF-30-2
Rated Output	MW	30
Rated Voltage	kV	6.3
Rated Electric Current	A	3473
Rated Rotation Speed	r/min	3000

Biomass residues collection stations around the project site and a large one at the project could guarantee the biomass residues supply for this project during this monitoring period.

The electricity output is transmitted through a transformer at the site to Huixin substation, and then connected to Shandong Provincial Grid that is an integral part of NCG. Please see the diagram below[2]:

[2] Note that the storage time of the biomass is not meant to surpass one year.

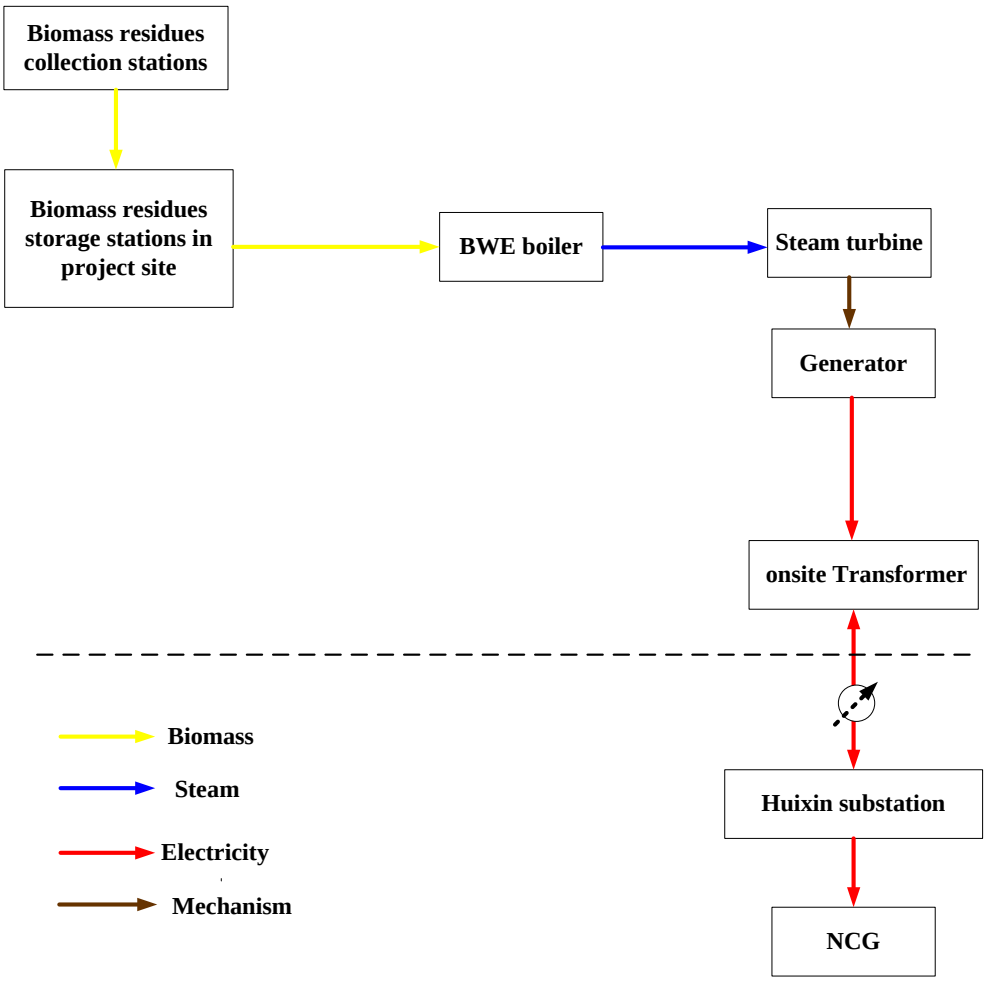

Figure3 Technical Diagram

A.5. Title, reference and version of the baseline and monitoring methodology applied to the project activity:

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The baseline and monitoring methodology applied to this project includes:

- The approved consolidated baseline and monitoring methodology ACM0006 "Consolidated methodology for grid-connected electricity generation from biomass residues Version 04";

A.6. Registration date of the project activity:

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The registration date of the project was 20/03/2008.

A.7. Crediting period of the project activity and related information (start date and choice of crediting period):

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The start date of the crediting period is 20/03/2008. Renewable crediting period (7*3 years) was chosen for the project.

The first crediting period is 20/03/2008-19/03/2015.

A.8. Name of responsible person(s)/entity(ies):

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Person(s)/entity(ies) responsible for completing the monitoring report are listed as follows:

Project owner:

National Bio Energy Co., Ltd

Contact information:
Contact Person: Mr. Zhao Hui
Position: CDM project manager
E-mail: zhaohui@nbe.cn

Project Consultant:

Chinese Renewable Energy Industries Association, Beijing 100044, P.R.China, A2106 WuHua Plaza, Che Gongzhuang Street, Xicheng District

Tel: (8610)68002617 ext.101
E-mail: malifang@creia.net

SECTION B. Implementation of the project activity

B.1. Implementation status of the project activity

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The project started to construct since 01/04/2006. It was put into trial operation on 29/01/2007 and in full operation since April, 2008.

During this monitoring period, all the monitoring equipments and facilities are managed by responsible person, and the project has been running normally. No change of monitoring equipments. Local surplus biomass residues (cotton straw, wood residues and wheat bran) are utilized by the project for electricity generation.

Two permanent changes occurred during the project actual implementation stage, which related to the 1st monitoring period.

Change 1: Three types of biomass residues (Cotton stalk, Wood residues and Wheat Bran) have been applied to the project.

Change 2: Higher power generation.

Base on these two changes, the PDD has been revised and the re-analysis for the applicability of the methodology has been done. The result shows that the methodology of ACM0006 still applicable. The revised PDD has been approved by EB.

B.2. Revision of the monitoring plan

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The monitoring plan was revised and submitted to EB as a part of the changed PDD, and it has been approved by EB on 02/03/2012.

B.3. Request for deviation applied to this monitoring period

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There is no deviation to this monitoring period.

B.4. Notification or request of approval of changes

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Two permanent changes from project description in registered PDD occurred during the project actual activities, include:

Change1: three types of biomass residues (cotton stalk, wood residues and wheat bran) have been applied to the project;

Change2: higher power generation.

These changes in revised PDD version7 have been notified and approved by EB on 02/03/2012.

SECTION C. Description of the monitoring system

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Organizational Structure

National Bio Energy Co., Ltd has established and maintained the appropriate monitoring systems and quality control, the responsibilities for carrying out these tasks are broadly elaborated in below:

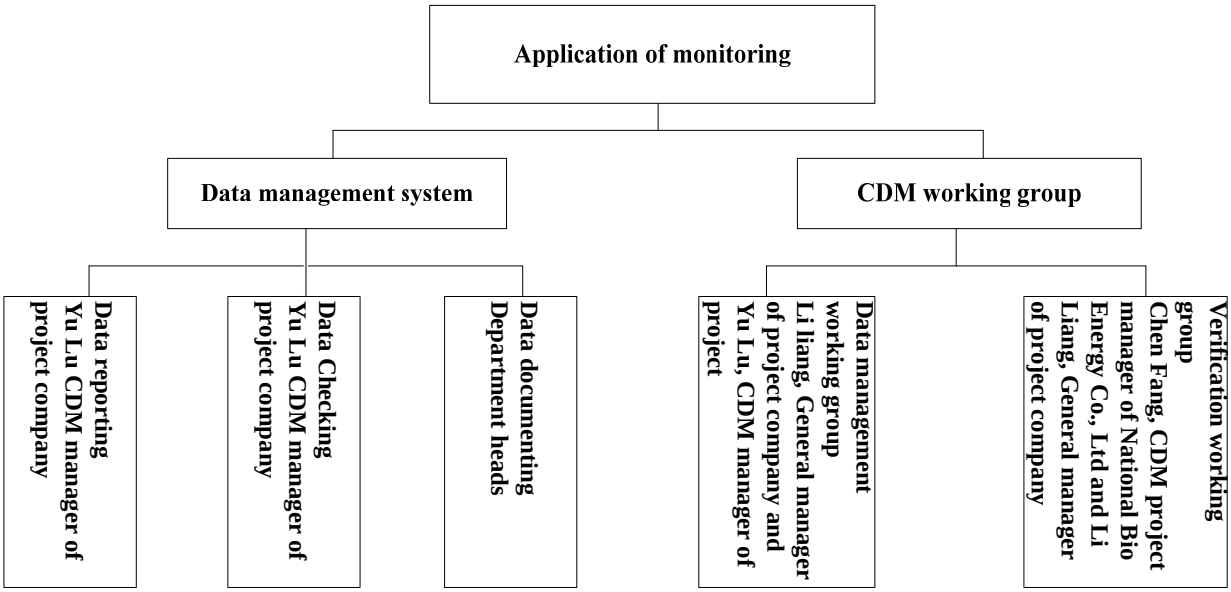

Figure4 Organizational Structure

Roles and responsibilities of personnel

National Bio Energy Co., Ltd is the project owner. Staffs from the onsite company conduct the monitoring procedures and work based on the monitoring methodology described.

The application of monitoring includes two parts: data management system and CDM working group. The monitoring data such as all kinds of tables for different monitoring parameters, reports are processed and stored first in the plant office by operating manager and biomass purchase department manager, and are reported and checked Ms. Yu Lu. Mr. Lin Li'ang and Ms. Yu Lu are in charge of the data management working group and the results are sent periodically to Ms. Chen Fang, the CDM manager of National Bio Energy Co., Ltd and a number of the verification working group, for quality assurance.

The personal responsibilities of the project are:

Operating manager of the plant: Overall management of power plant operation and in charge of collecting monitoring data as requested by the monitoring plan.

Biomass purchase department manager: Biomass 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 would not be stored over one year.

Data collection procedures

- Line diagrams

The line diagrams are shown in below:

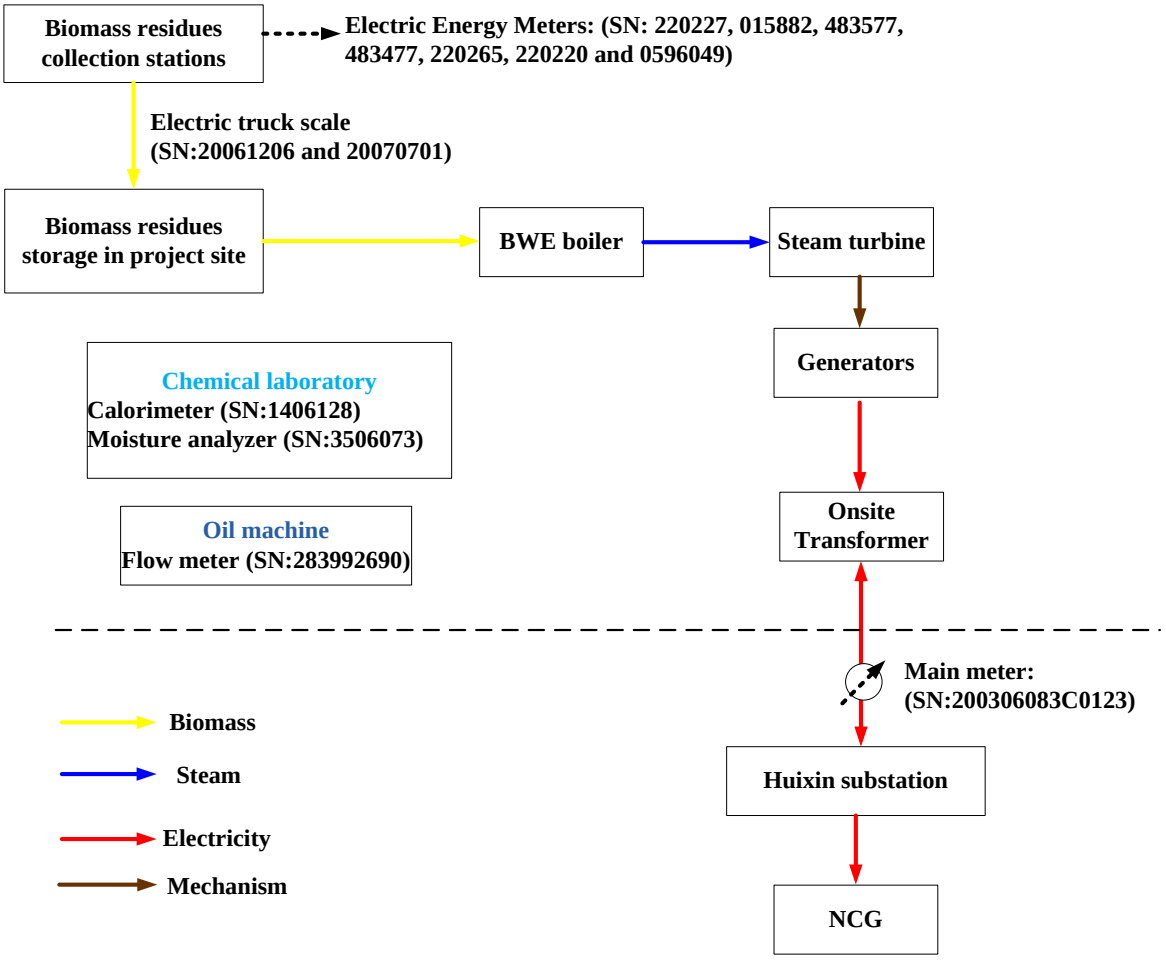

Figure5 Line diagrams

- Information flow

EG_y: Net quantity of electricity delivered to grid.

A main meter installed at the Huixin substation is used for monitoring electricity generated by the project plant continuously. Data from the meter is monthly recorded by the grid company.

$BF_{k,y}$: Quantity of biomass residues type k combusted in the project plant.

On site measured by weight meters (two truck scales) and recorded by the procurement department of the plant. In order to determine the quantity of dry biomass which is required by the approved methodology, the moisture content of biomass residues is used for adjusting. Total consumptions are summarized in the monthly report.

Moisture: Moisture content of the biomass residues.

When biomass residues are transported to the plant, each batch of different biomass of homogeneous quality are sampled and monitored by the moisture analyzer at chemical laboratory on site. Measurements are record monthly.

NCV_k: Net Calorific Value of biomass residue type k consumed by the project.

Biomass residues are sampled and NCV of them is monitored by a calorimeter at the chemical laboratory on site at least every six months. The operator takes at least three samples of biomass residues for each measurement according to the monitoring plan of the approved changed PDD and national standard (GB/T213-1996). Measured records have been saved. Measurements are summarized monthly.

AVD_y: Average return trip distance (from and to) between biomass fuel supply sites and the project site.

Whenever the truck arrives at the plant, the staff puts down the name of biomass supply site and trip distance provided by the truckers. The average value is adopted for every monitoring month.

N_y: Number of truck trips for the transportation of biomass.

Whenever the truck arrives in the power plant, the staff puts the number and the distance in the data collection system. And summarize them monthly.

$FF_{project, site,I,y}$: Quantity of diesel combusted at the project site for other purposes that are attributable to the project activity.

Diesel consumed by vehicles (grass-grasping machine and loader) which are used for preparation of biomass residues on site is measured by a volume flow meter installed on an oiling machine. It is summarized monthly.

$EC_{PJ,y}$: On-site electricity consumption attributable to the project activity.

The main meter installed at Huixin substation, which is the same one used for monitoring EG_y, is also used for monitoring the electricity consumed by the project plant continuously. Meters installed at the biomass collection stations are used respectively for monitoring electricity consumed for the preparation of biomass continuously.

Emergency procedures

In case of emergencies, measures should be taken to guarantee the conservativeness of the project activities.

If the main meters are damaged or inaccurate, disposal of urgency would be implemented according to the stipulations in the Power Purchase Agreement, Parallel Operation Agreement, and so on.

For measurement of amount of biomass residues, if there is something wrong with the weight meter, the responsible person for CDM shall inform relevant staffs to repair and calibrate the equipments as soon as possible.

SECTION D. Data and parameters

According to the approved monitoring methodology, the data and parameter to calculate emissions reductions are as follows:

D.1. Data and parameters determined at registration and not monitored during the monitoring period, including default values and factors

Data / Parameter:	GWP_{CH4}
Data unit:	tCO2e/tCH4
Description:	Global Warming Potential for CH4

Source of data used:	IPCC default value
Value(s) :	21 for the first commitment period.
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculation ($BF_{biomass,y}$), and Project emission calculation(PE_y)
Additional comment:	Shall be updated according to any future COP/MOP decisions.

Data / Parameter:	**$EF_{electricity,y}$**
Data unit:	tCO2e/MWh
Description:	CO_2 emission factor for the electricity displaced due to the project activity during the year y
Source of data used:	Approved changed PDD
Value(s) :	0.975
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculation ($ER_{electricity,y}$)
Additional comment:	-

Data / Parameter:	**$EF_{,gird,y}$**
Data unit:	tCO2e/MWh
Description:	CO_2 emission factor for grid electricity during the year y
Source of data used:	Approved changed PDD
Value(s) :	0.975
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emission calculation ($PE_{EC,y}$)
Additional comment:	-

D.2. Data and parameters monitored

Data / Parameter:	**EG_y**
Data unit:	MWh
Description:	Net quantity of electricity delivered to grid in year y
Measured /Calculated /Default:	Measured
Source of data:	Electricity meter (main meter) reading at Huixin substation.
Value(s) of monitored parameter:	180,722.52 (179,818.91, deducted 0.5%)
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculations ($ER_{electricity,y}$)
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	

Type	**Electricity meter (Main meter)**
Location	Huixin substation
Model	DTSD341
Accuracy class	0.5
Serial Number	200306083C0123

	Calibration frequency	Once per year	
	Calibrated on	10/06/2007 23/03/2008 13/03/2009	
	Valid date to	12/03/2010	
Measuring/ Reading/ Recording frequency:	Continuous on-site measurements and monthly recording by the power distribution company		
Calculation method (if applicable):	-		
QA/QC procedures applied:	The electricity meter is operated by the power distribution company and calibrated periodically according to relevant national standards. Data measured by meter has been cross checked by the electricity sales receipts and the results are correct. The meters accuracy level is 0.2s in the registered PDD. In the project actual implementation stage, the monitoring equipment accuracy level is 0.5. The accuracy level 0.5 in this project is in line with national standard "Technical Administrative Code of Electric Energy Metering"(DL/T448-2000): it is required that power plants with installed capacity under 100MW must use electricity meters with accuracy level not inferior than 1.0 in paragraphs 5.1.3 and 5.3 of DL/T448-2000. So the accuracy 0.5 of the main meter in this project is in line with national standard (DL/T448-200)）. According to the PPA signed between the project owner and the North-China Power Grid（Liaocheng Power Supply Bureau）, the North-China Power Grid has the right to possess, operate and maintain the Main Meter. Which means that the project owner has no right to settle or change the accuracy of the main meter, Liaocheng Power Supply Bureau set the accuracy of the main meter to be 0.5 which is just common practice in Shandong Provincial Power Grid. Furthermore, PPs decided to discount 0.5% of EG_y monitored by electricity meter with accuracy 0.5 for conservation and it has been approved in the revised Monitoring Plan by EB on 02/03/2012.		

Data / Parameter:	**$BF_{k,y}$**
Data unit:	tons
Description:	Quantity of biomass residue type k combusted in the project plant during the year y
Measured /Calculated /Default:	Measured
Source of data:	Project records from project procurement department of plant
Value(s) of monitored parameter:	66,011.91 tons (dry base) for cotton straw; 91,902.57tons (dry base) for wood residues; 11,928.17tons (dry base) for wheat bran
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculation ($BE_{Biomass,y}$), and Project emission calculation ($PE_{biomass,CH4,y}$)
Monitoring equipment (type, accuracy class, serial	

<table>
<tr><td>number, calibration frequency, date of last calibration, validity)</td><td>
<table>
<tr><td>Type</td><td>Electric truck scale #1</td></tr>
<tr><td>Location</td><td>East weight house</td></tr>
<tr><td>Model</td><td>SCS-30</td></tr>
<tr><td>Accuracy class</td><td>class III</td></tr>
<tr><td>Serial Number</td><td>20061206</td></tr>
<tr><td>Calibration frequency</td><td>Once per six months</td></tr>
<tr><td>Calibrated on</td><td>28/09/2007
27/03/2008
25/09/2008
22/03/2009</td></tr>
<tr><td>Valid date to</td><td>21/09/2009</td></tr>
</table>
<table>
<tr><td>Type</td><td>Electric truck scale #2</td></tr>
<tr><td>Location</td><td>West weight house</td></tr>
<tr><td>Model</td><td>SCS-30</td></tr>
<tr><td>Accuracy class</td><td>class III</td></tr>
<tr><td>Serial Number</td><td>20070701</td></tr>
<tr><td>Calibration frequency</td><td>Once per six months</td></tr>
<tr><td>Calibrated on</td><td>28/09/2007
27/03/2008
25/09/2008
22/03/2009</td></tr>
<tr><td>Valid date to</td><td>21/09/2009</td></tr>
</table>
</td></tr>
<tr><td>Measuring/ Reading/ Recording frequency:</td><td>Measuring continuously and monthly record</td></tr>
<tr><td>Calculation method (if applicable):</td><td>-</td></tr>
<tr><td>QA/QC procedures applied:</td><td>All purchase records, invoices, biomass available in the store and biomass quantity combusted for production are all available at the plant site. $BF_{k,y}$ measurements had been crosscheck with an annual energy balance that is based on purchased quantities and stock change for QA/QC.</td></tr>
</table>

Data / Parameter:	Moisture content of the biomass residues
Data unit:	% water content
Description:	Moisture content of each biomass residue type k
Measured /Calculated /Default:	Measured and Calculated
Source of data:	On-site measurements by moisture analyzer
Value(s) of monitored parameter:	Please see the column of moisture content for each kind of biomass in table 7.
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculation ($BE_{biomass,y}$) and Project emission calculation ($PE_{Biomass,CH4,y}$)
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	<table><tr><td>Type</td><td>Moisture analyzer</td></tr><tr><td>Location</td><td>Chemical lab</td></tr><tr><td>Model</td><td>SDTGA300</td></tr><tr><td>Accuracy class</td><td>0.01</td></tr></table>

	Serial Number	3506073
	Calibration frequency	Once a year
	Calibrated on	10/02/2008 07/02/2009
	Valid date to	06/02/2010
Measuring/ Reading/ Recording frequency:	Measuring continuously and monthly record	
Calculation method (if applicable):	Mean values calculated for every monitoring month	
QA/QC procedures applied:	-	

Data / Parameter:	**NCV_k**
Data unit:	TJ/tonne
Description:	Net Calorific Value of biomass residue type k consumed by the project
Measured /Calculated /Default:	Measured and calculated
Source of data:	Measured in project plant
Value(s) of monitored parameter:	Please see the columns of NCV_k for each kind of biomass in table 7.
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emission calculation ($PE_{Biomass,CH4,y}$)
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Type: **Calorimeter** Location: Chemical lab Model: SDACM3000 Accuracy class: Qualified Serial Number: 1406128 Calibration frequency: Once a year Calibrated on: 10/01/2008, 09/01/2009 Valid date to: 08/01/2010
Measuring/ Reading/ Recording frequency:	Monthly measuring and taking at least three samples for each measurement. Meanwhile, the results are read and recorded.
Calculation method (if applicable):	The monthly average value of biomass is calculated as $NCV_k = \frac{\sum_i NCV_{i,k}}{\sum i}$ Where: NCV_k: is the monthly averaged net caloric value of biomass k (TJ/ton), $NCV_{i,k}$: is the net caloric value of biomass k in day i (TJ/ton), k: is the type of biomass i: is the number of inspections in one month
QA/QC procedures applied:	PO has checked consistency of measurements with public available data, i.e. default values by China Energy Statistic Yearbook 2009 and

	IPCC[3]. There is little difference, so PO did not collect additional information.

Data / Parameter:	**AVD_y**
Data unit:	km
Description:	Average return trip distance (from and to) between biomass fuel supply sites and the project site
Measured /Calculated /Default:	Measured
Source of data:	Records by project participants
Value(s) of monitored parameter:	Please see the column of AVD_y in table 4.
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emission calculations (PET_y)
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	No monitoring equipment
Measuring/ Reading/ Recording frequency:	Recording distance when every truck arrived at project site.
Calculation method (if applicable):	The average value is adopted for every month.
QA/QC procedures applied:	PO has checked consistency of distance records in which those distances are provided by the truckers by comparing recorded distances with maps for QA/QC.

Data / Parameter:	**N_y**
Data unit:	
Description:	Number of truck trips for the transportation of biomass
Measured /Calculated /Default:	Measured
Source of data:	Fuel department of the power plant
Value(s) of monitored parameter:	Please see the column of N_y in table 4.
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emission calculations (PET_y)
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	No monitoring equipment.
Measuring/ Reading/ Recording frequency:	Recording when every truck arrived at the project site
Calculation method (if	-

[3] 2006 IPCC Guidelines for National Greenhouse Gas Inventories, table 1.2, Volume 2 Energy, chapter 1, Page 1.19.

applicable):	
QA/QC procedures applied:	PP has checked consistency of the number of truck trips with the inventory of combusted biomass and quantity of biomass purchased for QA/QC.

Data / Parameter:	$\mathbf{EF_{km,CO2,y}}$
Data unit:	tCO_2/km
Description:	Average CO_2 emission factor for transportation of biomass with trucks
Measured /Calculated /Default:	default
Source of data:	IPCC 2006 default value form Moderate Control index for the US heavy Duty Diesel Vehicle.
Value(s) of monitored parameter:	0.001011
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emission calculations (PET_y)
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	-Not applicable
Measuring/ Reading/ Recording frequency:	-Not applicable
Calculation method (if applicable):	-Not applicable
QA/QC procedures applied:	PO has reviewed the IPCC 2006 manual, there no new version of IPCC manual, so this parameter remains the same as stated in approved notification PDD and was thought to be suitable and accurate.

Data / Parameter:	$\boldsymbol{FF_{project\ plant,i,y}}$
Data unit:	tons
Description:	Quantity of diesel combusted in the biomass residue fired power plant during the year y
Measured /Calculated /Default:	Measured
Source of data:	Project records from project procurement department of plant
Value(s) of monitored parameter:	0
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emission calculations ($PEFF_y$)
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	According to the actual design, the boiler does not need any diesel for start-ups, so no monitoring equipment has been settled to monitor $FF_{project\ plant,i,y}$
Measuring/ Reading/ Recording frequency:	-Not applicable
Calculation method (if	-Not applicable

applicable):	
QA/QC procedures applied:	-Not applicable

Data / Parameter:	$FF_{project\ site,i,y}$
Data unit:	tons
Description:	Quantity of diesel combusted at the project site for other purposes that are attributable to the project activity during the year y
Measured /Calculated /Default:	Measured
Source of data:	Direct measurement and calculation in the procurement department of plant
Value(s) of monitored parameter:	96.62
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emission calculations ($PEFF_y$)
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	**Type** / **Flow meter** Location / Gaotang Petrol station Model / CS2000-30CA Accuracy class / qualified Serial Number / 283992690 Calibration frequency / Once two years Calibrated on / 28/07/2007 Valid date to / 27/07/2009
Measuring/ Reading/ Recording frequency:	Measuring continuously and monthly record
Calculation method (if applicable):	$FF_{project\ site,i,y}$=density of diesel(kg/liter)*volume flow(liter)/1000
QA/QC procedures applied:	PO had crosschecked the measurements with the invoice of purchased diesel, and found that the monitored results are accurate

Data / Parameter:	ρ_{diesel}
Data unit:	kg/liter
Description:	Density of diesel
Measured /Calculated /Default:	Default
Source of data:	The national standard “automobile diesel fuel GB/T19147-2003”
Value(s) of monitored parameter:	0.86kg/liter
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emission calculations ($PEFF_y$)
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	-Not applicable

Measuring/ Reading/ Recording frequency:	-Not applicable
Calculation method (if applicable):	-Not applicable
QA/QC procedures applied:	There is no update for this parameter in GB/T19147-2003, so the default value is applied.

Data / Parameter:	$EF_{CO2,FF,i}$
Data unit:	tCO_2/GJ
Description:	CO_2 Emission Factor for fossil fuel type i
Measured /Calculated /Default:	Default
Source of data:	IPCC default value (table 1.4, chapter1, volume2: energy)
Value(s) of monitored parameter:	0.0741
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emission calculations ($PEFF_y$)
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	-Not applicable
Measuring/ Reading/ Recording frequency:	-Not applicable
Calculation method (if applicable):	-Not applicable
QA/QC procedures applied:	Because measurements for $COEF_i$ are not available, latest IPCC 2006 default value $0.0741tCO_2/GJ$ was used.

Data / Parameter:	NCV_i
Data unit:	GJ/ton fossil fuel
Description:	Net Calorific Value of fossil fuels combusted at the project site for other purposes that are attributable to the project activity during the year y
Measured /Calculated /Default:	Default
Source of data:	China Energy Statistical Yearbook
Value(s) of monitored parameter:	42.652 GJ/ton
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emission calculations ($PEFF_y$)
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	-Not applicable
Measuring/ Reading/	-Not applicable

Recording frequency:	
Calculation method (if applicable):	-Not applicable
QA/QC procedures applied:	PO has checked the consistency of national data with default values by the IPCC, in table 1.2, Chapter 1, volum2 of IPCC 2006 manual, it stated that the Net Calorific Value of diesel is 0.043 TJ/tonne which differs little with China Energy Statistical Yearbook. So, 42.652 GJ/tonne was thought to be suitable and accurate.

Data / Parameter:	$NCV_k*EF_{burning,CH4,k,y}$
Data unit:	tCH_4/ton biomass residue
Description:	CH_4 emission factor for uncontrolled burning of the biomass residue type k during the year y
Measured /Calculated /Default:	Default
Source of data:	IPCC 2006 default value 0.0027 tCH_4/ton is used as $NCV_k*EF_{burning,CH4,k,y,}$ and the conservative factor of 0.73 is applied
Value(s) of monitored parameter:	0.001971
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Baseline emission calculations ($BE_{biomass,y}$)
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	-Not applicable
Measuring/ Reading/ Recording frequency:	-Not applicable
Calculation method (if applicable):	-Not applicable
QA/QC procedures applied:	-Not applicable

Data / Parameter:	$EF_{CH4,BF}$
Data 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:	Default values, as provided in Table3 of ACM0006 (Version4) which sources from 2006 IPCC Guideline, Volume2, Chapter2, Tables 2.2 to 2.6
Value(s) of monitored parameter:	0.0000411
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emission calculations ($PE_{biomass,CH4,y}$)
Monitoring equipment (type, accuracy class, serial number, calibration	-Not applicable

frequency, date of last calibration, validity)	
Measuring/ Reading/ Recording frequency:	-Not applicable
Calculation method (if applicable):	-Not applicable
QA/QC procedures applied:	PO has reviewed the IPCC 2006 manual, there no new version of IPCC manual, so this parameter remains the same as stated in the approved changed PDD and was thought to be suitable and accurate.

Data / Parameter:	$EC_{PJ,y}$
Data unit:	MWh
Description:	On-site electricity consumption attributable to the project activity during the year y (including the electricity consumed for the preparation of the biomass residue in all collection stations)
Measured /Calculated /Default:	Measured and calculated
Source of data:	Main meter reading at Huixin substation and electricity meters reading at collection stations.
Value(s) of monitored parameter:	919.738
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Project emission calculations ($PE_{EC,y}$)
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	

Type	**Electricity meter (Main meter)**
Location	Huixin substation
Model	DTSD341
Accuracy class	0.5
Serial Number	200306083C0123
Calibration frequency	Once per year
Calibrated on	10/06/2007 23/03/2008 13/03/2009
Valid date to	12/03/2010

Type	**#1electricity meter**
Location	Qingping collection station
Model	DT862
Accuracy class	2.0
Serial Number	220227
Calibration frequency	Once per five years
Calibrated on	20/09/2006
Valid date to	19/09/2011

Type	**#2 electricity meter**
Location	Fengzhuang collection

	station
Model	DT862
Accuracy class	2.0
Serial Number	015882
Calibration frequency	Once per three years
Calibrated on	30/09/2006
Valid date to	29/09/2009

Type	**#3 electricity meter**
Location	Wangxianzhuang collection station
Model	DT862-4
Accuracy class	2.0
Serial Number	483577
Calibration frequency	Once per five years
Calibrated on	25/11/2006
Valid date to	24/11/2011

Type	**#4 electricity meter**
Location	Dongzhuang collection station
Model	DT862-4
Accuracy class	2.0
Serial Number	483477
Calibration frequency	Once per five years
Calibrated on	05/11/2007
Valid date to	04/11/2012

Type	**#5 electricity meter**
Location	Tianzhai collection station
Model	DT862
Accuracy class	2.0
Serial Number	220265
Calibration frequency	Once per three years
Calibrated on	21/08/2006
Valid date to	20/08/2009

Type	**#6 electricity meter**
Location	Liusi collection station
Model	DT862
Accuracy class	2.0
Serial Number	220220
Calibration frequency	Once per three years
Calibrated on	08/10/2006
Valid date to	07/10/2009

	Type	**#7 electricity meter**
	Location	Liangcun collection station
	Model	DT862-4
	Accuracy class	2.0
	Serial Number	0596049
	Calibration frequency	Once per five years
	Calibrated on	05/12/2007
	Valid date to	04/12/2012
Measuring/ Reading/ Recording frequency:	The electricity consumed by the project plant is continuously on-site measured and monthly recording by the power distribution company; The electricity consumed by the biomass collection stations is continuously measured by meters installed at the collection stations. It is read and recorded according to the schedule of the power distribution company	
Calculation method (if applicable):	electricity consumption=electricity consumption by the project pant + electricity consumption by all biomass collection stations	
QA/QC procedures applied:	The electricity main meter has been operated by the power distribution company and calibrated periodically according to relevant national standards; The electricity meters installed at the collection stations have been calibrated periodically according to relevant national standards. The data measured by the meters has been cross checked by electricity sales receipts and the results are correct.	

Data / Parameter:	
Data unit:	Tons
Description:	Quantity of available biomass residues of type k in the region
Measured /Calculated /Default:	Calculated
Source of data:	Statistics from local governments
Value(s) of monitored parameter:	This is obtained from official data. Please refer to table 9 below for more details.
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Leakage emission calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	-Not applicable
Measuring/ Reading/ Recording frequency:	Data was obtained from statistic or survey conducted by local government annually.
Calculation method (if applicable):	It is equal to the sum of statistics of available biomass residues which is reported by regional Statistic Bureaus
QA/QC procedures applied:	The Statistic Data of Biomass in the region was provided by local governments, i.e. Statistic Bureaus of Gaotang City, Xiajin City, Guanxian City, Linqing City, Pingyuan City, Wucheng City, Yucheng City, Chiping City, which are official and authoritative, so there is no need for supplementary data sources and expert judgment.

Data / Parameter:	
Data unit:	Tons
Description:	Quantity of biomass residues of type k that are utilized (e.g. for energy generation or as feedstock) in the defined geographical region
Measured /Calculated /Default:	Calculated
Source of data:	Statistics from local governments
Value(s) of monitored parameter:	This is obtained from official data. Please refer to table 9 below for more details.
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Leakage emission calculations
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	-Not applicable
Measuring/ Reading/ Recording frequency:	Data was obtained from statistic or survey conducted by local government annually.
Calculation method (if applicable):	Sum of biomass residues utilized out of this project and biomass residues utilized by this project
QA/QC procedures applied:	The Statistic Data of Biomass utilized in the region was provided by local governments, i.e. Statistic Bureaus of Gaotang City, Xiajin City, Guanxian City, Linqing City, Pingyuan City, Wucheng City, Yucheng City, Chiping City, which is official and authoritative, so there is no need for supplementary data sources and expert judgment.

SECTION E. Emission reductions calculation

The project owner uses the approved consolidated monitoring methodology ACM0006 (version 04) regarding grid-connected electricity generation from biomass residues, in conjunction with ACM0002 (version 06) to establish the grid emissions factor for renewable energy projects. The grid emissions factor has been fixed for the first 7-year crediting period.

In each year the amount of eRs actually generated by the project will vary depending on the net electricity supplied to the grid, project emissions due to transport and fossil fuel use, on-site consumption of fossil fuels, electricity consumption and as well as methane emissions from the biomass combusted in the project scenario and avoided in the baseline as detailed in the PDD and summarized below.

E.1. Baseline emissions calculation

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The GHG emission reductions of the project are from two major sources: CO_2 emission reductions through the substitution of electricity generation in North China Power Grid, CH_4 emission reductions from a reduction of natural decay or burning of anthropogenic sources of biomass residues.

a) Emission reductions due to displacement of electricity（$ER_{electricity,y}$）

The project owner used ACM0002 in the PDD to establish the emissions factor for the net electricity generated by the project. Following this methodology, the emission reductions achieved by the project activity from electricity generation can be calculated by multiplying the net electricity supplied to the

grid and the appropriate emissions factor of the grid.

The emission reductions from electricity $ER_{electricity,y}$ by the project activity during a given year y is

$$ER_{electricity,y} = EG_y * EF_{electricity,y} \quad (2)$$

Where:

$ER_{electricity,y}$ are the emission reductions due to displacement of electricity during the year y (tCO_2/yr)

EG_y is the net quantity of electricity delivered to grid in year y

$EF_{electricity,y}$ is the CO_2 emission factor for the electricity displaced due to the project activity during the year *y* (tCO_2/ MWh).

The emission factor $EF_{electricity,y}$ of the grid is represented as a combination of the Operating Margin and the Build Margin, and was fixed for the duration of the crediting period in the approved changed PDD. The Operating Margin emission factor $EF_{OM,y}$ was calculated in the approved changed PDD as 1.069tCO2e/MWh. The Build Margin emission factor $EF_{BM,y}$ was calculated as 0.880tCO2e/MWh. Where the weights w_{OM} and w_{BM}, by default, are 50% (i.e., $w_{OM} = w_{BM} = 0.5$).So

$EF_{electricity,y} = w_{OM} * EF_{OM,y} + w_{BM} * EF_{BM,y} = 1.069*0.5 + 0.880*0.5 = 0.975tCO_2/MWh$

Net electricity delivered to grid is monitored through the use of onsite metering equipment and calculated from total supply to the grid. With the emissions factor fixed for the crediting period which is established and fixed in the PDD as $0.975tCO_2e/MWh$.

All metering equipment is calibrated regularly in line with industry standards. In addition, total supply is checked against sales receipts.

Table 2. Monitored electricity data and calculation of $ER_{electricity,y}$

Period	EG_y (MWh)	$EF_{electricity,y}$ (tCO_2e/MWh)	$ER_{electricity,y}$ (tCO_2e)
	A1	B1	C1=A1*B1
20/03/2008-29/03/2008	5,400.70	0.975	5,265
30/03/2008-28/04/2008	12,091.16	0.975	11,788
29/04/2008-29/05/2008	14,359.40	0.975	14,000
30/05/2008-28/06/2008	13,416.38	0.975	13,080
29/06/2008-29/07/2008	14,557.73	0.975	14,193
30/07/2008-28/08/2008	11,814.03	0.975	11,518
29/08/2008-26/09/2008	15,399.62	0.975	15,014
27/09/2008-25/10/2008	14,296.36	0.975	13,938
26/10/2008-25/11/2008	14,946.49	0.975	14,572
26/11/2008-25/12/2008	17,414.37	0.975	16,979
26/12/2008-22/01/2009	15,031.86	0.975	14,656
23/01/2009-22/02/2009	15,785.75	0.975	15,391
23/02/2009-25/03/2009	15,305.05	0.975	14,922
Total	179,818.91		175,316

b) Baseline emissions due to natural decay or burning of anthropogenic sources of biomass residues ($BE_{biomass,y}$)

The project participants, using ACM0006（Version 04）, established in the PDD that methane emissions would occur in the baseline scenario. The biomass residue would have been burned in an uncontrolled manner or dumped and left to decay, generating significant methane emissions. Methane emissions from dumping biomass residues, and leaving them to decay, are higher than when they are burned in an uncontrolled manner. Therefore to be conservative, it is assumed, that all residues are burned.

Unused biomass burned in open-air is a conservative scenario, because the quantity of the GHG produced from natural decay of biomass is far more than that from biomass burning in open-air. Therefore, the emission from the unused biomass is calculated on the following equation:

$$BE_{biomass,y} = GWP_{CH4} * \sum_{k} BF_{PJ,k,y} * NCV_k * EF_{burning,CH4,k,y} \quad (3)$$

Where：

$BE_{biomass,y}$ is baseline emissions due to natural decay or burning of anthropogenic sources of biomass residues during the year y（$tCO_2e/year$）

GWP_{CH_4} is the Global Warning Potential for methane valid for the relevant commitment period which is determined in the PDD as $21tCO_2/tCH_4$

NCV_k is the net calorific value of the biomass residue type k in GJ per tons of dry matters

$BF_{PJ,k,y}$ is the incremental quantity of biomass residue type k used as fuel in the project plant during the year y in tons,

$EF_{burning,CH_4,k,y}$ is the CH_4 emission factor for uncontrolled burning of the biomass residue type k in tCH_4/GJ,

And GWP_{CH_4} = 21, and PPs used 0.0027[4] tCH_4/ton biomass for product of $EF_{burning,CH4,k,y}*NCV_k$ for conservation and the corresponding conservativeness factor is 0.73.

[4] 2006 IPCC guidelines, volume 4, table 2.5, default value for agriculture residues.

Table 3. Monitored biomass fuel quantities $BF_{PJ,k,y}$, NCV_k and calculation of $BE_{biomass,y}$

Period	BF_1(t) dry base	BF_2(t) dry base	BF_3(t) dry base	$EF_{burning,CH4,k,y*}NCV_k$ (tCH4/Ton)	GWP_{CH4} (tCO_2e/tCH_4)	$BE_{biomass,y}$ (tCO_2e)
	A2	B2	C2	D2	E2	G2=(A2+B2+C2)*D2*E2
20/03/2008-29/03/2008	2,612.34	2,963.33	182.75	0.001971	21	238
30/03/2008-28/04/2008	2,871.62	8,332.19	94.52	0.001971	21	468
29/04/2008-29/05/2008	2,579.74	6,634.39	483.27	0.001971	21	401
30/05/2008-28/06/2008	3,424.12	3,324.71	279.40	0.001971	21	291
29/06/2008-29/07/2008	4,462.23	5,180.07	31.42	0.001971	21	400
30/07/2008-28/08/2008	3,801.54	8,001.52	398.30	0.001971	21	505
29/08/2008-26/09/2008	258.10	7,716.96	1,759.18	0.001971	21	403
27/09/2008-25/10/2008	420.69	3,631.79	1,691.98	0.001971	21	238
26/10/2008-25/11/2008	2,421.59	5,050.75	382.23	0.001971	21	325
26/11/2008-25/12/2008	14,450.61	4,943.57	2,412.74	0.001971	21	903
26/12/2008-22/01/2009	14,780.19	5,640.99	1,222.98	0.001971	21	896
23/01/2009-22/02/2009	6,385.51	2,332.02	2,009.93	0.001971	21	444
23/02/2009-25/03/2009	7,543.62	28,150.28	979.45	0.001971	21	1,518
Total	66,011.91	91,902.57	11,928.17			7,030

E.2. Project emissions calculation

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Project emissions include CO_2 emission from transportation of biomass residues to the project site (PET_y), CO_2 emissions from on-site consumption of fossil fuels due to the project activity ($PEEF_y$), CO_2 emissions from on-site electricity consumption attributable to the project activity ($PE_{EC,y}$) and CH_4 emissions from the controlled combustion of biomass residues ($PE_{biomass,CH4,y}$). GHG emissions from the project activity in year y are calculated on the following equation:

$$PE_y = PET_y + PEFF_y + PE_{EC,y} + GWP_{CH4} * PE_{biomass,CH4,y} \quad (4)$$

Where:

PE_y are project CO_2 emissions during the year y（tCO_2e/year）,

PET_y are CO_2 emissions during the year y due to transportation of the biomass to the project plant（tCO_2e/year）,

$PEFF_y$ are the CO_2 emissions during the year y due to fossil fuels co-fired by the generation facility or other fossil fuels consumption at the project site that is attributable to the project activity（tCO_2e/year）,

$PE_{EC,y}$ are the CO_2 emissions during the year y due to electricity consumption at the project that is attributable to the project activity（tCO_2e/year）.

GWP_{CH_4} is the Global Warming Potential for methane valid for the relevant commitment period,

$PE_{biomass,CH4,y}$ is the CH_4 emissions from the combustion of biomass residues during the year y(tCH_4/year).

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

Following ACM0006 in the PDD, the project owner established the formulae for calculating the emissions from the transport of biomass residues to the project plant. The emissions were calculated in the PDD from the number of truck trips, the average round trip distance between the biomass residue supply sites and the project plant, and the CO_2 emissions factor from fuel used for transportation. The emissions related to biomass residues transportation can be calculated as follows:

$$PET_y = N_y * AVD_y * EF_{km,CO2,y} \quad (5)$$

Where:

PET_y are CO_2 missions during the year y due to transport of biomass residues to the project plant（tCO_2e/yr）

AVD_y is the 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)

$EF_{km,CO_2,y}$ is the average CO_2 emission factor for the trucks measured during the year y (tCO_2e/km)

N_y is the number of truck trips during the year y

The radius from each collection site is used for the round trip distance the biomass gets transported to the project plant, and the IPCC 2006 default value from the Moderate Control index for the US heavy Duty Diesel Vehicle, which is 1.011kgCO_2/km, is used as the CO_2 emissions factor from fuel used for transportation.

Table 4. Monitored data for transport emissions and calculation of PET_y

Period	N_y	AVD_y (km)	$EF_{km,CO2}$ (tCO_2/km)	PETy (tCO_2e)
	A3	B3	C3	D3=A3*B3*C3
20/03/2008-29/03/2008	913	58.17	0.001011	54
30/03/2008-28/04/2008	1,609	60.90	0.001011	100
29/04/2008-29/05/2008	1,935	57.78	0.001011	114
30/05/2008-28/06/2008	1,809	55.25	0.001011	102
29/06/2008-29/07/2008	2,108	61.26	0.001011	131
30/07/2008-28/08/2008	2,193	53.06	0.001011	118
29/08/2008-26/09/2008	1,590	36.48	0.001011	59
27/09/2008-25/10/2008	1,124	33.95	0.001011	39
26/10/2008-25/11/2008	1,628	44.71	0.001011	74
26/11/2008-25/12/2008	3,996	41.79	0.001011	169
26/12/2008-22/01/2009	3,815	47.10	0.001011	182
23/01/2009-22/02/2009	1,898	38.61	0.001011	75
23/02/2009-25/03/2009	4,102	48.29	0.001011	201
Total				1,418

b) Carbon dioxide emissions from fossil fuel consumption in the power plant ($PEFF_y$)

There is no fossil fuel was combusted as auxiliary fuel for boiler start up. Following ACM0006 in the PDD, the project owner established the formulae for calculating the emissions from fossil fuel use in the project plant, using the quantity of each fuel combusted and the appropriate emissions coefficient, as follows:

$$PEFF_y = \sum_i (FF_{proect,\ plant,\ i,\ y} + FF_{project,\ site,\ i,\ y}) * NCV_i * EF_{CO2,\ FF,\ i} \quad (6)$$

Where:

$PEFF_y$ are CO_2 emissions from on-site consumption of fossil fuels in the biomass power plant during the year y in tons of CO_2 equivalents,

$FF_{project,plant,i,y}$ is the quantity of fossil fuel type i combusted in the project plant during the year y (ton/year), which is 0 in this project,

$FF_{project,site,i,y}$ is the quantity of fossil fuel type i combusted at the project site during the year y (ton/year),

NCV_i is the Net calorific value of diesel（GJ/ton）, which is 42.652 GJ/ton,

$EF_{CO2,FF,i}$ is CO2 emission factor for the diesel（tCO_2/GJ）, which is 0.0741tCO_2/GJ.

Table 5. Monitored data for emissions from on-site consumption of fossil fuels ($PEFF_y$)

Period	$FF_{project\ plant,i,y}$	Volume (liter)	ρ_{diesel} (kg/liter)	$FF_{project\ site,i,y}$（t）	NCV_i（GJ/ton）	$EF_{CO2,FF,i}$ (tCO2/GJ)	PEFFy (tCO_2e)
	A4	B4	C4	D4=B4*C4/1000	D4	E4	F4=(A4+D4)*D4*E4
20/03/2008-29/03/2008	0	2,366	0.86	2.03	42.652	0.0741	7
30/03/2008-28/04/2008	0	8,251	0.86	7.10	42.652	0.0741	23
29/04/2008-29/05/2008	0	8,314	0.86	7.15	42.652	0.0741	23
30/05/2008-28/06/2008	0	8,102	0.86	6.97	42.652	0.0741	23
29/06/2008-29/07/2008	0	9,786	0.86	8.42	42.652	0.0741	27
30/07/2008-28/08/2008	0	8,429	0.86	7.25	42.652	0.0741	23
29/08/2008-26/09/2008	0	9,815	0.86	8.44	42.652	0.0741	27
27/09/2008-25/10/2008	0	8,475	0.86	7.29	42.652	0.0741	24
26/10/2008-25/11/2008	0	10,234	0.86	8.80	42.652	0.0741	28
26/11/2008-25/12/2008	0	12,284	0.86	10.56	42.652	0.0741	34
26/12/2008-22/01/2009	0	7,176	0.86	6.17	42.652	0.0741	20
23/01/2009-22/02/2009	0	9,120	0.86	7.84	42.652	0.0741	25
23/02/2009-25/03/2009	0	10,001	0.86	8.60	42.652	0.0741	28
Total	0	112,353		96.62			312

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

All the on-site electricity consumption is provided by the project itself. And electricity consumption at the biomass residue collection stations is measured by meters respectively.

Following ACM0006（Version 04）in the PDD, the project owner established the formulae for calculating the emissions from electricity consumption , using the quantity of electricity purchased and the appropriate emissions coefficient, as follows:

$$PE_{EC,y} = EC_{PJ,y} * EF_{,grid,y} \quad (7)$$

Where:

$PE_{EC,y}$ are CO_2 emissions from on-site electricity consumption attributable to the project activity （tCO_2e/year）.

$EC_{PJ,y}$ is the on-site electricity attributable to the project activity during the year y（MWh）,

$EF_{,grid,y}$ is the CO_2 emission factor for grid electricity during the year y（tCO_2/ MWh）.

Table 6. Monitored data for emissions from electricity consumption ($PE_{EC,y}$)

Period	$EC_{PJ,y}$（MWh）	$EF_{grid,y}$ (tCO_2e/MWh)	$PE_{EC,y}$ (tCO_2e)
	A5	B5	C5
20/03/2008-29/03/2008	80.909	0.975	79
30/03/2008-28/04/2008	84.341	0.975	82
29/04/2008-29/05/2008	73.715	0.975	72
30/05/2008-28/06/2008	97.093	0.975	95
29/06/2008-29/07/2008	26.791	0.975	26
30/07/2008-28/08/2008	82.807	0.975	81
29/08/2008-26/09/2008	19.266	0.975	19
27/09/2008-25/10/2008	67.286	0.975	66
26/10/2008-25/11/2008	72.691	0.975	71
26/11/2008-25/12/2008	69.557	0.975	68
26/12/2008-22/01/2009	87.616	0.975	85
23/01/2009-22/02/2009	86.669	0.975	85
23/02/2009-25/03/2009	70.997	0.975	69
Total	919.738		898

d) Methane emissions from combustion of biomass residues ($PE_{biomass,CH4,y}$)

It was established in the PDD that the emissions can be calculated from the quantity of biomass that would not be used in absence of the project activity, with the net caloric value and the appropriate emissions factor, as follows:

$$PE_{biomass,CH4,y} = EF_{CH4,BF} * \sum_{k} BF_{k,y} * NCV_{k} \quad (8)$$

Where:

$PE_{biomass,CH4,y}$ are the project emissions from biomass controlled burning（tCO_2e/year）,

$BF_{k,y}$ is the quantity of the biomass residues used as fuel in the project plant during the year y in tons

NCV_{k} is the net calorific value of the biomass residues type k in GJ per ton, and

$EF_{CH_4,BF}$ is the CH_4 emission factor for controlled burning of the biomass residues in tCH_4/TJ

According to the recording of the project owner, cotton stalk, wood residues and wheat bran are used.

Methane emissions in both the baseline and project scenario are calculated from the amount of biomass residues burned in the project plant. The quantities and energy content are monitored. The methane emissions factor for burning biomass in a controlled manner $EF_{CH4,BF} = 0.03tCH_4/TJ$ with a conservativeness factor of 1.37.

Table 7. Monitored biomass fuel quantities $BF_{k,y}$, NCV_k and calculation of $PE_{Biomass,CH_4,y}$

Period	BF_1(t) wet base	moisture 1（%）	BF_1(t) dry base	NCV_1(TJ/t) dry base	BF_2(t) wet base	moisture 2（%）	BF_2(t) dry base	NCV_2(TJ/t) dry base	BF_3(t) wet base	moisture 3（%）	BF_3(t) dry base	NCV_3(TJ/t) dry base	$EF_{CH4,BF}$ (tCH4/GJ)	$PE_{biomass,CH4,y}$ (tCH4)
	A6	B6	X1=A6*（100-B6）/100	C6	D6	E6	X2=C6*（100-D6）/100	F6	G6	H6	X3=G6*(100-H6)/100	I6	J6	L6=(X1*C6+X2*F6+X3*I6)*J6*1000
20/03/2008-29/03/2008	3,373.21	22.56	2,612.34	0.01402	4,143.11	28.48	2,963.33	0.01449	225.16	18.84	182.75	0.01420	0.0000411	4
30/03/2008-28/04/2008	3,726.10	22.93	2,871.62	0.01406	11,663.69	28.56	8,332.19	0.01296	118.35	20.14	94.52	0.01394	0.0000411	7
29/04/2008-29/05/2008	3,750.37	31.21	2,579.74	0.01355	9,907.54	33.04	6,634.39	0.01423	745.13	35.14	483.27	0.01211	0.0000411	6
30/05/2008-28/06/2008	5,006.38	31.60	3,424.12	0.01377	5,547.47	40.07	3,324.71	0.01353	439.53	36.43	279.40	0.01206	0.0000411	4
29/06/2008-29/07/2008	5,768.64	22.65	4,462.23	0.01233	6,800.46	23.83	5,180.07	0.01373	43.82	28.30	31.42	0.01482	0.0000411	6
30/07/2008-28/08/2008	5,273.95	27.92	3,801.54	0.01242	10,521.31	23.95	8,001.52	0.01287	546.34	27.10	398.30	0.01406	0.0000411	7
29/08/2008-26/09/2008	349.30	26.11	258.10	0.01354	11,868.75	34.98	7,716.96	0.01429	2,516.70	30.10	1,759.18	0.01533	0.0000411	6
27/09/2008-25/10/2008	663.95	36.64	420.69	0.01343	6,197.91	41.40	3,631.79	0.01354	2,322.76	27.16	1,691.98	0.01344	0.0000411	4
26/10/2008-25/11/2008	2,984.75	18.87	2,421.59	0.01429	7,433.64	32.06	5,050.75	0.01398	438.04	12.74	382.23	0.01225	0.0000411	5
26/11/2008-25/12/2008	16,730.66	13.63	14,450.61	0.01333	7,785.54	36.50	4,943.57	0.01167	2,815.26	14.30	2,412.74	0.00904	0.0000411	12
26/12/2008-22/01/2009	18,452.54	19.90	14,780.19	0.01292	8,090.04	30.27	5,640.99	0.01312	1,460.56	16.27	1,222.98	0.01001	0.0000411	12
23/01/2009-22/02/2009	7,707.18	17.15	6,385.51	0.01619	3,124.07	25.35	2,332.02	0.01541	2,483.64	19.07	2,009.93	0.00991	0.0000411	7
23/02/2009-25/03/2009	9,647.39	21.81	7,543.62	0.01483	36,976.48	23.87	28,150.28	0.01710	1,253.78	21.88	979.45	0.00981	0.0000411	25
Total	83,434.42		66,011.91		130,060.01		91,902.57		15,409.07		11,928.17			105

Note: BF1=Cotton straw; BF2=Wood residues; BF3=Wheat bran

Table 8. Project Emission（PE_y）calculation

Period	PETy (tCO_2e)	PEFFy (tCO_2e)	$PE_{biomass,CH4,y}$ (tCH4)	$PE_{EC,y}$ (tCO2e)	GWP_{CH4} (tCO_2e/tCH_4)	pEy (tCO_2e)
	A7=D3	B7=F4	C7=L6	D7=C5	E7	F7=A7+B7+D7+C7*E7
20/03/2008-29/03/2008	54	7	4	79	21	224
30/03/2008-28/04/2008	100	23	7	82	21	352
29/04/2008-29/05/2008	114	23	6	72	21	335
30/05/2008-28/06/2008	102	23	4	95	21	304
29/06/2008-29/07/2008	131	27	6	26	21	310
30/07/2008-28/08/2008	118	23	7	81	21	369
29/08/2008-26/09/2008	59	27	6	19	21	231
27/09/2008-25/10/2008	39	24	4	66	21	213
26/10/2008-25/11/2008	74	28	5	71	21	278
26/11/2008-25/12/2008	169	34	12	68	21	523
26/12/2008-22/01/2009	182	20	12	85	21	539
23/01/2009-22/02/2009	75	25	7	85	21	332
23/02/2009-25/03/2009	201	28	25	69	21	823
Total	1,418	312	105	898		4,833

E.3. Leakage calculation

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As stated in the baseline and monitoring methodology of the proposed project activity, leakage emissions will be calculated due to insufficient biomass supply. If the biomass supply is insufficient, biomass transportation from other consumers to the project site will cause additional fossil fuel consumption around the project site. The biomass in surplus will be monitored and recorded annually. On the condition that biomass supply proves sufficient, the emission leakage is zero. There are three options in the baseline methodology to demonstrate that the biomass used in the project power plant will not increase the fossil fuel consumption elsewhere. Among them, option 2 is: "Demonstrate that there is an abundant surplus of the biomass in the region of the project activity which is not utilized". For this purpose, the project owner has to demonstrate that the quantity of available biomass in the region is at least 25% larger than the quantity of biomass that is utilized (e.g. for energy generation or as feedstock), including the project plant. So the project owner has got biomass availability from local government during the monitoring period. The project owner established that the leakage from the project activity is zero, as the surplus of biomass residues is far greater than the quantity of residues used in the project plant. Please refer to table 9 for more information.

As for the project, the maximum radius for biomass collection is 50 km, which is between 20 km and 200km, and therefore the radius meets the requirements of the methodology.

The data of available biomass and biomass utilised out of the project in the region was calculated from official data provided by local government, i.e. Statistic Bureaus of Gaotang City, Xianjin City, Guanxian City, Linqing City, Pingyuan City, Wucheng City, Yucheng City and Chiping City. Please refer to table 9 for more details.

Table 9 Demonstration of abundant surplus of biomass availability

	Cotton Straw (t)	Wood residues (t)	Wheat bran (t)
Available Biomass in the region	966,614	1,226,463	90,450
Biomass utilized out of the project	204,070	316,150	13,300
Biomass utilized by the project	83,434.42	130,060.01	15,409.07
Total biomass utilized, including the project	287,504.42	446,210.01	28,709.07
Available Biomass/Total biomass utilized	336%	275%	315%
Available Biomass/Total biomass utilized -100%	236%	175%	215%
Abundant surplus? (more than 25%)	Yes	Yes	Yes

From table 9, it can be concluded that the available quantity of biomass in the region is 25% larger than the quantity of biomass that is utilized, including the project. And According to the description in section E3, leakage from this project is zero during this monitoring period.

E.4. Emission reductions calculation / table

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The project achieves the GHG emissions by the way of CO_2 emission reductions through the substitution of electricity generation in North China Power Grid, CH_4 emission reductions from a reduction of natural decay or uncontrolled burning of biomass ($ER_{electricity,y}$, $BE_{biomass,y}$) by deducting the project emissions (PE_y) and leakage emissions (L_y). The equation is as follows:

$$ER_y = ER_{electricity,y} + BE_{biomass,y} - PE_y - L_y \quad (9)$$

Where:

ER_y is emissions reductions of the project activity during the year *y* (tCO_2/yr)

$ER_{electriciy,y}$ is emission reductions due to displacement of electricity during the year *y* (tCO_2/yr)

$BE_{biomass,y}$ is baseline emissions due to natural decay or burning of anthropogenic sources of biomass residues during the year *y* (tCO_2e/yr)

PE_y is project emissions during the year *y* (tCO_2e/yr)

L_y is leakage emissions during the year *y* (tCO_2e/yr)

Table 10. Emissions reductions calculation (tCO_2e)

Period	$ER_{electricity,y}$ (tCO_2e)	$BE_{biomass,y}$ (tCO_2e)	PE_y (tCO_2e)	L_y (tCO_2e)	ER_y (tCO_2e)
	A8=C1	B8=G2	C8=F7	D8	E8=A8+B8-C8-D8
20/03/2008-29/03/2008	5,265	238	224	0	5,279
30/03/2008-28/04/2008	11,788	468	352	0	11,904
29/04/2008-29/05/2008	14,000	401	335	0	14,066
30/05/2008-28/06/2008	13,080	291	304	0	13,067
29/06/2008-29/07/2008	14,193	400	310	0	14,283
30/07/2008-28/08/2008	11,518	505	369	0	11,654
29/08/2008-26/09/2008	15,014	403	231	0	15,186
27/09/2008-25/10/2008	13,938	238	213	0	13,963
26/10/2008-25/11/2008	14,572	325	278	0	14,619
26/11/2008-25/12/2008	16,979	903	523	0	17,359
26/12/2008-22/01/2009	14,656	896	539	0	15,013
23/01/2009-22/02/2009	15,391	444	332	0	15,503
23/02/2009-25/03/2009	14,922	1,518	823	0	15,617
Total	175,316	7,030	4,833	0	**177,513**

E.5. Comparison of actual emission reductions with estimates in the CDM-PDD

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According to the approved notification PDD of the project, the annually expected emission reduction of the project is 180,881 tCO2, and it should be 183,854[5] tCO_2e in 371days (as this monitoring period is from 20/03/2008 to 25/03/2009, i.e.371 days)

From 20/03/2008-25/03/2009, the actual emission reductions are 177,513tCO_2 as calculated in Table 10.

Item	Values applied in ex-ante calculation of the approved changed CDM-PDD	Actual values reached during the monitoring period
Emission reductions (tCO_2e)	183,854 (371 days)	177,513 (371 days)

E.6. Remarks on difference from estimated value in the PDD

>>

The actual emission reductions reached during this monitoring period is around 3.45% lower than the estimation in the approved changed PDD, which is calculated as (180,881/365*371-177,513)/(180,881/365*371)*100%. However, according to the requirement by EB 66th meeting, the annual amount of CERs to be issued to this project activity shall be capped at the average annual emissions reductions estimated in the original registered PDD, i.e. 140,695tCO_2. Therefore, the total emissions reductions for this monitoring period (371 days) should be 143,007[6] tCO_2.

[5] 183,854=180,881/365*371

[6] 143,007 tCO_2=140,695 tCO_2/365*371

Annex 1: The energy balance calculation for the verification period

The total inputs of all types of fuels combusted and useful output of electricity from the project are presented below. From this data the conversion efficiency of the project in this period is calculated as 27.28%.

Table 11. The energy input and electricity generation in the project activity in this period

	bFi（t）dry base	NCVi（(TJ/t) dry base	Energy（TJ）
BF1	66011.91	0.01369	903.95
BF2	91902.57	0.01462	1343.36
BF3	11928.17	0.01150	137.19
Total			2384.49
		electricity expored（TJ）	650.60
		efficiency	27.28%

Energy Balance：

$E_{biomass}$ =2384.49 TJ

Electricity exported=180722.52 MWh= 650.60 TJ

Efficiency= Electricity exported/ $E_{biomass}$ =27.28%

Version	Date	Nature of revision(s)
1.0	15 June 2009	Initial version for GSP
2.0	27 July 2011	Updated following the new MR format
3.0	25 May 2012	Revised based on the approved revised PDD and DOE's Findings Overview
3.1	19 July 2012	Revised based on DOE's Findings Overview
4.0	08 August 2012	Revised based on DOE's technical review

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History of the document

Version	**Date**	**Nature of revision**
01	EB 54, Annex 34 28 May 2010	Initial adoption.
Decision Class: Regulatory **Document Type**: Guideline, Form **Business Function**: Issuance		