Monitoring Report

Version 1.0

Dated: 21 Jun 2009

Start monitoring period: 1 July 2008
End monitoring period: 31 May 2009
（4th Monitoring Period）

Title: Zhangbei Manjing Windfarm Project

UNFCCC Reference Number: 0233

Project developer:

Beijing Guotou Energy Conservation Company

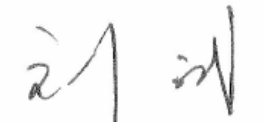
This Monitoring Report is approved:	
	Mr Liu Bin Head of the Zhangbei Manjing Windfarm Administration Office Beijing Guotou Energy Conservation Company
	Date: 21 June 2009
Total amount of CER for 4th monitoring period	109846 tons
Project advisor: Carbon Resource Management	Verifier: TÜV SÜD

Table of Contents

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

Monitoring report number 4: 1 July 2008—31 May 2009

2 Project description

2.1 Title

Zhangbei Manjing Windfarm Project

2.2 UNFCCC Reference Number

0233

2.3 Project summary

The Zhangbei Manjing Windfarm Project is located in Hebei Province, China. The project consists of the installation of 30 turbines, each of 1,500 kW capacity, providing a total of 45MW. The project is expected to generate some 108GWh per year once fully operational which will be exported to the North China Power Grid.

A more detailed description is available in the PDD and related documentation.

2.4 Category of project activity

Using the agreed methodology AM0005 the category of the project activity is:

- Sectoral scope 1: Energy industries
- Category: Renewable electricity generation in grid connected applications

3 Project timeline

Starting date of the electricity production	30 December 2005
Registration date	23 March 2006
Crediting period	First renewable crediting period
Starting date of crediting period	1 January 2006
End date of crediting period	31 December 2012
Previous monitoring reports	
Volume 1	1 Jan 2006 – 31 Aug 2006

Volume 2	1 September 2006 – 31 August 2007
Volume 3	1 September 2007 - 30 Jun 2008
This monitoring report	
Start of monitoring period	1 July 2008
End of monitoring period	31 May 2009

4 Baseline

4.1 Methodology

The project participants use the approved baseline and monitoring methodology AM0005 (version 1) "baseline methodology (barrier analysis, baseline scenario development and baseline emission rate, using combined margin) for small grid-connected zero-emissions renewable electricity generation".

Using AM0005, the emission reductions achieved by the project activity can be calculated by multiplying the net electricity supplied to the grid and the appropriate emissions factor of the grid.

4.2 Calculations

The emission reductions ERy by the project activity during a given year y is

ERy = EGy * EFy

where EGy is the net electricity supplied to the grid, EFy is the CO2 emission factor of the grid.

The emission factor EFy of the grid is represented as a combination of the Operating Margin and the Build Margin.

The Operating Margin emission factor EF_OMy is defined as the generation-weighted average emissions per electricity unit (tCO_2/MWh) of all generating sources serving the system, excluding zero- or low-operating cost power plants (hydro, geothermal, wind, low-cost biomass, nuclear and solar generation), based on the latest year for which statistics data is available. In accordance with the approved PDD the calculation is made from the share of generation from each fuel multiplied by the emissions coefficient for that fuel. The China Energy Statistical Yearbook and China Electric Power Yearbook present these data annually.

The Build Margin emission factor EF_BMy is given as the weighted average emission factor of the most recent 20% of the generating units built. In accordance with the approved PDD, and because of the limited availability of publicly available data, the most recent 20% of additions is calculated from the China Electric Power Yearbook by comparing installed capacity in historic years, following the three steps below:

- Using the latest statistical data available (from the China Electric Power Yearbook) determine the two years with added generation capacity closest to 20% (below and above 20%).
- Calculate the Build Margin for both these years.
- Adopt the lowest, i.e. most conservative, BM.

For the latest year available, the build margin is calculated from the additional generation capacity in the last 2 years:

$EF\_BMy = \Sigma i\ Si,y*CEFi$

Where Si is the share in added generation from technology/fuel i for year y, and CEFi the CO_2 emission factor for technology/fuel i. The CEF represents the best available power generation technology (with lowest carbon emission level) in the North China Power Grid. The calculation is made for the two years closest to 20% additional capacity.

According to AM0005 if the grid imports or exports electricity from/to other grids, a correction of the emissions factor made be required. However, with regards to the North China Power Grid, such corrections for imports and exports would be negligible, as the other grids surrounding the North China Power Grid have very similar emissions factors, and power flows between these interconnected grids are very limited, less than 1% in the latest year for which data is available in the China Electric Power Yearbook.

5 Monitoring methodology and plan

The monitoring is in compliance with the monitoring methodology AM0005, following the revised monitoring plan. The two main variables are the net electricity supplied to the grid, which is calculated from the data monitored with electricity meters, and the appropriate emissions factor of the grid, which is calculated from national statistics and other official sources.

5.1 Monitored data

As the emissions factor is not fixed for the whole period, the monitored data for the project activity includes the variables required to calculate the CO2 emissions factor of the grid:

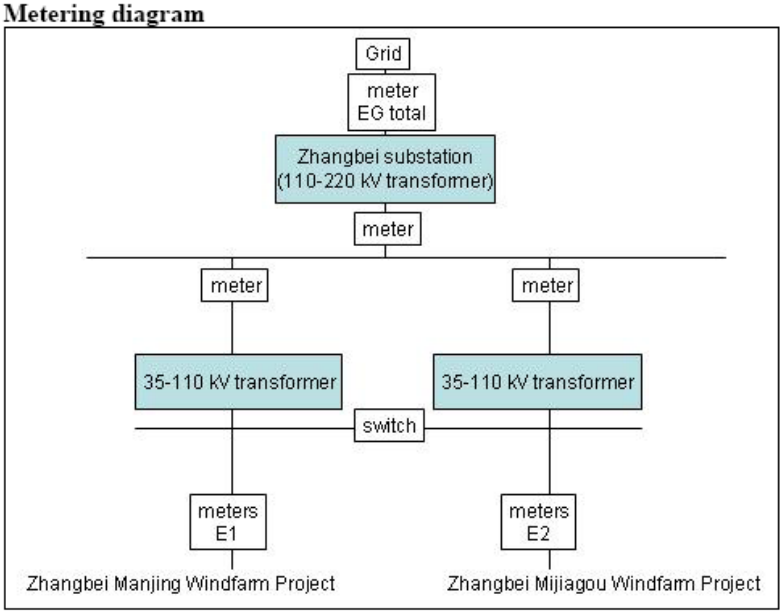
ID	Variable	Source of data
1	EG: net electricity supplied to the grid	Measured
2	EF: CO_2 emissions factor of the grid	Calculated
3	EF_OM: operating margin	Calculated
4	EF_BM: build margin	Calculated
5	TEM: total CO_2 emissions of the grid	Calculated
6	TGEN: total electricity generation from included sources	Calculated
7	Fi: amount of fuel consumed	China Energy Statistical Yearbook 2008
8	COEFi: GHG emissions coefficient of fuel	China Energy Statistical Yearbook 2008 and IPCC2006
9	Si: Share in added generation	China Electric Power Yearbook 2008
10	CEFi: CO_2 emissions factor of best available technology	Tshingua Univeristy study for NC4

11	EL: net import/export	Calculated from 12 and 13
12	EL_in: imports	China Electric Power Yearbook 2008
13	EL_out: exports	China Electric Power Yearbook 2008
14	EF_in: emissions factor of imports	Calculated if net import > 2%
15	EF_out: emissions factor of exports	Calculated if net export > 2%

5.2 Baseline data

5.2.1 EG: net electricity supplied to the grid

As described in the revised monitoring plan approved on 19 Oct 07, the electricity supplied to NCPG by the Zhangbei Manjing Windfarm currently shares the main electricity meter at the 220kV substation with the Zhangbei Mijiagou windfarm (CDM project 0845), so the meter at the 220kV level measures the total electricity from the two windfarms delivered to the NCPG. In line with the revised monitoring plan, back-up metering equipment at the project site is used to calculate the share of each of the projects of the generation to the grid at 220kV, as follows:



*EG_1 = EG_total * E1 / (E1 + E2)*

Where:
EG_1 is the calculated power generation from the project activity;
EG_total is the total electricity supplied to the grid at the Zhangbei substation metered by the main meter;
E1 is the electricity generation metered from the Zhangbei Manjing Windfarm Project from the onsite meters; and
E2 is the electricity generation metered from the Zhangbei Mijiagou 49.5MW Windfarm Project from the onsite meters

Zhangjiakou Electric Power Company has the responsibility to operate the 220kV sub-station and read the main meter installed at the 220kV sub-station at 0:00 every day and send this report to the Zhangbei Manjing Windfarm monthly.

To be conservative, the total power consumption of these two projects is considered as the power consumption of Zhangbei Manjing windfarm project.

Table 1 Net electricity generation by the project (MWh)

Month	E1	E2	EG_Total	EG1	Consumption	Net Supply
Jul-08	6679.200	7057.600	13613.952	6619.468	78.408	6541.060
Aug-08	7140.320	7559.200	14630.748	7106.914	98.736	7008.178
Sep-08	7258.240	7312.800	14405.952	7176.005	68.508	7107.497
Oct-08	10120.000	11660.000	21648.660	10058.973	60.456	9998.517
Nov-08	8902.960	10731.600	19370.472	8783.214	74.976	8708.238
Dec-08	14715.360	15426.400	29822.892	14559.687	105.468	14454.219
Jan-09	14065.920	11642.400	25638.360	14027.642	130.284	13897.358
Feb-09	5593.060	4915.460	10210.992	5434.704	102.300	5332.404
Mar-09	18348.646	17660.426	35709.696	18196.097	69.036	18127.061
Apr-09	12550.560	11906.400	24208.932	12423.280	86.724	12336.556
May-09	13341.680	12679.920	25852.728	13255.097	32.472	13222.625

5.2.2 EF: CO_2 emissions factor of the grid

The emissions factor is calculated annually using the latest data available in line with the monitoring plan.

5.2.2.1 EF_OM: Operating margin emission factor

First, the emission coefficient is established for all fuels used in NCPG.

Table 2 COEF calculation

Fuel types	Unit	Net Caloric Value(MJ/unit)	Oxidation rate(%)	Carbon Emission Factor(tc/TJ)	COEF(tCO2e/unit)
Raw coal	tonne	20908	100	25.8	1.9778968
Clean coal	tonne	26344	100	25.8	2.4921424
Other washed coal	tonne	8363	100	25.8	0.7911398
Coke	tonne	28435	100	25.8	2.6899510
Coke oven gas	1000m3	16726	100	12.1	0.7420769
Other coal gas	1000m3	5227	100	12.1	0.2319046
Crude oil	tonne	41816	100	20	3.0665067
Gasoline	tonne	43070	100	18.9	2.9847510
Diesel	tonne	42652	100	20.2	3.1590915
Fuel oil	tonne	41816	100	21.1	3.2351645
PLG	tonne	50179	100	17.2	3.1646223
Refinery gas	tonne	46055	100	18.2	3.0734037
Natural gas	1000m3	38931	100	15.3	2.1840291
Other petroleum products	tonne	38369	100	20	2.8137267
Kerosene	tonne	43070	100	19.6	3.0952973

Source: NCV from China Energy Statistical Yearbook 2008 P283, CEF and OXID from IPCC 2006

Secondly, the fuel use is given and resulting emissions are calculated for the latest year for which data is available.

Table 3 Fuel use and emissions

Fuel types	Unit	Beijing	Tianjin	Hebei	Shanxi	Inner mongolia	Shandong	NCPG total	COEF(tCO2/unit)	Emission(MtCO2e)
Raw coal	million tonnes	8.1617	17.5399	77.1613	75.1006	104.34250	118.8483	401.15430	1.9778968	793.4418063
Clean coal	million tonnes						0.1843	0.18430	2.4921424	0.459301844
Other washed coal	million tonnes	0.0576		1.5689	4.7881	0.4857	7.5684	14.46870	0.7911398	11.44676442
Coke	million tonnes						0.0409	0.04090	2.6899510	0.110018996
Coke oven gas	billion m3	0.007	0.072	0.313	2.546	0.258	1.361	4.55700	0.7420769	3.381644281
Other coal gas	billion m3	1.180	0.76	8.838	7.280	2.817	2.964	23.83900	0.2319046	5.528372965
Crude oil	million tonnes							0.00000	3.0665067	0
Gasoline	million tonnes			0.0001				0.00010	2.9847510	0.000298475
Diesel	million tonnes	0.0033		0.0235		0.0062	0.0508	0.08380	3.1590915	0.264731865
Fuel oil	million tonnes	0.0474		0.0018			0.0235	0.07270	3.2351645	0.235196462
PLG	million tonnes							0.00000	3.1646223	0
Refinery gas	million tonnes			0.0285			0.0165	0.04500	3.0734037	0.138303165
Natural gas	billion m3	0.503	0.073		0.054			0.63000	2.1840291	1.375938333
Other petroleum products	million tonnes							0.00000	2.8137267	0
Kerosene	million tonnes								3.0952973	
Total emission	MtCO2e									816.3823771

Source: Fuel consumption for thermal power generation in the North China Power Grid is obtained from page 122-142, page 178-182, China Energy Statistical Yearbook 2008.

Thirdly, generation on the grid is calculated from the data available.

Table 4 Generation and self-use rates in 2007.

	Unit	Beijing	Tianjin	Hebei	Shanxi	Inner mongolia	Shandong	NCPG total
Gross generation	10^8 KWh	227	399	1646	1759	1830	2596	
Self use rate	%	7.400%	6.640%	6.660%	7.880%	7.670%	7.220%	
Net generation	10^8 KWh	210.202	372.5064	1536.3764	1620.4	1689.64	2408.57	7837.6834

Source: China Electric Power Yearbook (2008) p733, p734

Finally, the operating margin emissions factor can be calculated

Table 5 Operating margin emissions factor

	Value	Unit
Total emissions	816382377.1	tCO_2e
Total thermal generation	783768340	MWh
EF_OM	1.042	tCO_2e/MWh

5.2.2.2 EF_BM: Build margin emission factor

To calculate the build margin emissions factor, first the two years since which added generating capacity is closest to 20% are determined from the latest data available.

Table 6 Added capacity in the North China Power Grid

Year	Installed capacity (MW)	Growth to 2007(%)	Selected
2007	171,020.00	N/a	N/a
2006	146,479.00	14. 35%	yes
2005	114,674.50	21.71%	yes

Source: China Electric Power Yearbook (2006, 2007 and 2008 editions)

As per the procedure described in the PDD, the Build Margin Emission Factors since 2005 and 2006 are now calculated in Table 8 and 9 below. In line with the methodology described, the most conservative (i.e. lowest) is chosen.

The CEF for the best available technology is taken from the Tshinghua University Study for NC4.[1]

Table 7 Build Margin data for the North China Power Grid (since 2005)

Source	Capacity, 2005	Capacity, 2007	Added capacity, 2004-2006	Share	CEF	Weighted average EF_BM
	(MW)	(MW)	(MW)	(%)	(kgCO2e/kWh)	(kgCO2e/kWh)
Hydro*	3242.6	4510.00	1267.4	2.249%		
Thermal	111139.7	164800.0	53660.3	95.22%	0.886	0.843640551
Other (wind)	292.3	1719.200	1426.9	2.53%		
Total	114674.6	171029.2	56354.6	100.00%		

Source: China Electric Power Yearbook (2006, 2008); Tshinghu University for NC4

Table 8 Bild Margin data for the North China Power Grid (since 2006)

Source	Capacity, 2006	Capacity, 2007	Added capacity, 2006-2007	Share	CEF	Weighted average EF_BM
	(MW)	(MW)	(MW)	(%)	(kgCO2e/kWh)	(kgCO2e/kWh)
Hydro*	4004	4510.00	506	2.061%		
Thermal	141538.0	164800.0	23262	94.753%	0.886	0.839509739
Other (wind)	937	1719.200	782.2	3.186%		
Total	146479	171029.2	24550.2	100.00%		

Source: China Electric Power Yearbook (2007, 2008); Tshinghua University for NC4

[1] "Title", Tshinghua University for NC4.

To be conservative, the lowest build margin emissions factor, 0.840tCO2e/MWh, is adopted in line with the procedures set out and approved in the PDD.

5.2.2.3 EF calculation

The emissions factor is now calculated as the average of EF_OM and EF_BM.

Table 9 Actual calculated emissions factors compared to projected values in the PDD

	Actual value	PDD projection
Latest year available	2007	2003
EF_OM	1.042	0.993
Chosen year for BM	2007	1999
EF_BM	0.840	0.819
EF	0.941	0.906

5.2.3 Correction for electricity imports and exports

Table 10 Electricity exchange between grids in 2007 (MWh)

Net exchange	Net exchange (%)
1583000	<1%

Source: China Electric Power Yearbook (2008 Page 455).

Total net electricity exchange between the North China Power Grid and other grids is presented in Table 1. With total generation in the North China Power Grid in 2007 being 845,700,000 MWh, this amount is less than 1% and is neglected in the calculations in line with the approved use of the methodology AM0005.

6 Quality assurance and quality control measures

6.1 Roles and responsibilities

Overall responsibility for monitoring and carrying out the monitoring following this monitoring plan lies with the Zhangbei Manjing Windfarm Administration Office of the Beijing Guotou Energy Conservation Company (BG).

Mr. Deng Hui, Operation Department Manager of Zhangbei Manjing Windfarm, is responsible for the operation and maintenance, which includes the monitoring, of the windfarm.

Mr. Liu Yu, Project Manager of Operation Department Manager, is responsible for the daily monitoring and reporting.

6.2 Training

Carbon Resource Management has advised BG on monitoring work.
The staff who are responsible for electricity meter reading and recording, and who are responsible for auditing these metered data have been trained according to the CDM monitoring and management manual for the Zhangbei Manjing Windfarm Project.

6.3 Calibrations

The Power Interchange Agreement between the Zhangbei Manjing Wind Farm and the North China Power Grid Company Limited defines the metering arrangements and the required quality control procedures to ensure accuracy.

The metering equipment are calibrated and checked annually for accuracy. The metering equipments have sufficient accuracy. The energy output and input registered by the meters alone will suffice for the purpose of billing and emission reduction verification as long as the error in the meters is within the agreed limits.

Calibration is carried out by North China Power Grid with the records being supplied to the Zhangbei Manjing Wind Farm, and these records will be maintained by the Zhangbei Manjing Wind Farm and then appointed third party.

All the meters shall be jointly inspected and sealed on behalf of the parties concerned and shall not be interfered with by either party except in the presence of the other party or its accredited representatives.

All the meters installed shall be tested by North China Power Grid within 10 days after:

- the detection of a difference larger than the allowable error in the readings of both meters; and/or
- the repair of all or part of meter caused by the failure of one or more parts to operated in accordance with the specifications.

If any errors are detected the party owning the meter shall repair, recalibrate or replace the meter giving the other party sufficient notice to allow a representative to attend during any corrective activity.

Should any previous months reading of the main meter be inaccurate by more than the allowable error, or otherwise functioned improperly, the net energy output shall be determined by (a) first, by reading backup meter, unless a test by either party reveals it is inaccurate; (b) if the backup system is not with acceptable limits of accuracy or is otherwise performing improperly the Zhangbei Manjing Wind Farm and North China Power Grid shall jointly prepare an estimate of the correct reading; and (c) if the North China Power Grid and the Zhangbei Manjing Wind Farm fail to agree then the matter will be referred for arbitration according to agreed procedures.

No meter errors have occurred to-date at the Zhangbei Manjing Windfarm. Calibration took place as per schedule. Calibrations were carried out by staff from the North China Power Grid.

The calibration results show that both meters operate in accordance with the industry standards and are qualified to measure the electricity supplied to the grid and consumed by the windfarm.

6.4 Quality control

Monthly generation data has been approved and signed off by staffs that are responsible for recording meter reading in the 110kV substation installed on the windfarm side of the sub-station, and cross checked with receipt from North China Power Grid.

The additional data required and collected annually from the China Electric Power Yearbook and China Energy Statistical Yearbook has been approved and signed off by Ms. Chen Dongjuan.

7 Emission reduction calculations

7.1 Project emissions

As a renewable energy project, project emissions are zero.

7.2 Baseline emissions

Table 11 Monthly emission reductions achieved

Month	EG (MWh)	EF (tCO_2e/MWh)	BE (tCO_2e)
Jul-08	6541.060	0.941	6155.137
Aug-08	7008.178	0.941	6594.695
Sep-08	7107.497	0.941	6688.155
Oct-08	9998.517	0.941	9408.605
Nov-08	8708.238	0.941	8194.452
Dec-08	14454.219	0.941	13601.420
Jan-09	13897.358	0.941	13077.414
Feb-09	5332.404	0.941	5017.792
Mar-09	18127.061	0.941	17057.564
Apr-09	12336.556	0.941	11608.699
May-09	13222.625	0.941	12442.490
Total	116733.713		109846.423

7.3 Leakage emissions

As a wind energy project, leakage from the project are considered zero.

7.4 Summary of emission reductions during the monitoring period

Table 12 Emission reduction calculation (tCO_2e)

Period	Project emissions	Baseline emissions	Leakage	Emission reduction
1 July 2008 to 31 May 2009	0	109846.423	0	109846