

Monitoring Report

Volume 1

Start monitoring period: 1 January 2006

End monitoring period: 31 August 2006

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: _____

Project advisor:
Carbon Resource Management

Verifier:
TÜV SÜD

Table of Contents

1 Introduction 3

2 Project description 3

3 Project timeline..... 4

4 Baseline 5

5 Monitoring methodology and plan 6

6 Quality assurance and quality control measures.....10

7 Emission reduction calculations12

Annex 1: Contact details.....13

Annex 2: Calculations14

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

Volume 1: 1 January 2006 to 31 August 2006

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 project activity	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
This monitoring report	Volume 1
Start of monitoring period	1 January 2006
End of monitoring period	31 August 2006

Table 1 lists the commissioning dates of 30 wind turbines installed in the Zhangbei Manjing Windfarm Project.

Table 1 Commissioning dates of turbines

Turbine number	Commissioning date
11#	2005.12.30
12#	2006.1.7
10#	2006.1.10
9#	2006.1.16
14#	2006.1.19
3#	2006.1.21
8#	2006.4.15
1#	2006.4.22
30#	2006.4.25
2#	2006.4.27
4#	2006.4.27
5#	2006.4.28
6#	2006.4.30
7#	2006.5.3
15#	2006.6.8
13#	2006.6.13
16#	2006.6.22
17#	2006.6.22
18#	2006.6.24
19#	2006.6.30
21#	2006.7.12
22#	2006.7.13
23#	2006.7.14
27#	2006.7.15
20#	2006.7.15
25#	2006.7.19

26#	2006.7.22
28#	2006.8.18
29#	2006.9.1
24#	Under installation

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 ER_y by the project activity during a given year y is

$$ER_y = EG_y * EF_y$$

where EG_y is the net electricity supplied to the grid, EF_y is the CO₂ emission factor of the grid.

The emission factor EF_y 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 (tCO₂/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 x years:

$$EF_BM_y = \sum_i S_{i,y} * CEF_i$$

Where S_i 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 methodology follows option 2: direct monitoring of the emission reductions from the project activity, which is appropriate for AM0005 and for renewable energy projects in general. The two main variables are the net electricity supplied to the grid, which is 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 CO_2 emissions factor of the grid:

ID	Variable	Source of data
----	----------	----------------

1	EG: net electricity supplied to the grid	Electricity meter
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 2005
8	COEFi: GHG emissions coefficient of fuel	China Energy Statistical Yearbook 2005 and IPCC
9	Si: Share in added generation	China Electric Power Yearbook 2005
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 2005
13	EL_out: exports	China Electric Power Yearbook 2005
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

Table 2 Electricity generation by the project

Month	Generation (kWh)	Consumption (kWh)	Net supply (kWh)
Dec 2005	48,972	7,128	41,844
Jan 2006	1,051,776	39,336	1,012,440
Feb 2006	2,175,756	29,700	2,146,056
Mar 2006	3,341,316	8,316	3,333,000
Apr 2006	3,660,492	13,464	3,647,028
May 2006	5,291,088	3,960	5,287,128

Jun 2006	4,421,868	12,276	4,409,592
Jul 2006	6,777,936	19,140	6,758,796
Aug 2006	4,930,464	20,724	4,909,740
Total	31,699,668	154,044	31,545,624

5.2.2 EF: CO₂ emissions factor of the grid

5.2.2.1 EF_OM: Operating margin emission factor

Table 3 Factors determining the grid operating margin emissions factor

	Value	Unit
Total emissions	538,303,494	tCO ₂ e
Total thermal generation	489,173,110	MWh
EF_OM	1.100	tCO ₂ e/MWh

Source: China Energy Statistical Yearbook 2005; and China Electric Power Yearbook 2005.

Detailed data is presented in Annex 2.

5.2.2.2 EF_BM: Build margin emission factor

Table 4 Added capacity in the North China Power Grid

Year	Installed capacity (MW)	Growth to 2005 (%)	Selected
2004	96,983.2	n/a	n/a
2003	87,362.7	9.9%	No
2002	78,955.3	18.6%	Yes
2001	72,071.9	25.7%	Yes

Source: China Electric Power Yearbook (2002, 2003, 2004 and 2005 editions)

As per the procedure described in the PDD, the Build Margin Emission Factors since 2001 and 2002 are calculated in **Table 5** and **Table 6** below. The most conservative (i.e. lowest) is chosen.

Table 5 Build Margin data for the North China Power Grid (2001)

Source	Installed capacity in 2001 (MW)	Installed capacity in 2004 (MW)	Added capacity (MW)	Si, share of added capacity (%)	CEFi (tCO ₂ e/MWh)*	EF_BM (tCO ₂ e/MWh)
Hydro	3,224	3,250	26.7	0.11	0	0

Coal	68,791.3	93,594.9	24,803.6	99.57	0.868	0.865
Nuclear	0	0	0		0	0
Gas	0	0	0		0.333	0
Other (wind)	56.6	137.5	80.9	0.32	0	0
Total	72,071.9	96,983.1	24,911.2	100		0.865

Source: China Electric Power Yearbook, pages 666 (2002 edition) and 473 (2005 edition).

Note: * CEFi values are calculated as per the PDD.

Table 6 Build Margin data for the North China Power Grid (2002)

Source	Installed capacity in 2002 (MW)	Installed capacity in 2004 (MW)	Added capacity (MW)	Share of added capacity (%)	CEFi (tCO ₂ e/MWh)*	EF_BM (tCO ₂ e/MWh)
Hydro	3,257.6	3,250.7	-6.9	-0.04	0	0
Coal	75,607.6	93,594.9	17,987.3	99.78	0.868	0.866
Nuclear	0	0	0	0	0	0
Gas	0	0	0	0	0.333	0
Other (wind)	90.1	137.5	47.4	0.26	0	0
Total	78,955.3	96,983.1	18,027.8	100		0.866

Source: China Electric Power Yearbook, pages 616 (2001 edition) and 473 (2005 edition).

Note: * CEFi values are calculated as per the PDD.

To be conservative, the lowest build margin emissions factor, 0.865 tCO₂e/MWh, is adopted in line with the procedures set out and approved in the PDD.

5.2.2.3 EF calculation

Table 7 Actual calculated emissions factors compared to projected values in the PDD

	Actual value	PDD projection
Latest year available	2004	2003
EF_OM	1.100	0.993
Chosen year for BM	2001	1999
EF_BM	0.865	0.819

EF	0.983	0.906
----	-------	-------

5.2.3 Correction for electricity imports and exports

Table 8 Electricity exchange between grids in 2004 (MWh)

Imports	Exports	Net exchange	Net exchange (%)
4,244,380	0	4,244,380	<1%

Source: China Electric Power Yearbook (2005).

Total net electricity exchange between the North China Power Grid and other grids is presented in Table 8. With total generation in the North China Power Grid in 2004 being 526,772,000 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 Zhangbei Manjing Windfarm Project.

6.3 Calibrations

The Power Interchange Agreement between Hebei Zhangbei Manjing Wind Farm and 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 equipment shall have sufficient accuracy so that any error resulting from such equipment shall not exceed 0.5% of full-scale rating. The net energy output 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 Zhangbei Manjing Wind Farm, and these records will be maintained by Zhangbei Manjing Wind Farm and the appointed third party.

Both 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;
- the repair of all or part of meter caused by the failure of one or more parts to operated in accordance with the specifications; and/or

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 North China Power Grid and Zhangbei Manjing Wind Farm fail to agree then the matter will be referred for arbitration according to agreed procedures.

No errors occurred during the first 6 months operations of the Zhangbei Manjing Windfarm Project. Calibration took place as per schedule. Calibrations were carried out by staff from North China Power Grid on the dates given in Table 9 below.

Table 9 Dates of calibrations of monitoring equipment

Equipment	Dates of calibrations
Main metering equipment at substation owned by the North China Power Grid	7 April 2006

Back-up metering equipment owned by Zhangbei Manjing Wind Farm	September 2006 (planned)
--	--------------------------

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 net generation data has been approved and signed off by staff who are responsible for recording meter reading in the 110kV substation installed in windfarm side, 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 10 Monthly emission reductions achieved

Month	EG (MWh)	EF (tCO ₂ e/MWh)	BE (tCO ₂ e)
Dec 2005	41.844	0.983	41.132
Jan 2006	1,012.440	0.983	995.229
Feb 2006	2,146.056	0.983	2,109.573
Mar 2006	3,333.000	0.983	3,276.339
Apr 2006	3,647.028	0.983	3,585.029
May 2006	5,287.128	0.983	5,197.247
Jun 2006	4,409.592	0.983	4,334.629
Jul 2006	6,758.796	0.983	6,643.896

Aug 2006	4,909.740	0.983	4,826.274
Total	31,545.624	0.983	31,009.348

7.3 Leakage emissions

As a relatively small renewable energy project, leakage from the project are considered zero.

7.4 Summary of emission reductions during the monitoring period

Table 11 Emission reduction calculation (tCO₂e)

Period	Project emissions	Baseline emissions	Leakage	Emission reduction
1 January 2006 to 31 August 2006	0	31,009	0	31,009

Annex 1: Contact details

Project developer

Beijing Guotou Energy Conservation Company
18th Floor, East Wing, Sichuan Mansion, No.1 Fuwai Street,
Xicheng District, Beijing 100037
China
Tel: +86 10 8833 7332

Project advisor

Carbon Resource Management
Technology House
16-18 Whiteladies Road
Bristol BS8 2LG
UK
Tel: +44 117 980 9440

Annex 2: Calculations

Table A1 Operating margin data for the North China Power Grid in 2004

Fuel types	Unit	Fuel consumption in the NCPG*	Emission factor** (tc/TJ)	Oxidation rate** (%)	Average net caloric value**** (MJ/t,m3, tce)	CO ₂ emission (tCO ₂ e)	Electricity generation supplied to the NCPG**** (MWh)	OM emission factor (tCO ₂ e/MWh)
		A	B	C	D	$E = A * B * C * D * 44 / 12 / 100$	F	G
Raw coal	Mtons	272.2829	25.8	98	20908	316677083		
Cleaned coal	Mtons	0.4	25.8	98	26344	0		
Coke	Mtons	0.0022	25.8	98	28435			
Other washed coal	Mtons	7.4591	25.8	98	8363	2269527		
Coke oven gas	Mm ³	1554	13	99.5	16.726	24275		
Other coal gas	Mm ³	6807	13	99.5	5.227	93883		
Crude oil	Mtons	0	20	99	41816	0		
Diesel	Mtons	0.0589	20.2	99	42652	267401		
Fuel oil	Mtons	0.1482	21.1	99	41816	503802		
LPG	Mtons	0	17.2	99.5	50179	0		
Refinery gas	Mtons	0.0197	18.2	99.5	46055	8257		
Natural gas	Mm ³	56	15.3	99.5	38.931	10866		
Other energy	Mtce	1.5826	0		29271.2	0		

Coke	Mtons	0.028	25.8	98	28435	73812		
					Total	538303494	489173110	1.100

Source: China Energy Statistical Yearbook 2005, page 202-221, page 258-261.

*Note: * Fuel consumption for thermal power generation in the North China Power Grid is obtained from page 202-221, page 258-261, China Energy Statistical Yearbook 2005*

*** Emission factors for various fuels are obtained from the Revised 1996 IPCC Guidelines.*

**** Oxidation rate for various fuels are obtained from the Revised 1996 IPCC Guidelines.*

***** Average net caloric values for various fuels are obtained from page 365, China Energy Statistical Yearbook 2005.*

****** Electricity generation supplied to the North China Power Grid is obtained from page 472 and 474, China Electric Power Yearbook 2005.*