Monitoring Report

Volume 1
Version 1.4
15 February 2008

Start monitoring period: 18 March 2007
End monitoring period: 31 October 2007

Title: Zhongjieneng Suqian 2*12MW Biomass Direct Burning Power Plant Project

UNFCCC Reference Number: 0819

Project developer

Zhongjieneng Biomass Energy Investment Corporation

This Monitoring Report is approved by:	Zhongjieneng Biomass Energy Investment Corporation
Date:	15 February 2008

Project advisor: Carbon Resource Management Ltd	Verifier: SGS

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1 Introduction

The purpose of this Monitoring Report is to calculate the emission reductions achieved by the project activity in the period covered by this report, and to serve as the basis for the verification of these reductions and issuance of the CERs.

1.1 Monitoring period

First monitoring period: 18 March 2007 – 31 October 2007[1]

2 Project description

2.1 Title

Zhongjieneng Suqian 2*12MW Biomass Direct Burning Power Plant Project

2.2 UNFCCC Reference Number

0819

2.3 Project summary

The project activity is to collect and utilise biomass residues to generate electricity. The biomass residue fired power plant has a total installed capacity of 24 MWe. The expected annual net generation of 132.6 GWh will be exported to the East China Power Grid.

2.4 Category of project activity

Using the agreed methodology ACM0006 version 3, the category of the project activity is:

- Sectoral scope 1: Energy industries
- Category: grid connected renewable electricity

3 Project timeline

Commission and first electricity generation date	28 April 2007
CDM registration date	18 March 2007
Crediting period	First renewable crediting period

[1] The monitoring report version 1.0 was made public with ending date on 28th Oct 2007. During verification site visit, it was noted that evidences for all concerned parameters were not cut off on the same date as the 28th Oct 2007, hence, the 31st Oct 2007 on which data of all parameters are available is set as the new ending date of this monitoring period in this final monitoring report.

This monitoring report	Volume 1
Start of this monitoring period	18 March 2007
End of this monitoring period	31 October 2007

4 Baseline methodology

4.1 Methodology

The project participants use the approved consolidated monitoring methodology ACM0006 (version 3) regarding grid-connected electricity generation from biomass residues, in conjunction with ACM0002 (version 6) 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 CERs 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, as well as methane emissions from the biomass combusted in the project scenario and avoided in the baseline as detailed in the PDD and summarised below.

4.2 Calculations Methodology

4.2.1 Electricity

The project participants used ACM0002 in the PDD to calculate the emissions factor for the net electricity displaced 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

$ER_{electricity,y} = EG_y * EF_y$

Where EG_y is the net electricity supplied to the grid, EF_y is the CO_2 emission factor of the grid and BE_y is the baseline emissions.

The emission factor EF_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 PDD. The Operating Margin emission factor $EF_{OM,y}$ was calculated in the PDD as 0.9448 tCO_2e/MWh. The Build Margin emission factor $EF_{BM,y}$ was calculated as 0.7869 tCO_2e/MWh. The weighted average of Operating and Build Margin emission factors is:

$EF_y = w_{OM} \bullet EF_{OM,y} + w_{BM} \bullet EF_{BM,y}$

$= 0.5 \bullet 0.9448 + 0.5 \bullet 0.7869 = 0.866$ tCO2/MWh

4.2.2 Project emissions from transport

Following ACM0006 in the PDD, the emissions from the transport were estimated in the

PDD from the projected total amount of biomass residues combusted, the average truck load, average distance the biomass gets transported to the project plant, and the CO2 emissions factor from fuel used for transportation. During operation, the number of truck is monitored so that the following formula is used to calculate the project emission from transportation:

$PET_y = N_y * AVD_y * EF_{km,CO2}$

4.2.3 Project emissions from fossil fuel use

A small quantity of fossil fuels may be combusted as auxiliary fuel for boiler start up. Following ACM0006 in the PDD, the project participants established the formulae for calculating the emissions from fossil fuel use in the project plant, using the quantity of each fuel used and the appropriate emissions coefficient, as follows:

$PEFF_y = \sum_i (FF_{i,y} * COEF_{CO2,i})$

4.2.4 Methane from biomass

Finally, the project participants, using ACM0006, 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. 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 (uncontrolled burning), as follows:

$BE_{biomass,y} = GWP_{CH4} * \sum_i (BF_{i,y} * NCV_i) * EF_{uncontroled\ burning,CH4,i}$

Accounting for the methane emissions in the baseline, methane emissions from the combustion in the project scenario also needs to be calculated. The formula used in the PDD presents project methane emissions, using the quantity of biomass used in the project activity, the net caloric value and the appropriate emissions factor (controlled burning in power plant), as follws:

$PE_{biomass,CH4,y} = \sum_i (BF_{i,y} * NCV_i) * EF_{CH4,i}$

The CO2 equivalent emissions can be calculated as:
$PE_{biomass,CO2,y} = GWP_{CH4} * PE_{biomass,CH4,y} = GWP_{CH4} * \sum_i (BF_{i,y} * NCV_i) * EF_{CH4,i}$

5 Monitoring data

5.1 Electricity

The net electricity displacement by the project is monitored through the use of metering equipment at the substation. With the emissions factor fixed for the crediting period, net electricity displacement is calculated from total exports to the grid and total imports from the grid at the power plant.

All metering equipment is calibrated regularly in line with industry standards. In addition, total supply and total imports are checked against invoices.

Table 1 Monitored electricity data and calculation (MWh)

Monitoring period	Exported Power	Imported Power	Net Electricity displacement
	Es	Ei	EG=Es-Ei
Mar-07	0	0	0
Apr-07	710	0	710
May-07	3290	34.804	3255.196
Jun-07	3800	39.732	3760.268
Jul-07	1960	107.66	1852.34
Aug-07	4250	59.108	4190.892
Sep-07	5240	49.196	5190.804
Oct-07	7410	0.336	7409.664
Total	26660	290.836	26369.164

5.2 Transport

Transport emissions are calculated from the number of truck round trips for the transportation of biomass. The transport distance between every biomass collection point to power plant site has been monitored during the monitoring period and the longest distance is 50km.For conservativeness, 100km is adopted as the average transport distance as a return trip from the collection point to power plant site. The CO2 emissions factor of the fuel used for transportation is adopted in PDD as 0.001011tCO2/km.

Table 2 Monitored data for transport emissions (number of truck return trips)

Monitoring period	Return Trips
Mar-07	0
Apr-07	96
May-07	636
Jun-07	144
Jul-07	406
Aug-07	754
Sep-07	702
Oct-07	1088
Total	3826

5.3 Fossil fuel use

Emissions from project fossil fuel are calculated from the total amount of fossil fuels used (diesel only) and the appropriate coefficient.

Table 3 Monitored data for fossil fuel use (tonne)

Monitoring period	FF_{diesel}
Mar-07	0
Apr-07	1.87
May-07	4.6
Jun-07	3.5
Jul-07	7.34
Aug-07	11.37
Sep-07	1.21
Oct-07	0.83
Total	30.72

5.4 Methane emissions

Methane emissions in both the baseline and project scenario are calculated from the amount of biomass residue burned in the project plant. Wheat straw, rice straw and rice hull are used in this monitoring period. The quantities (BFi) and net calorific value (NCV) of each kind of biomass residues are monitored as following table shown.

Table 4 Monitored BF (tonne) and NCV (TJ/tonne)

Monitoring period	Rice Hull	Rice Straw	Wheat Straw
Mar-07	0	0	0
Apr-07	560.24	284.11	119.01
May-07	4500	361	38.5
Jun-07	4065	966	69
Jul-07	3080	110	10
Aug-07	6103	754	492
Sep-07	5081.57	2582.44	189.2
Oct-07	5670	5065	0
Total	29059.81	10122.55	917.71
NCV	0.01257	0.01052	0.01331

6 Quality assurance and quality control measures

6.1 Roles and responsibilities

ZHONGJIENENG Suqian Biomass Energy Investment Co. Ltd is the daughter company of ZHONGJIENENG Biomass Energy Investment Co. Ltd. The staff from the onsite subsidiary company will conduct the monitoring procedures and work based on the monitoring methodology described.

The monitoring data such as all kinds of tables for different monitoring parameters, reports will be processed and stored first in the plant office, and will be sent periodically to the ZHONGJIENENG Biomass Energy Investment Co. Ltd headquarter in Beijing for Quality Assurance and final processing.

The following table shows the responsibilities for carrying out the monitoring plan after the operation of proposed power plant.

Main technical supervision	Xing Bohua
Data acquisition (continuously, monthly and annually)	Lv Gang
Emission Reduction calculation (monthly and annually)	Zhao Ya'nan
Main monitoring supervision (continuously)	Wu Xiaohua

6.2 Training

The staffs responsible for monitoring or for auditing these data have been trained according to the CDM monitoring and management methodology.

6.3 Calibrations

All metering equipment are calibrated and checked for accuracy in line with industry standards. No errors occurred during this monitoring period.[2]

6.4 Quality control

Monitored data has been cross-checked with invoicing, approved and signed off. No errors occurred during this monitoring period.[3]

7 Emission reduction calculations

7.1 Project emissions

Project emissions are the sum of the emissions from transport, onsite fossil fuel use and methane emissions from burning biomass residues in the project plant:

$PET_y = N_y * AVD_y * EF_{km,CO2}$
With $EF_{km,CO2}$ established and fixed in the PDD as 1.011 kg/km

$PEFF_y = \sum_i (FF_{i,y} * COEF_{CO2,i})$
With $COEF_{CO2,i}$ calculated from net caloric value of diesel, carbon content of diesel, and oxidation rate, all estimated and adopted in the PDD: $COEF_{CO2,diesel} = NCV_{diesel} * CEF_{diesel} * OXID_{diesel} * 44/12$ = 0.0427 TJ/tonne * 20.2 tC/TJ * 99% * 44/12 tCO2/tC = 3.13 tCO2e/t.

$PE_{biomass,CO2,y} = GWP_{CH4} * \sum_i (BF_{i,y} * NCV_i * EF_{CH4,i})$
With the GWP_{CH4} = 21, and the methane emissions factor for burning biomass in a controlled manner $EF_{CH4,i}$ = 30 kg_{CH4}/TJ with a conservativeness factor of 1.37.

[2] Calibration records have been presented to the DOE.

[3] Invoicing records have been presented to the DOE.

Using the data presented in section 5, total project emissions can now be calculated as the aggregate of the above.

Table 5 Project emissions calculation (tCO2e)

Monitoring Period	PETy	PEFFdiesel	PEbiomass	Project Emission
Mar-07	0.00	0.00	0.00	0.00
Apr-07	9.71	5.85	10.02	25.58
May-07	64.30	14.39	52.54	131.23
Jun-07	14.56	10.95	53.67	79.17
Jul-07	41.05	22.96	34.53	98.54
Aug-07	76.23	35.57	78.71	190.51
Sep-07	70.97	3.78	80.75	155.51
Oct-07	110.00	2.60	107.50	220.10
Total	386.81	96.09	417.73	900.63

7.2 Baseline emissions

Baseline emissions are the sum of the emissions from displaced electricity, and the methane emissions from the burning of biomass residues in an uncontrolled manner in the baseline scenario:

$ER_{electricity,y} = EGy * EFy$
With EF_y calculated and fixed in the PDD as 0.866 tCO2e/MWh

$BE_{biomass,y} = GWP_{CH4} * \sum_i (BF_{i,y} * NCV_i * EF_{CH4,i})$
With the GWP_{CH4} = 21, and the methane emissions factor for burning biomass in an uncontrolled manner $EF_{CH4,i}$ = 300 kg_{CH4}/TJ with a conservativeness factor of 0.73.

Using the data presented in section 5, total baseline emissions can now be calculated as the aggregate of the above.

Table 6 Baseline emissions calculation (tCO2e)

Monitoring Period	Power Supply Baseline	Unused Biomass Baseline	Baseline Emission
Mar-07	0.00	0.00	0.00
Apr-07	614.86	53.42	668.28
May-07	2819.00	279.96	3098.96
Jun-07	3256.39	285.96	3542.35
Jul-07	1604.13	183.99	1788.11
Aug-07	3629.31	419.41	4048.72
Sep-07	4495.24	430.29	4925.52
Oct-07	6416.77	572.83	6989.60
Total	22835.70	2225.85	25061.55

7.3 Leakage emissions

In line with the approved methodology ACM0006 (version 3), the PDD determined that no leakage would occur due to diversion of biomass from other uses to the project plant. In the PDD, option L2 was used to demonstrate that there is an abundant surplus of biomass in the region of the project activity which is not utilised.

During this monitoring period, the utilization of the types of biomass used by this project have been monitored by the project participants, and the total available biomass and other utilizations in the area (not including this project) was carried out by Blue-Sky Investment Consulting & Management Co. Ltd. through on-site visits and samplings.

Project participants use the biomass resource investigation report ('*Report of Resource Investigation in Suqian Area*', Blue-Sky Investment Consulting & Management Co. Ltd., September 2007) and official data ('*Statistic Yearbook of Suqian City – Agriculture Volume 2007 Version*', Statistical Bureau of Suqian City) to demonstrate that the biomass used in this project activity did not lead to leakage emissions by increasing fossil fuel consumption elsewhere. The data shows that the project does not influence the biomass utilization structure in Suqian City, and that the three types of biomass were all in abundant surplus during this monitoring period.

Table 7 below demonstrates that the quantity of available biomass in the region is 'at least 25% larger than the quantity of biomass utilised (e.g. for energy generation or as feedstock), including the project plant.'

Table 7 Demonstration of abundant surplus of biomass availability

Biomass type	rice straw	wheat straw	rice hull
Total biomass generation in the region (kt)	281	167	299
Biomass loss (kt)	37	32	24
Available Biomass (kt)	244	135	275
Biomass used excluding the project plant (kt)	73	27	125
Biomass used in the project plant (kt)	10	1	29
Total used biomass including project plant (kt)	83	28	154
Available Biomass/Total used biomass - 100%	193%	381%	78%
Abundant surplus? (more than 25%)	yes	yes	yes

Sources: 'Report of Resource Investigation in Suqian Area', Blue Sky Investment and Consulting Co. Ltd., September 2007; 'Statistic Yearbook of Suqian City – Agriculture Volume (2007 Version)', Government of Suqian City.

Thus, the leakage from this project is neglected and considered as zero: Ly = 0.

7.4 Summary of emission reductions during the monitoring period

Table 8 Emission reductions calculation (tCO2e)

Monitoring Period	Project Emission	Baseline Emission	Leakage	Emission Reduction
Mar-07	0.00	0.00	0.00	0
Apr-07	25.58	668.28	0.00	643
May-07	131.23	3098.96	0.00	2,968
Jun-07	79.17	3542.35	0.00	3,463
Jul-07	98.54	1788.11	0.00	1,690
Aug-07	190.51	4048.72	0.00	3,858
Sep-07	155.51	4925.52	0.00	4,770
Oct-07	220.10	6989.60	0.00	6,770
Total	900.63	25061.55	0.00	24,161

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 19.78%.

The energy input and output in the project activity in this period

	FF_i(Tonne)	NCV(TJ/Tonne)	Energy (TJ)
Rice Hull	29059.81	0.01257	365.3
Rice Straw	10122.55	0.01052	106.5
Wheat Straw	917.71	0.01331	12.2
diesel	30.72	0.042652	1.3
total			485.3

Energy Balance

$E_{total}=E_{biomass1}+E_{biomass2}+E_{biomass3}+E_{fosil}=$ 485.3 TJ

$E_{output}=E_G=$ 96.0 TJ

$e=E_{output}/E_{total}$ 19.78%

Annex 2: Contact details

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