Monitoring Report

Version 1.0

Dated: 04 May 2010

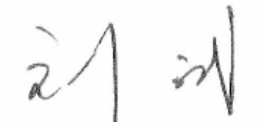
Start monitoring period: 01 June 2009
End monitoring period: 30 April 2010
（5th Monitoring Period）

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: 04 May 2010
Total amount of CER for 5th monitoring period	99640 tons

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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

Monitoring report number 5: 01 June 2009—30 April 2010

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.

2.4 Implementation Status:

The project was implemented as described in the PDD. During this monitoring period, the project had a good running, smooth data transfer and grid connection, and no permanent changes happened, which would impact the additionality, scale of project activity and the applicability of the approved methodology.

2.5 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
Volume 4	1 July 2008–31 May 2009
This monitoring report	
Start of monitoring period	01 June 2009
End of monitoring period	30 April 2010

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 2009.

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 2009
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 2009
13	EL_out: exports	China Electric Power Yearbook 2009
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 (http://cdm.unfccc.int/Projects/DB/DNV-CUK1136989231.92/view), 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
Jun-09	12994.080	13332.880	26140.620	12902.109	40.656	12861.453
Jul-09	6365.040	6439.840	12696.024	6310.930	64.944	6245.986
Aug-09	6067.600	6056.160	12001.440	6006.382	76.824	5929.558
Sep-09	8619.600	8412.800	16974.012	8590.052	47.256	8542.796
Oct-09	11524.480	11536.800	22887.084	11437.429	46.596	11390.833
Nov-09	12209.120	11827.200	23862.828	12120.996	85.404	12035.592
Dec-09	13572.240	12777.600	26184.444	13487.048	34.188	13452.860
Jan-10	12398.320	10920.800	23176.692	12322.594	130.944	12191.650
Feb-10	8099.520	7858.400	15866.532	8053.136	118.536	7934.600
Mar-10	11905.520	12998.480	24647.304	11782.805	73.920	11708.885
Apr-10	10772.080	12420.320	23101.584	10729.899	53.460	10676.439
Total						112970.650

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	15.7	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	0.0006		0.0285			0.0165	0.04500	3.0734037	0.138303165
Natural gas	billion m3	0.503	0.073		0.054	0.422	0.001	0.63000	2.1840291	1.375938333
Other petroleum products	million tonnes	0.0172						0.00000	2.8137267	0
Kerosene	million tonnes								3.0952973	
Total emission	MtCO2e									817.3372105

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 2008.

	Unit	Beijing	Tianjin	Hebei	Shanxi	Inner mongolia	Shandong	NCPG total
Gross generation	10^8 KWh	247	397	1601	1786	2057	2697	
Self use rate	%	7.020%	7.050%	6.890%	8.120%	7.790%	7.130%	
Net generation	10^8 KWh	229.6606	369.0115	1490.69	1640.977	1896.7597	2504.704	8131.8036

Source: China Electric Power Yearbook (2009) p695, p706

Finally, the operating margin emissions factor can be calculated

Table 5 Operating margin emissions factor

	Value	Unit
Total emissions	817337210.5	tCO_2e
Total thermal generation	813180360.0	MWh
EF_OM	1.005	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 2008(%)	Selected
2008	187,670.00	N/a	N/a
2007	171,020.00	9.74%	yes
2006	146,479.00	16.75%	yes

Source: China Electric Power Yearbook (2007, 2008 and 2009 editions)

As per the procedure described in the PDD, the Build Margin Emission Factors since 2006 and 2007 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 2007)

Source	Capacity, 2007	Capacity, 2008	Added capacity, 2007-2008	Share	CEF	Weighted average EF_BM
	(MW)	(MW)	(MW)	(%)	(kgCO2e/kWh)	(kgCO2e/kWh)
Hydro*	4510.00	5260.00	750.00	4.507%		
Thermal	164800.0	179040.0	14240.00	85.573%	0.886	0.758175088
Other (wind)	1719.200	3370.000	1650.80	9.920%		
Total	171029.20	187670.00	16640.80	100.00%		

Source: China Electric Power Yearbook (2008, 2009); Tshinghu University for NC4

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

Source	Capacity, 2006	Capacity, 2008	Added capacity, 2006-2008	Share	CEF	Weighted average EF_BM
	(MW)	(MW)	(MW)	(%)	(kgCO2e/kWh)	(kgCO2e/kWh)
Hydro*	4004.00	5260.00	1256.00	3.049%		
Thermal	141538.00	179040.00	37502.00	91.04%	0.886	0.806651259

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

Other (wind)	937.00	3370. 00	2433.00	5.91%		
Total	146479.00	187670.00	41191.00	100.00%		

Source: China Electric Power Yearbook (2007, 2009); Tshinghua University for NC4

To be conservative, the lowest build margin emissions factor, 0.758tCO2e/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	1.005	0.993
Chosen year for BM	2008	1999
EF_BM	0.758	0.819
EF	0.882	0.906

5.2.3 Correction for electricity imports and exports

Table 10 Electricity exchange between grids in 2009 (MWh)

Net exchange	Net exchange (%)
5,250,000	<1%

Source: China Electric Power Yearbook (2009 Page 432).

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 2008 being 878,500,000MWh, 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 invoice 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)
Jun-09	12861.453	0.882	11343.802
Jul-09	6245.986	0.882	5508.960
Aug-09	5929.558	0.882	5229.870
Sep-09	8542.796	0.882	7534.746
Oct-09	11390.833	0.882	10046.714
Nov-09	12035.592	0.882	10615.392
Dec-09	13452.860	0.882	11865.423
Jan-10	12191.650	0.882	10753.035
Feb-10	7934.600	0.882	6998.317
Mar-10	11708.885	0.882	10327.236
Apr-10	10676.439	0.882	9416.619
Total			99640.114

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
01 June 2009 to 30 April 2010	0	99640.114	0	99640

7.5 Emission reduction comparison with registered PDD

During the monitoring period, the CO2 emission reductions amounted to 99,640 tCO2e. As the monitoring period is for 11 months, multiplying the annual volume in the PDD by 11/12ths give a volume of 89,694 tCO2 and so the actual volume would appear to be 11% higher than the estimates in the registered PDD.

The reason why the Emission Reduction in monitoring report is higher than it assumed in PDD is because there was abundant wind resource during the monitoring period.