

Hebei Kangbao Sanxiatian Wind Farm Project

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1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

Hebei Kangbao Sanxiatian Wind Farm Project (hereafter referred as “the project”) is a Greenfield grid-connected wind power project. The project is invested, constructed and operated by Hebei Construction Investment New Energy Co., Ltd.. The total installed capacity of the project is 49.5MW equipped with 33 sets of wind turbines with a unit installed capacity of 1,500kW. The project has been registered as a CDM project on 26/11/2010.

The objective of the project is to generate electricity by using wind resource and deliver the generated electricity to North China Power Grid (NCPG) via a 110 KV transmission line. As a renewable energy source, the project generates emission reductions by avoiding CO₂ emissions from the same amount of electricity generation from NCPG, which is mainly dominated by fossil fuel-fired power plants. The project contributes to annual GHG reductions estimated at 124,846tCO₂e.

Relevant dates for the project are as follows:

The construction of the project started on 01/05/2009, the first wind turbine of the project has been put into operation on 28/11/2009 and the commissioning time of all 33 wind turbines was 18/12/2009. The date of CDM registration date is 26/11/2010, and the CDM crediting period (renewable) is 26/11/2010 – 25/11/2017.

During the monitoring period (from 30/11/2011 to 31/12/2012), the monitoring activities were conducted strictly in accordance with the monitoring plan in the registered PDD. The project has operated without any accidental or emergency events that might impact the accuracy and/or implementation of monitoring activities. The net feed-in electricity during this period is 153,422.28MWh, and the emission reduction achieved by the project in this monitoring period is 161,836tCO₂e. The emission reductions in the monitoring period will be verified and issued under VCS rules.

1.2 Sectoral Scope and Project Type

This category would fall within sectoral scope 1: energy industries (Renewable sources).

Project type: wind power project.

1.3 Project Proponent

Organization name	Hebei Construction Investment New Energy Co., Ltd.
Contact person	Cao Wanpeng
Title	Project manager

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1.4 Other Entities Involved in the Project

Organization name	Goldchina Consultancy International Co., Ltd.
Role in the project	The buyer
Contact person	Dr, Zheng Zhaoning
Title	Technical director
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1.5 Project Start Date

28/11/2009. (It is the date when the first turbine was commissioned.)

1.6 Project Crediting Period

Renewable crediting period (7yrs×3) is adopted by the project, so the first 7-year renewable crediting period is from 26/11/2010 to 25/11/2017.

1.7 Project Location

The project is located in Kangbao County, Zhangjiakou City, Hebei Province, P. R. of China. The central geographical coordinates of the project is longitude 114°29'47.3"E and latitude 41°53'57.6" N.

1.8 Title and Reference of Methodology

Approved consolidated baseline and monitoring methodology ACM0002 "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" (Version 10).

1.9 Other Programs

Emission Trading Programs and Other Binding Limits:

The project has been registered as a CDM project on 26/11/2010, for which a renewable crediting period of 3×7 years will be used under the CDM GHG Program. The project proponent confirmed

that, once emission reductions generated from 30/11/2011 to 31/12/2012 are issued under VCS rules, those credits will not be claimed as CERs and will be claimed as zero in the possible future CER monitoring report. And issued VCUs will be sold only once to one particular buyer.

Once the project proponent are included in an emissions trading program or any other mechanism that includes GHG allowance trading, the VCU issuance under VCS rules will be stop immediately since the date of included in an emissions trading program or any other mechanism that includes GHG allowance trading.

Other Forms of Environmental Credit:

The Project is a renewable energy generation project, which discharges no emission during operation period. Thus, the project doesn't fall into categories that creating GHG emissions primarily for the purpose of its subsequent removal or destruction.

The Project has not created another form of environmental credit, which will be verified by DOE. And The Project will not create other environmental credit in the future.

Participation under Other GHG Programs:

The Project has been registered as a VCS project with registration number 697.

The Project has been registered as a CDM project with registration number 3312.

2 IMPLEMENTATION STATUS

2.1 Implementation Status of the Project Activity

The project is a greenfield grid-connected wind power project. The total installed capacity of the project is 49.5MW equipped with 33 sets of wind turbines with a unit installed capacity of 1.5MW. Electricity generated by the project is delivered to NCPG via a 110 KV transmission line.

Construction of the project was started on 01/05/2009. The date of first wind turbine started operation was 28/11/2009. And the date of all wind turbine started full operation was 18/12/2009.

Major technical parameters of the key equipments employed by the project are illustrated in the following table.

Table 1. Key technical parameters of turbines in the project

Parameter	Unit	Value
Model	-	GE1.5sle
Height of hub	m	80

Wind turbine	Rotor diameter	m	77
	Number of blades		3
	Rated wind speed	m/s	14
	Cut-in wind speed	m/s	3.5
	Cut-off wind speed	m/s	25
Generator	Rated power	kW	1500
	Rated voltage	V	690

During this monitoring period from 30/11/2011 - 31/12/2012, the project has a normal operation, smooth data transfer and grid connection as per the registered CDM-PDD without any emergencies or special events, which might impact the applicability of the chosen methodology.

2.2 Deviations

2.2.1 Methodology Deviations

There is no deviation applied to this monitoring period.

2.2.2 Project Description Deviations

There is no deviation applied to this monitoring period.

2.3 Grouped Project

The Project is not a grouped project.

3 DATA AND PARAMETERS

3.1 Data and Parameters Available at Validation

Data / Parameter	EF_y
Data unit	tCO ₂ e/MWh
Description	Baseline emission factor of NCPG in the monitoring period.

Source of data	The registered PDD
Value applied:	1.05485
Justification of choice of data or description of measurement methods and procedures applied	<i>Notification on 2008 baseline emission factors for regional power grids in China</i> , issued by China on July 18, 2008 and updated on Dec 30, 2008 and the registered PDD.
Purpose of the data	Calculation of baseline emissions
Comments	Determined ex-ante and fixed for the first crediting period

3.2 Data and Parameters Monitored

Data / Parameter	$EG_{facility,y}$
Data unit	MWh
Description	The quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the project in year y
Source of data	Calculated
Description of measurement methods and procedures to be applied	Calculated as follows: $EG_{facility,y} = EG_{export,y} - EG_{import,y}$
Frequency of monitoring/recording	calculated and recorded monthly
Value monitored:	153,422.280
Monitoring equipment	-
QA/QC procedures to be applied	Power supplied to the grid is checked by inter verification procedure and electricity sales receipts.
Purpose of the data	Calculation of baseline emissions
Calculation method	Calculated as $EG_{export,y} - EG_{import,y}$
Comments	-

Data / Parameter	$EG_{export,y}$
Data unit	MWh
Description	The electricity delivered by the project to the grid in year y
Source of data	Measured
Description of measurement methods and procedures to be applied	The electricity delivered by the project to the grid in year y ($EG_{export,y}$) is determined as the conservative value

applied	between Monthly Production Reports and electricity sales receipts
Frequency of monitoring/recording	Continuously measured and Monthly recorded
Value monitored:	153,657.240
Monitoring equipment	Meter: M1 Type: DTSD341 Accuracy Class; 0.2S Serial Number: 09070111440058 Calibration date: 02/07/2011; 26/06/2012. Validity: Yes
QA/QC procedures to be applied	sales receipts are used for crosscheck. Calibration and maintenance has been conducted to guarantee the accuracy and normal functions of the meter.
Purpose of the data	Calculation of baseline emissions
Calculation method	-
Comments	-

Data / Parameter	$EG_{import,y}$
Data unit	MWh
Description	The electricity imported by the project from the grid in year y
Source of data	Measured
Description of measurement methods and procedures to be applied	The electricity imported by the project from the grid in year y ($EG_{import,y}$) is determined as the conservative value between Monthly Production Reports and electricity sales receipts
Frequency of monitoring/recording	Continuously measured and monthly recorded
Value monitored:	234.96
Monitoring equipment	Meter: M1 Type: DTSD341 Accuracy Class; 0.2S Serial Number: 09070111440058 Calibration date: 02/07/2011; 26/06/2012. Validity: Yes
QA/QC procedures to be applied	Sales receipts are used for crosscheck. Calibration and maintenance has been conducted to guarantee the accuracy and normal functions of the

	meter
Purpose of the data	Calculation of baseline emissions
Calculation method	-
Comments	-

3.3 Monitoring Plan

In line with the methodology ACM0002 (Version 10) and the registered CDM-PDD (version 02), it is required to monitor the following parameters:

Parameter	Description
$EG_{export,y}$	The electricity delivered by the project to the grid in year y
$EG_{import,y}$	The electricity imported by the project from the grid in year y
$EG_{facility,y}$	The quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the project in year y

Monitoring point of the project

The monitoring point of the project is shown in figure 2.

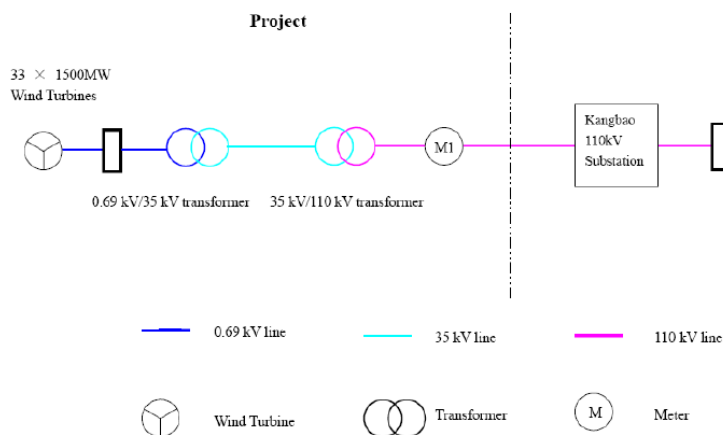


Figure 2. Monitoring point of the project

Information on the monitoring equipment used in the project is summarized in table 2.

Table 2. Monitoring equipment used in the project

Parameter	Monitoring point	Serial number	Accuracy class
$EG_{export,y}$	Electricity meter installed on the main transmission line of the Project	09070111440058	0.2S
$EG_{import,y}$	Electricity meter installed on the main transmission line of the project	09070111440058	0.2S
$EG_{facility,y}$	-	-	-

Data generation, recording and calculation

The electricity delivered by the project to the grid in year y

The electricity delivered by the project to the grid in year y ($EG_{export,y}$) was continuously measured by the bi-directional electricity meter on the main transmission line of the project.

Readings of the electricity meter were recorded every day in the Daily Reading Records by designated personnel at the wind farm of the Project. Designated personnel of the Project Owner monthly summarized and recorded readings of the electricity meter in Monthly Production Report of the Project to verify the data.

For the electricity delivered by the project to the grid in year y ($EG_{export,y}$), Electricity Transaction Notes (ETNs) were monthly issued by the grid company to the project owner. ETN issued by the grid company are used for crosscheck.

The electricity imported by the project from the grid in year y:

The electricity imported by the project from the grid in year y ($EG_{import,y}$) was continuously measured by the bi-directional electricity meter installed on the main transmission line of the project.

Readings of the electricity meter were recorded every day in the Daily Reading Records by designated personnel at the wind farm of the Project. Designated personnel of the Project Owner monthly summarized and recorded readings of the electricity meter in Monthly Production Report of the Project to verify the data.

For the electricity imported by the Project from the grid ($EG_{import,y}$) in year y, ETNs were issued by the grid company to the Project Owner on a monthly basis. ETNs issued by the grid company are used for crosscheck.

The quantity of net electricity generation

The net electricity that was produced and fed into the grid as a result of the implementation of the project in year y ($EG_{\text{facility},y}$) was calculated monthly with on-site monitored data of $EG_{\text{export},y}$ and $EG_{\text{import},y}$ using the formula $EG_{\text{facility},y} = EG_{\text{export},y} - EG_{\text{import},y}$

Organizational structure, roles and responsibilities of the personnel

The organization structure of the monitoring system is shown in Figure 3:

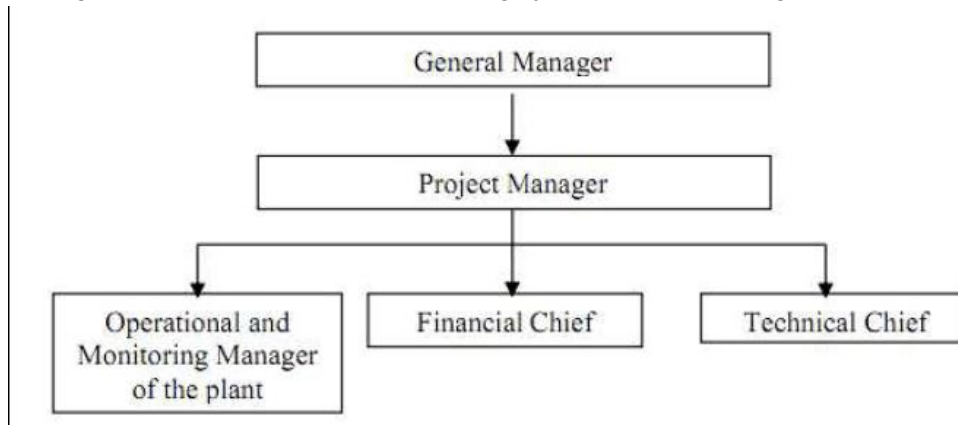


Figure 3 Sketch map of organization structure of the project

The responsibilities of the project staff are specified as follow:

- General Manager: To be responsible for supervising the whole monitoring procedure.
- Project Manager: To be responsible for data management and compiling monitoring report.
- Operational and monitoring manager: To be responsible for collecting data and do internal audit.
- Financial chief: To be responsible for collection of electricity sales records.
- Technical chief: To be responsible for preparing operating periods, equipment defects, etc.

Emergency procedures

In case metering equipment is damaged and no reliable readings can be recorded, the project entity will estimate net supply by the proposed project activity according to the following procedure:

The project entity and the grid company will jointly calculate a conservative estimate of power supplied to the grid. A statement will be prepared indicating

- the background to the damage to metering equipment
- the assumptions used to estimate net supply to the grid for the days for which no record could be recorded
- the estimation of power supplied to the grid. The statement will be signed by both a representative of the project entity as well as a representative of the grid company.

4 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

4.1 Baseline Emissions

Baseline emissions in the monitoring period are calculated by multiplying the fixed baseline emission factor determined in the registered PDD of the project ex ante by net electricity supplied by the Project to the NCPG in the monitoring period.

$$BE_y = EG_{facility,y} \times EF_y \quad (1)$$

Where:

BE_y is the baseline emissions in year y (tCO₂e);

$EG_{facility,y}$ is the quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the project activity in year y (MWh);

EF_y is the baseline emission factor which is ex-ante determined in the registered CDM-PDD. (tCO₂/MWh)

Net electricity generation supplied by the Project ($EG_{facility,y}$)

As per the registered CDM-PDD (version 02), the project is the installation of a new grid-connected renewable power plant at a site where no renewable power plant was operated prior to the implementation of the project, so:

$$EG_{facility,y} = EG_{export,y} - EG_{import,y}$$

Where:

$EG_{facility,y}$ is the quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the project activity in year y (MWh);

$EG_{export,y}$ is electricity supplied by the project to the grid in year y (MWh);

$EG_{import,y}$ is the electricity imported by the project from the grid in year y (MWh);

So, the $EG_{facility,y}$ are listed as follow:

Date	$EG_{export,y}$ (MWh)		
	Electricity data from meter readings (kWh)	Data on the sales records (kWh)	Conservative value for ER calculation (kWh)
	A	B	C=min (A,B)
30/11/2011-30/12/2011	11,069.52	11,069.52	11,069.52
31/12/2011(0:00-24:00)	539.88	539.88	539.88
Total from 30/11/2011 to 31/12/2011			11,609.40

01/01/2012-30/01/2012	8,034.84	8,034.84	8,034.84
31/01/2012-28/02/2012	12,528.12	12,528.12	12,528.12
29/02/2012-30/03/2012	12,456.84	12,456.84	12,456.84
31/03/2012-29/04/2012	16,275.60	16,275.60	16,275.60
30/04/2012-30/05/2012	14,626.92	14,626.92	14,626.92
31/05/2012-29/06/2012	11,914.32	11,914.32	11,914.32
30/06/2012-30/07/2012	8,285.64	8,285.64	8,285.64
31/07/2012-30/08/2012	6,989.40	6,989.40	6,989.40
31/08/2012-29/09/2012	7,630.92	7,630.92	7,630.92
30/09/2012-30/10/2012	10,074.24	10,074.24	10,074.24
31/10/2012-29/11/2012	16,530.36	16,530.36	16,530.36
30/11/2012-30/12/2012	15,776.64	15,776.64	15,776.64
31/12/2012 (0:00-24:00)	924.00	924.00	924.00
Total in 2012			142,047.84
Sum			153,657.24

Date	$EG_{import, y}(\text{MWh})$		
	Electricity data from meter readings (kWh)	Electricity data from sales receipts (kWh)	Conservative value for ER calculation (kWh)
	D	E	F=max (D,E)
30/11/2011-30/12/2011	25.08	25.08	25.08
31/12/2011(0:00-24:00)	0	0	0
Total from 30/11/2011 to 31/12/2011			25.08
01/01/2012-30/01/2012	33.00	33.00	33.00
31/01/2012-28/02/2012	11.88	11.88	11.88
29/02/2012-30/03/2012	13.20	13.20	13.20
31/03/2012-29/04/2012	7.92	7.92	7.92
30/04/2012-30/05/2012	7.92	7.92	7.92
31/05/2012-29/06/2012	7.92	7.92	7.92
30/06/2012-30/07/2012	17.16	17.16	17.16
31/07/2012-30/08/2012	19.80	19.80	19.80
31/08/2012-29/09/2012	44.88	44.88	44.88
30/09/2012-30/10/2012	22.44	22.44	22.44
31/10/2012-29/11/2012	9.24	9.24	9.24
30/11/2012-30/12/2012	14.52	14.52	14.52
31/12/2012 (0:00-24:00)	0.00	0.00	0.00
Total in 2012			209.88
Sum			234.96

*,** At 24:00 of the last but one day of every month, the raw data of meter reading of meter are recorded by the project owner and form monthly reading record.

Date	$EG_{export,y}$ (MWh)	$EG_{import,y}$ (MWh)	$EG_{facility,y}$ (MWh)
30/11/2011 - 31/12/2011	11,609.40	25.08	11,584.32
01/01/2012 - 31/12/2012	142,047.84	209.88	141,837.96
Total	153,657.24	234.96	153,422.28

Date	$EG_{facility,y}$ (MWh)	EF_y (tCO ₂ e/MWh)	BE_y (tCO ₂ e)
30/11/2011 - 31/12/2011	11,584.32	1.05485	12,219
01/01/2012 - 31/12/2012	141,837.96	1.05485	149,617
Total	153,422.28		161,836

4.2 Project Emissions

The Project is a zero-emission renewable electricity generating activity. Therefore no emission from the project activity was identified, and $PE_y = 0$.

4.3 Leakage

According to the methodology ACM0002, the project leakage is not considered.

4.4 Net GHG Emission Reductions and Removals

Year	Baseline emissions or removals (tCO ₂ e)	Project emissions or removals (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Net GHG emission reductions or removals (tCO ₂ e)
30/11/2011 - 31/12/2011	12,219	0	0	12,219
01/01/2012 - 31/12/2012	149,617	0	0	149,617
Total	161,836			161,836

The estimated annual emission reductions are 124,846tCO₂e as per registered PDD. The monitoring period covers 398 days, $124,846 \times 398 / 365 = 136,133$ tCO₂e, and the emission reduction achieved by the

project in this monitoring period is 161,836tCO₂e, so the emission reductions during current monitoring period are 18.88% higher than the estimates in the registered PDD.

As is known, the average annual quantity of power generation is a parameter derived from theoretical calculation based on the wind resource data of the representative year which can reflect the mean level of wind energy in long term in some area. And wind speed is a key parameter which can essentially affect the quantity of power generation.

Annual average wind speed of the representative year and actual wind speed during this monitoring period are listed in table below.

Table 2. Comparison between actual wind speed and wind speed of representative year

Date	wind speed (m/s)	wind speed (m/s)
	Monitoring period	Representative year
Dec. 2011	10.5	7.5
Jan. 2012	9.45	6.4
Feb. 2012	8.2	8
Mar. 2012	10.1	8.1
Apr. 2012	9.6	8.3
May. 2012	10.35	9.5
Jun. 2012	6.5	6.4
Jul. 2012	6.5	6.6
Aug. 2012	5.4	5.7
Sep. 2012	6.8	7
Oct. 2012	7.3	7.6
Nov. 2012	7.9	8.1
Dec. 2012	9.2	7.5
Average	8.29	7.44

The energy available in a wind stream is proportional to the cube of its speed¹, the wind speed in the monitoring period is 11.42% $((8.29-7.44)/7.44=11.42\%)$ higher than the wind speed of representative year, which means the wind energy in the monitoring period is 38.32% higher than that of the wind speed of representative year theoretically. So, it is reasonable that actual emission reductions during this monitoring period (from 30/11/2011 to 31/12/2012) 18.88% higher than the estimated emission reductions in the registered PDD. It can be concluded to the increase of emission reductions is due to wind speed fluctuation and not under the control of the project owner.

As per the results of sensitivity analysis in the PDD, if the annual net electricity increases by 20%, IRR of the project could achieve the benchmark. And then even the actual ERs increase by 18.88% in the current monitoring period over the estimated one in the PDD, it can be definitely concluded that the impact of temporary increase in actual ERs of this monitoring period on the additionality of the project is limited and cannot result in the break of the benchmark of 8%.

¹ $P = \frac{1}{2} \rho A v^3$, where P is the kinetic power, ρ is the air density, A is the area, v is the wind speed, source from Page 48 of *Developing Wind Power Projects: Theory and Practice*(written by Tore Wizelius), so, the wind energy is the proportional to the cube of its speed.