Project design document form for CDM project activities

(Version 05.003)

Complete this form in accordance with the Attachment "Instructions for filling out the project design document form for CDM project activities" at the end of this form.

PROJECT DESIGN DOCUMENT (PDD)	
Title of the project activity	Inner Mongolia China Water Group Huade Niujiafangzi Wind Farm 49.5MW Project
Version number of the PDD	2.01.4
Completion date of the PDD	28/07/201427/03/2012
Project participant(s)	China Water Group Huade Wind Power Co., Ltd. (Project owner) Eco-Tec Asia (UK) Ltd. (Buyer)
Host Party	China
Sectoral scope and selected methodology(ies), and where applicable, selected standardized baseline(s)	01: Energy Industries (renewable resources) Wind Power Generation ACM0002: Consolidated baseline methodology for grid-connected electricity generation from renewable sources (Version 12.1.0，EB 58)
Estimated amount of annual average GHG emission reductions	96,159 tCO_2e

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

>>

Inner Mongolia China Water Group Huade Niujiafangzi Wind Farm 49.5MW Project (hereafter, the “Project”) is located at Niujiafangzi Wind Farm 14.2 km away from the southwest of Changshun Town, Huade county, Ulanqab City in the Inner Mongolia Autonomous Region of the People’s Republic of China (hereafter, the “Host Country”). The Project is being constructed by China Water Group Huade Wind Power Co., Ltd. (hereafter, “CWG”).

The Project’s baseline scenario, which is the same as the existing scenario prior to implementation of the Project, involves electricity being generated by fossil fuel power plants connected to the North China Power Grid (hereafter, “NCPG”).

The Project will install and operate 33 sets of wind turbines, each of which has a capacity of 1500kW; therefore, the total installed capacity of the Project will be 49.5MW. The full load hours estimated is 2,087 hours per year and the expected net electricity generation supplied to NCPG is 103,297 MWh per year. The Project will reduce greenhouse gas (hereafter, “GHG”) emissions by replacing electricity that would otherwise be generated from coal-fired power plants. The Project’s annual expected emissions reduction is 96,159 tCO_2e.

The Project is consistent with and will contribute to the achievement of the Host Country’s sustainable development objectives. Specifically, the Project will have several positive social and environmental impacts:

- Make full use of Inner Mongolia’s wind energy resources;
- Satisfy increases in demand for electricity in Inner Mongolia;
- Reduce GHG emissions and other pollutants such as SO_2, NO_X and flue gas dust by substituting Project-generated electricity for electricity produced by fossil fuel power plants presently supplying the NCPG;
- Create employment opportunities through the Project’s construction and operation; and
- Provide an attraction for tourism.

A.2. Location of project activity

A.2.1. Host Party

>>

People’s Republic of China

A.2.2. Region/State/Province etc.

>>

Inner Mongolia Autonomous Region

A.2.3. City/Town/Community etc.

>>

Changshun Town, Huade County, Ulanqab City

A.2.4. Physical/Geographical location

>>

The Project is located at Niujiafangzi Wind Farm 14.2 km away from the southwest of Changshun Town, Huade County, Ulanqab City in the Inner Mongolia Autonomous Region of the People's Republic of China. Huade County is located in the northeast of Ulanqab City, to the south of Xianghuang Banner, to the east and north of Shangdu County, and to the west of Kangbao County of Hebei Province. The centre geographic coordinates of the wind farm is 113.8868°E，41.7890°N[1]. The Project site covers an area of 113.8692°E ~ 113.9326°E and 41.7691°N ~ 41.8029°N. Figure 1 and Figure 2 highlight the location of Inner Mongolia Autonomous Region and Ulanqab City. Figure 3 then shows the Project's location.

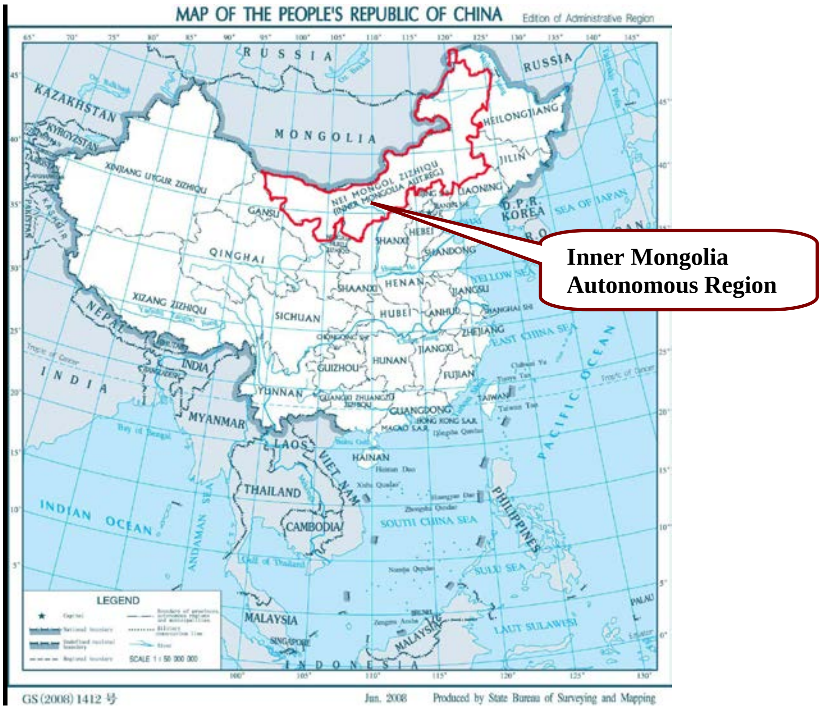

Figure 1 The Location of Inner Mongolia Autonomous Region

Figure 2 The Location of Ulanqab City

Figure 3 The Location of the Project Site in Ulanqab City

[1] FSR & Wind Farm Layout.

A.3. Technologies and/or measures

>>

The most important purpose of the Project is to avoid environmental pollution and GHG emissions from fossil fuel power plants, and utilize the wind energy.

The scenario existing prior to the start of the implementation of the Project

The scenario existing prior to the start of the implementation of the Project involves the electricity being generated by fossil fuel power plants connected to the NCPG. This scenario is the same as the Project's baseline scenario. This scenario's main emission sources and GHG is CO_2 emissions from fossil fuel based power plants connected to the NCPG.

The Project scenario

The Project involves the construction and operation of a new wind farm, with the purpose of utilizing wind energy to generate electricity. The Project will install 33 wind turbines, each of which have a capacity of 1500kW and manufactured by Xinjiang Goldwind Technology Co., Ltd., providing a total capacity of 49.5MW. The expected net electricity generation supplied to NCPG is 103,297 MWh per year.

The electricity generated from the Project will first be transmitted to the 220kV booster station built by CWG for Niujiafangzi Wind Farm Project. The Project will involve adding a 100MVA main transformer (Niujiafang~~zi~~ #1) in Niujiafang~~zi~~ booster station. After been transmitted to the 220 kV Niujiafang~~zi~~ booster station through three 35kV transmission lines, the electricity will further be transmitted to Xingguang substation of NCPG 18km away via single 220 kV transmission line.

The key technical specifications of wind turbines used in the Project are listed in Table 1.

Table 1 Key Technical Specifications of Wind Turbines[2]

Parameters		Value
Manufacturer / Type		Xinjiang Goldwind Technology Co., Ltd. GW77/1500kW
Life Time (Year)		20
Annual Operation Hours (Hours)		2087
Plant Load Factor (PLF)		0.24
Wind Wheel	Diameter (m)	77
	Rated Capacity (kW)	1500
	Cut-in Wind Speed (m/s)	3
	Rated Wind Speed (m/s)	12
	Cut-out Wind Speed (m/s)	22
	Operation Temperature(℃)	-30 ℃~+40℃
	Type	variable blade
	Swept Area (m^2)	4656
Generator	Type	Direct-drive permanent magnet synchronous generator

[2] Data Source of "Annual Operation Hours" and "Plant Load Factor": Feasibility Study Report (FSR);
Data Source of all the other parameters: Technical Specifications from the manufacturer.

	Capacity (kW)	1580
	Rated Voltage (V)	690
	Rated Current (A)	660
Tower	Type	cone
	Hub Height (m)	62.8
Power factor		0.95 (inductor) ~ 0.95 (capacitor)

Based on the description above, there is no greenhouse gases involved in the Project.

A.4. Parties and project participants

Party involved (host) indicates host Party	Private and/or public entity(ies) project participants (as applicable)	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
China (host)	China Water Group Huade Wind Power Co., Ltd.	No
United Kingdom of Great Britain and Northern Ireland	Eco-Tec Asia (UK) Ltd	No

Appendix 1 provides detailed information about the Project participants.

A.5. Public funding of project activity

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There is no public funding from Parties included in Annex I involved in the Project.

SECTION B. Application of selected approved baseline and monitoring methodology and standardized baseline

B.1. Reference of methodology and standardized baseline

>>

Approved consolidated baseline and monitoring methodology ACM0002: “Consolidated baseline methodology for grid-connected electricity generation from renewable sources” (Version 12.1.0，EB 58)

The methodology refers to the following tools:

“Tool for the demonstration and assessment of additionality” (Version 05.2.1, EB 39)
“Tool to calculate the emission factor for an electricity system” (Version 02.2.1, EB63)

For more information please refer to:
http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html

B.2. Applicability of methodology and standardized baseline

>>

The ACM0002 (Version 12.1.0, EB 58) states the applicability conditions as follows:

- The project activity is the installation or modification/retrofit of a power plant/unit of one of the following types: hydro power plant/unit (either with a run-of-river reservoir or an

accumulation reservoir), wind power plant/unit, geothermal power plant/unit, solar power plant/unit, wave power plant/unit or tidal power plant/unit;

The Project involves installation of a new wind power plant at the place where no renewable energy project was operated prior to the implementation of the Project and thus the above condition is met.

- The project activities do not involve switching from fossil fuels to renewable energy sources at the site of the project activity.

The Project is a newly built wind power project and does not involve switching from fossil fuels to renewable energy.

In conclusion, the ACM0002 (Version 12.1.0, EB 58) is applicable to the Project.

B.3. Project boundary

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ACM0002 (Version 12.1.0, EB 58) states:

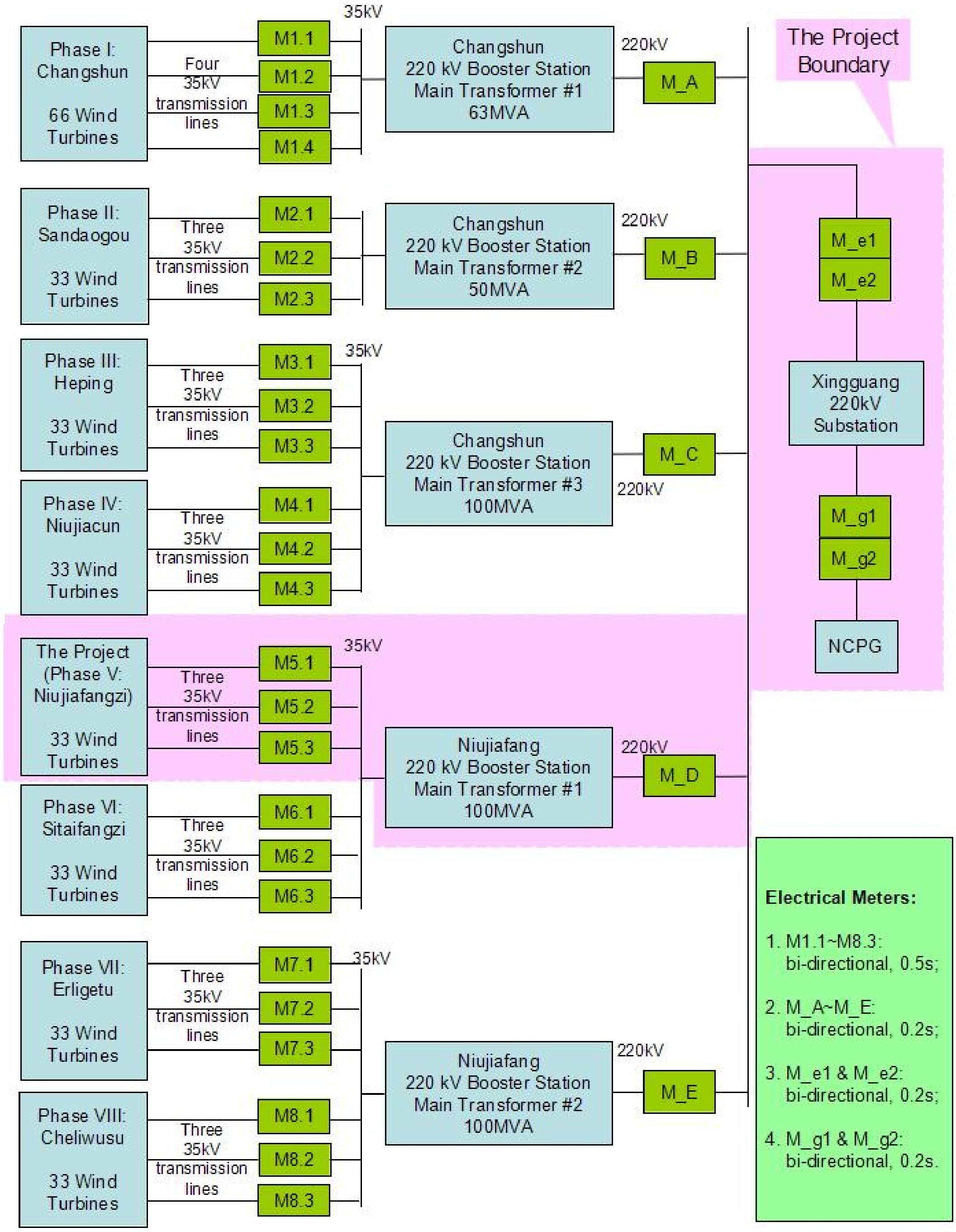
"The spatial extent of the project boundary includes the project power plant and all power plants connected physically to the electricity system that the CDM project power plant is connected to."

The electricity generated by the Project will be supplied to the NCPG. Thus, according to the Tool to calculate the emission factor for an electricity system (Version 02.2.1, EB63), the electricity system of the Project is defined as the NCPG which can be dispatched without significant transmission constraints. The Project boundary therefore includes all power plants physically connected to the NCPG and the Project power plant itself.

As the Chinese Designated National Authority (thereafter the "**DNA**"), the National Development and Reform Commission (therefore the "**NDRC**") publicated "2010 Baseline Emission Factors for Regional Power Grids in China", which stipulates that the NCPG is a regional grid in China including Beijing City Power Grid, Tianjin City Power Grid, Hebei Province Powe Grid, Shanxi Province Power Grid, Shandong Province Power Grid and Inner Mongolia Autonomous Region Power Grid."[3]

Figure 4 describes the project boundary of the Project:

[3] The National Development and Reform Commission, "2010 Baseline Emission Factors for Regional Power Grids in China," 20/12/2010,
20/12/2010 <http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File2552.pdf>


Phase I:
Changshun
66 Wind
Turbines
Four
35kV
transmission
lines
M1.1
M1.2
M1.3
M1.4
35kV
Changshun
220 kV Booster Station
Main Transformer #1
63MVA
220kV
M_A
The Project
Boundary
Phase II:
Sandaogou
33 Wind
Turbines
Three
35kV
transmission
lines
M2.1
M2.2
M2.3
Changshun
220 kV Booster Station
Main Transformer #2
50MVA
220kV
M_B
M_e1
M_e2
Phase III:
Heping
33 Wind
Turbines
Three
35kV
transmission
lines
M3.1
M3.2
M3.3
35kV
Xingguang
220kV
Substation
Changshun
220 kV Booster Station
Main Transformer #3
100MVA
M_C
220kV
Phase IV:
Niujiacun
33 Wind
Turbines
Three
35kV
transmission
lines
M4.1
M4.2
M4.3
M_g1
M_g2
NCPG
The Project
(Phase V:
Niujiafangzi)
33 Wind
Turbines
Three
35kV
transmission
lines
M5.1
M5.2
M5.3
35kV
Niujiafang
220 kV Booster Station
Main Transformer #1
100MVA
220kV
M_D
Phase VI:
Sitaifangzi
33 Wind
Turbines
Three
35kV
transmission
lines
M6.1
M6.2
M6.3
Electrical Meters:
1. M1.1~M8.3:
bi-directional, 0.5s;
2. M_A~M_E:
bi-directional, 0.2s;
3. M_e1 & M_e2:
bi-directional, 0.2s;
4. M_g1 & M_g2:
bi-directional, 0.2s.
Phase VII:
Erligetu
33 Wind
Turbines
Three
35kV
transmission
lines
M7.1
M7.2
M7.3
35kV
Niujiafang
220 kV Booster Station
Main Transformer #2
100MVA
220kV
M_E
Phase VIII:
Cheliwusu
33 Wind
Turbines
Three
35kV
transmission
lines
M8.1
M8.2
M8.3

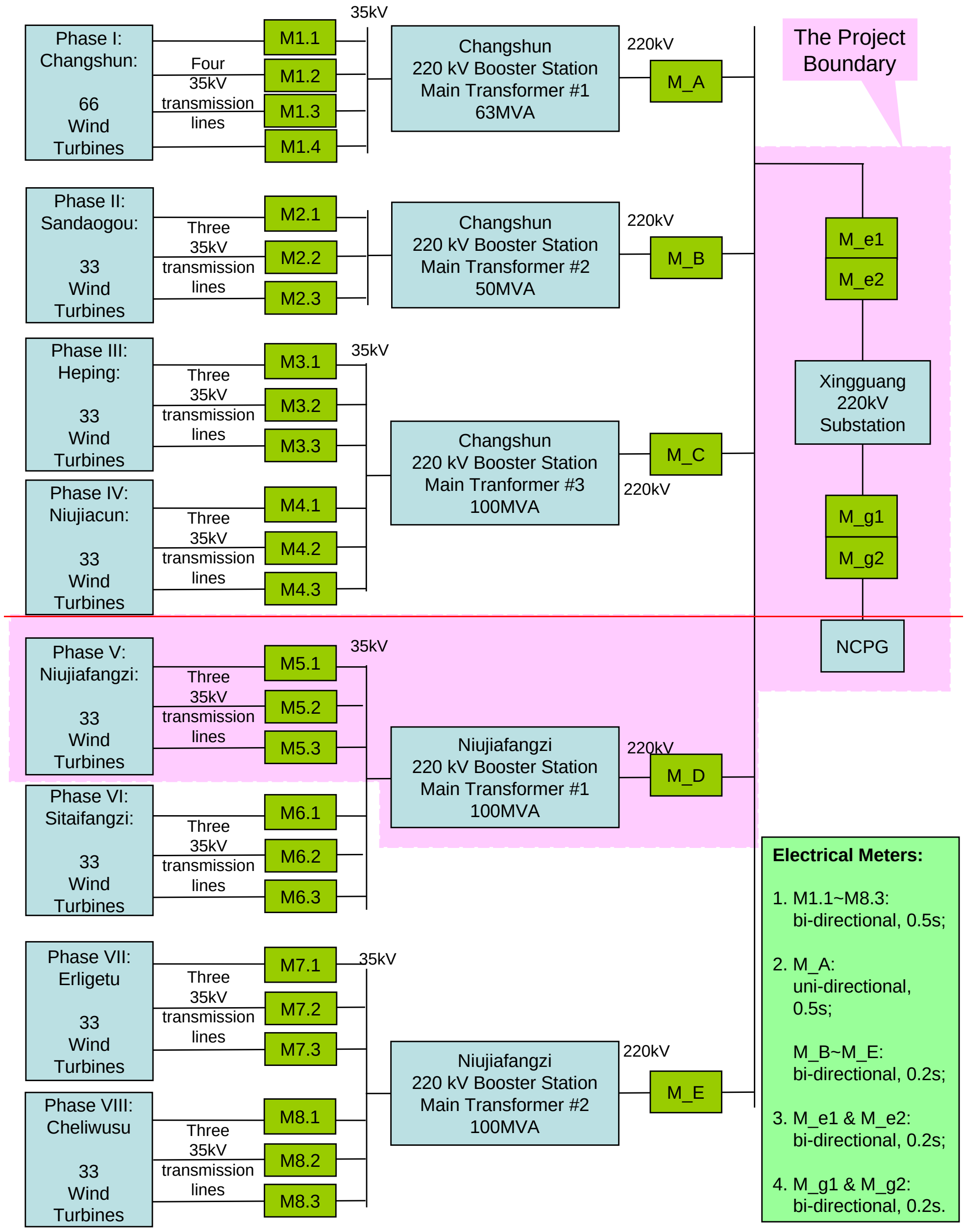


Figure 4 Project Boundary

The project will share the same gateway electrical meters at the Xingguang 220kV Substation with other seven projects developed by the same project owner. The list of the eight projects that share the same gateway electrical meters at the Xingguang 220kV Substation is as below:

- Huade Phase I project: *Huade Changshun 49.5MW Wind Power Project*, which is a registered CDM project (ref. No. 2093);
- Huade Phase II project: *Inner Mongolia China Water Group Huade Sandaogou Wind Farm 49.5MW Project*;

- Huade Phase III project: *Inner Mongolia China Water Group Huade Heping Wind Farm 49.5MW Project*;
- Huade Phase IV project: *Inner Mongolia China Water Group Huade Niujiacun Wind Farm 49.5MW Project*;
- **the proposed Project: Huade Phase V project: *Inner Mongolia China Water Group Huade Niujiafangzi Wind Farm 49.5MW Project*;**
- Huade Phase VI project: *Inner Mongolia China Water Group Huade Sitaifangzi Wind Farm 49.5MW Project*;
- Huade Phase VII project: *Inner Mongolia China Water Group Huade Erligetu Wind Farm 49.5MW Project*;
- Huade Phase VIII project: *Inner Mongolia China Water Group Huade Cheliwusu Wind Farm 49.5MW Project*;

The two bi-directional gateway meters (one is the main meter and the other is the back-up meter) are installed at the 220kV side of the Xingguang 220kV Substation to monitor the total amount of electricity delivered to and purchased from the NCPG by the eight projects simultaneously and the net total amount of electricity generation supplied to the NCPG by the eight projects activity would be calculated based on the readings of those meters.

In order to calculate the exact amount of electricity delivered to and purchased from the NCPG by the eight projects respectively, there have installed an bi-directional electrical meter at each of the 35kV transmission lines for each of the eight projects (25 meters for all the eight projects, and 3 meters for the proposed Project).

All equipment to be used in the Project has been manufactured domestically. The Project involves no international technology transfer.

Table 2 below provides an overview of the inclusion or exclusion of emission sources within the Project boundary.

Table 3 Overview of Project Boundary Inclusion or Exclusion of Emission Sources

Source		GHGs	Included?	Justification/Explanation
Baseline scenario	CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity	CO_2	Yes	Main emission source in the baseline scenario.
		CH_4	No	CH_4 are small compared to CO_2 emission from fossil fuel firing. Exclusion of this gas is conservative.
		N_2O	No	N_2O are small compared to CO_2 emission from fossil fuel firing. Exclusion of this gas is conservative.
Project scenario	The Project	CO_2	No	According to ACM0002, the project emission of renewable energy project activity is zero.
		CH_4	No	According to ACM0002, the project emission of renewable energy project activity is zero.
		N_2O	No	According to ACM0002, the project emission of renewable energy project activity is zero.

B.4. Establishment and description of baseline scenario

>>

The project activity is the installation of a new grid-connected renewable power plant/unit, and is

not a modification / retrofit of an existing plant / unit, thus, the baseline scenario, according to methodology ACM0002, is the following:

Electricity delivered to the NCPG by the Project would have otherwise been generated by the operation of grid-connected power plants in the NCPG and by the addition of new generation sources in the NCPG, as reflected in the combined margin (CM) calculation in Section B.6.

B.5. Demonstration of additionality

>>

Serious CDM consideration

The project owner considered CDM revenue from the very beginning of the project implementation. According to the "Guidelines on the Demonstration and Assessment of Prior Consideration on the CDM" (version 04, EB62), *project activity with a starting date on or after 02 August 2008, the project participant must inform a Host Party DNA and the UNFCCC secretariat in writing of the commencement of the project activity and of their intention seek CDM status, and such notification must be made within six months of the project activity start date. Such notification is not necessary if a PDD has been published for global stakeholder consultation before the project activity start date*.

The Project's start date is 30/05/2010 when the wind turbines purchase contract and the towers purchase contract were signed, which is the date of the earliest equipment purchase contracts signed, among all the contracts for equipment or construction/operation services required for the project activity. And the Project have not been published for global stakeholder consultation yet, so the notification is necessary for the Project.

The project owner informed the UNFCCC secretariat of the commencement of the project activity and its intention to seek CDM, the confirmation for the notification from the UNFCC secretariat was received on 12th October 2010[4]. Meanwhile, the project owner also informed the China's DNA the commencement of the Project and obtained the confirmation for the notification from the China's DNA on 9th October 2010. Dates of the two documents are both within 6 months after the Project's start date, and the related documents will be submitted to the DOE during validation process.

Therefore, as per the "Guidelines on the Demonstration and Assessment of Prior Consideration on the CDM", it is concluded that the CDM was seriously considered by the project owner in the decision to implement the project activity.

The detailed implementation timeline of the Project including CDM related events is demonstrated as below:

Table 4. Implementation Timetable of the Project

Date	Key Event
February 2010	The Feasibility Study Report (FSR) for the Project was completed by Inner Mongolia Power Exploration & Design Institute.
08/03/2010	The Board Minutes of Investment Decision about application CDM Financing was signed by the Project owner.
30/05/2010	The Purchase Contract of Wind Turbines, and the Purchase Contract of Towers were signed, which is the date of the earliest equipment purchase contracts signed, among all the contracts for equipment or construction/operation services required for the project activity, and is defined as the project activity starting date as per the lated CDM glossary.

[4] http://cdm.unfccc.int/Projects/PriorCDM/notifications/index_html

18/07/2010	The Environmental Impact Assessment (EIA) for the Project was completed by Ulanqub City Environmental Protection Research Institute.
06/09/2010	The Grid Connection Approval Note of the Project was issued.
09/10/2010	The notification of prior consideration of CDM was received by DNA of China.
12/10/2010	The notification of prior consideration of CDM was received by UNFCCC secretariat.
20/10/2010	The Project received approval of the EIA.
09/12/2010	The Project received approval of the FSR.
07/03/2011	The Wind Turbines' Foundation Construction Contract was signed.
20/04/2011	The Project started construction according to the Construction Commencement Approval.
07/04/2011	The ERPA was signed.
14/06/2011	The GSP was started.
November 2011	The Commissiong of the Project is estimated to start.
December 2011	The Project is estimated to start operation.

The additionality of the project is further demonstrated using the steps described in the "Tool for the demonstration and assessment of additionality" (version 05.2.1, EB 39) as follows:

Step 1: Identification of alternatives to the project activity consistent with current laws and regulations

Realistic and credible alternatives to the project activity that can be part of the baseline scenario are defined through the following sub-steps:

<u>Sub-step 1a. Define alternatives to the project activity:</u>

According to the Validation and Verification Manual (version 01.2): "105. The PDD shall identify credible alternatives to the project activity in order to determine the most realistic baseline scenario, unless the approved methodology that is selected by the proposed CDM project activity prescribes the baseline scenario and no further analysis is required". There is no need to further analyze alternatives to the project to assess and demonstrate the additionally, since the ACM0002 prescribes the baseline scenario for the project.

Step2: Investment analysis

The purpose of this investment analysis is to determine whether the Project is not:

(a) The most economically or financially attractive; or

(b) Economically or financially feasible, without the revenue from the sale of certified emission reductions ("**CERs**").

<u>Sub-step 2a: Determine appropriate analysis method</u>

There are three options listed in the "Tool for demonstration and assessment of additionality" (Version 05.2.1, EB39): simple cost analysis (Option1), investment comparison analysis (Option2) and benchmark analysis (Option3).

The electricity generated from the Project will be delivered to NCPG, it means that beside the additional CERs benefit, benefit from electricity sales can also be achieved; simple cost analysis can be excluded. Following EB guidance on the assessment of investment analysis[5], if the alternative to the Project is the supply of electricity from the grid, this is not considered an investment and a benchmark approach is considered appropriate. Therefore, a benchmark analysis is used to identify whether the project is economically attractive.

Sub-step 2b: Option III. Apply benchmark analysis

The likelihood of the development of this Project will be determined by comparing its IRR with the financial benchmark rate of return of 8% of the Project IRR (after tax) and widely used for electric power industry investment in China, according to the '*Interim Rules on Economic Assessment of Electrical Engineering Retrofit Projects*[6]'. The calculation and comparison of financial indicators are carried out in sub-step 2c.

Sub-step 2c: Calculation and comparison of financial indicators

(1) Basic parameters for calculation of financial indicators

Table 5 Parameters for financial analysis

series	item	value	remark	data source
	general description			
1	installed capacity	49.5	MW	FSR, page 1-6
2	net electricity generation supplied to NCPG	103,297	MWh/yr	FSR, page 1-7
3	construction period	1	year	FSR, page 15-1
4	operation period	20	year	FSR, page 15-1
5	bus-bar tariff (including VAT)	0.51	RMB/kWh	FSR, page 15-2
6	bus-bar tariff (excluding VAT)	0.47	RMB/kWh	FSR, page 15-2
	investment plan			
1	total investment (including circulating capital)	47440.18	10000RMB	FSR, page 15-4
2	total static investment	46181.33	10000RMB	FSR, page 15-4
3	interest incurred during construction	1110.35	10000RMB	FSR, page 15-4
4	circulating capital	148.50	10000RMB	FSR, page 15-4
5	thereinto: initial circulating capital	44.55	10000RMB	FSR, page 15-4
	captial raising			
1	total investment (including circulating capital)	47440.18	10000RMB	FSR, page 15-4
2	equity capital	9459.38	10000RMB	FSR, page 15-4

[5] Paragraph 19, 'Guidance on the assessment of Investment Analysis'(version 05), EB62 Annex 5.

[6] Operation Department of Power Generation and Transmission, State Power Corporation, Interim Rules on Economic Assessment of Electrical Engineering Retrofit Projects (China Electric Power Publishing House, 2003) 2.

3	equity capital for construciton investment	9414.83	10000RMB	FSR, page 15-4
4	initial circulating capital	44.55	10000RMB	FSR, page 15-4
5	totalloans	37980.80	10000RMB	FSR, page 15-4
6	long-term loans	37876.85	10000RMB	FSR, page 15-4
7	thereinto: long-term loans capital	36766.50	10000RMB	FSR, page 15-4
8	interest incurred during construction	1110.35	10000RMB	FSR, page 15-4
9	loans for circulating capital	103.95	10000RMB	FSR, page 15-4
	interest rate			
1	interest rate of long-term loans	6.04%		FSR,page 1-13
2	period of repayment	15	year	FSR,page 1-13
3	interest rate of loans for circulating capital	6.04%		FSR,page 1-13
4	interest rate of short-term loans	5.56%		FSR,page 15-2
	tax			
1	VAT	17%		FSR, page 15-2
2	Recovery of VAT on tariff	50%		FSR, page 15-2
3	income tax	0 for yr1~3; 12.5% for yr4~6; 25% for yr7~20.		FSR, page 15-2; Enterprise Income Tax Law of the PRC (Promulgated: 16 March 2007; Effective: 01 January 2008); Enterprise Income Tax Policy (Caishui [2008] 46)
4	urban maintenance and construction tax	5%		FSR, page 15-2
5	surtax for education	3%		FSR, page 15-2
	O&M cost			
1	material fee rate	3	10000RMB/MW	FSR,page 15-1
2	number of employees	15	person	FSR,page 15-2
3	salary	6	10000RMB/person.yr	FSR,page 15-2
4	welfare allowance rate	41%		FSR,page 15-2
5	repair fee rate	1.5%		FSR,page 15-1
6	insurance fee rate	0.25%		FSR, page 15-1
7	other expense rate	4	10000RMB/MW	FSR, page 15-1
	CERs revenue			
1	CER price	10.5	Euro/tCO_2	FSR, page 15-3;

				ERPA
2	Exchange rate	9.4	RMB/Euro	Estimation
3	Credit years	10	year	ERPA
	other			
1	period of depreciation	15	year	FSR, page 15-1
2	rate of residual value	5%		FSR, page 15-1

(2) Comparison of IRR for the project and the financial benchmark

Table 6 Financial indicators of the project

Item	Without CER revenue	Benchmark	With CER revenue
IRR (total investment after income tax)	5.11%	8%	8.21%

As described in the above table, if the Project is not undertaken as a CDM project, the Project IRR is 5.11%, which is lower than benchmark IRR. It means that the project is not financial attractive. However, if the project is undertaken as a CDM, with the CER revenue the project IRR can reach 8.21%. Thus CDM revenue can help the project to conquer investment barriers and make it economically feasible.

Sub-step 2d: Sensitivity analysis

A sensitivity analysis was conducted by altering the following parameters:

- Annual O&M cost;
- Total Static Investment;
- Electricity tariff (excl. VAT); and
- Annual net electricity generation supplied to NCPG.

These parameters were selected as being the most likely to fluctuate over time and have the greatest impact on IRR. Financial analyses were performed altering each of these parameters by ±10%[7], and assessing what the impact on the project IRR would be. The analysis shows that the project IRR remains lower than its alternative even in the case where these parameters change in favour of the Project.

Table 7 Sensitivity analysis

	-91.3%	-9.7%	-10.0%	0.0%	+10.0%	+23.8%
Annual O&M cost	8.00%	--	5.42%	5.11%	4.80%	--
Total Static Investment	--	8.00%	6.43%	5.11%	4.02%	--
Electricity tariff (excl. VAT)	--	--	3.78%	5.11%	6.29%	8.00%
Annual net electricity generation supplied to NCPG	--	--	3.78%	5.11%	6.29%	8.00%

[7] In terms of the guidance on the assessment of investment analysis version 05 from EB62, Annex 13, paragraph 17, as a general point of departure variations in the sensitivity analysis should cover a range of +10% and - 10%, Past trend may be a guide to determine the reasonable range.

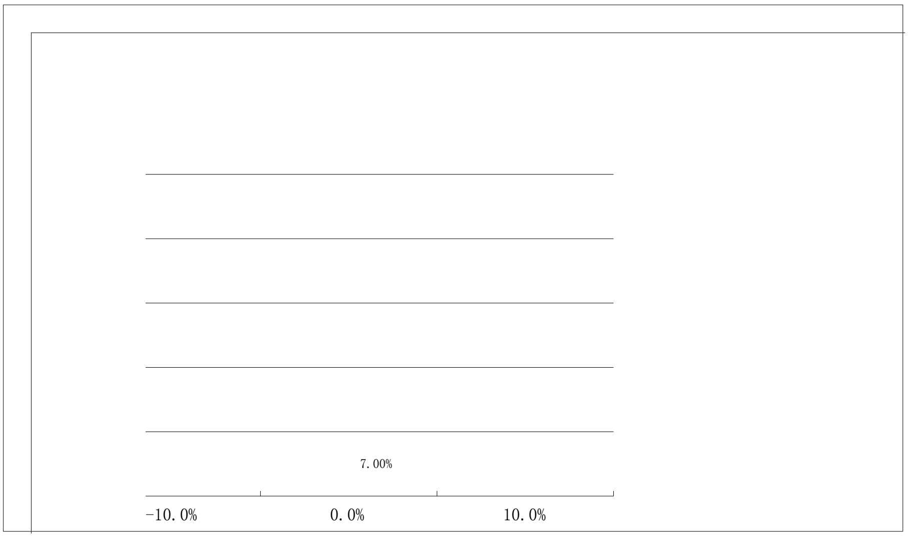


Figure 4 Sensitivity analysis of Project IRR

As shown in the sensitivity analysis, even if the variation range of the uncertain factors reaches +/-10%, the project IRR of the Project, could not reach the benchmark of 8% and the additionality of the Project would not be influenced.

As shown in the above table 7, the IRR of the Project could reach the benchmark if one of the following conditions can be achieved:

(1) The annual O&M cost would be decreased by at least 91.3%;
(2) The total static investment would be decreased by at least 19.7%;
(3) The electricity tariff would be increased by at least 23.8%;
(4) The annual net electricity generation supplied to NCPG would be increased by at least 23.8%.

Based on the explanation and justification below, none of these conditions can be achieved:

(1) The O&M cost include the repair charge, salary and welfare allowance, material cost, insurance premium and other expenses. These costs are calculated to be based on extensive the industry experience of the developer and the design institute. Therefore, it is convincing that the estimated O&M cost will not be of great difference with the actual one. Besides, the O&M cost of the poposed Project is quite reasonable and validable compared with other similar CDM projects. Due to the increasing of raw material price and staff wage and welfare cost as indicated by the increasing trend of Price index of PRC[8] and Inner Mongolia Autonomus Region[9] from 2003 ~ 2010, it is impossible to decrease the O&M cost as much as 91.3%. In addition, compared with the total static investment, electricity tariff and the annual electricity generation, the O&M cost has the least effect on the impact of project IRR. The O&M cost decreasing by as much as 91.3% will give arise to outreach of IRR benchmark, while it is unlikely to have this great dropdown in reality.

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[8] Data source of year 2003 ~ 2009: China Statistical Yearbook 2010. China Statistics Press, September 1st 2010.
Data source of year 2010: Statistics Communique of the PRC on the 2010 National Economic & Social Development, National Bureau of Statistics of China, February 28th 2011: http://www.stats.gov.cn/tjgb/ndtjgb/qgndtjgb/t20110228_402705692.htm

[9] Data source of year 2003 ~ 2010: Statistics Communique of the Inner Mongolia Autonomus Region on the 2003 ~ 2010 National Economic & Social Development, Inner Mongolia Autonomous Region Bureau of Statistics. http://www.nmgtj.gov.cn/Html/jjshfztjgb/index.shtml

(2) As for the total static investment, the most construction contracts of the Project have been signed in which the contracted capital of 463.86 million RMB already exceeds the adopted total static investment of about 461.8 million RMB in the project IRR calculation. Thus the decrease of the total static investment by 19.7% is impossible;

(3) As for the electricity tariff, which is regulated by the government authority in China, the wind power project tariff is not possible to rise or drop significantly. According to the Notice regarding Improving Wind Power Electricity Tariff Policy issued by the NDRC on 20/07/2009 (Fa Gai Jia Ge [2009] No. 1906[10]), the electricity tariff of the wind power projects constructed in the West Inner Mongolia Autonomous Region is streamlined as 0.51RMB/kWh (incl. VAT). However, if the electricity tariff increases by 23.8%, it will exceeds 0.63RMB/kWh (incl. VAT) which is even higher than the highest historical tariff of 0.54RMB/kWh (incl. VAT) in Inner Mongolia Autonomous Region according to EB. Thus, it is impossible for the Project to have the tariff increased by 23.8%;

(4) During the phase of the FSR, the design organization of the FSR collected one year data of the wind energy resources from on-site wind energy measurement point and analyzed more than thirty years of local meteorological data and approved by the Development and Reform Commission of Inner Mongolia Autonomous Region. The Project's electricity generation is estimated based on those wind energy data. Therefore, it is impossible to increase the annual net electricity generation supplied to NCPG by 23.8% throughout the whole lifetime of the Project.

To summarize, the project IRR of the Project could not reach the benchmark according to the sensitivity analysis and the additionality of the Project would not be influenced. The alternative (a) of the Project undertaken without being registered as a CDM project activity is not feasible.

Step3: Barrier analysis

This step is not adopted in this PDD.

Step4: Common practice analysis

<u>Sub-step 4a: Analyze other activities similar to the proposed project activity</u>

According to the definitions of other activities similar to the Project in "Tool for the Demonstration and Assessment of Additionality (version 05.2.1, EB39)", the non-CDM activities similar to the Project were selected according to the following rules:

1. In China, provincial governments are authorized to regulate wind power projects in the province by the NDRC[11]. So the investment climate, tariff, land policy, regulations etc. are usually similar for wind power projects in the same province. The location of the Project belongs to Inner Mongolia Autonomous Region. Inner Mongolia Autonomous Region is selected as the geographical scope for the common practice analysis of the Project.

2. In April 2002, China implemented power sector reform to establish a more commercialized power market[12]. As the market condition for wind power project development has changed significantly since 2002, the common practice analysis starts from 2002.

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[10] http://www.sdpc.gov.cn/zcfb/zcfbtz/2009tz/t20090727_292827.htm

[11] "Notice of the NDRC's requirement on the regulation of the wind power projects construction (FAGAINENGYUAN [2005] 1204)," July 4, 2005, July 2, 2009 <http://www.sdpc.gov.cn/nyjt/nyzywx/t20050810_41378.htm>.

[12] "China's State Council approved to implement the reform of China's electricity structure system" April 11, 2002, July 2, 2009 <http://www.ndrc.gov.cn/xwfb/t20050708_28096.htm>.1

3. The installed capacity of activities should be more than 15MW. Projects less than 15MW belong to small-scale projects.

Therefore, the similar projects are defined as the projects with the capacity larger than 15 MW operated after 2002 in Inner Mongolia Autonomous Region where the Project located. According to "Tool for the Demonstration and Assessment of Additionality (version 05.2.1, EB39)", "Other CDM project activities (registered project activities and project activities which have been published on the UNFCCC website for global stakeholder consultation as part of the validation process) are not to be included in this analysis". Therefore, the wind power projects which are either registered or applying for CDM are not taken into consideration here. The non-CDM similar projects are listed in Table 8 below.

Table 8 Similar Grid-Connected Inner Mongolian Wind Farms

Name	Capacity (MW)	Operation Date	Note
Keshiketeng Qi Dali Phase III wind power project[13] (Dali III)	31.2	2003.12 (10.2MW) 2004.4 (21MW)	Supported by National Debt Special Fund as a demonstration project of the domestication of wind turbines
Bailingmiao Phase I wind power project[14] (Bailingmiao I)	50	2007.12 (35MW) 2008.2 (15MW)	Registered as Voluntary Emission Reduction under Golden Standard Voluntary Carbon Standard
Bailingmiao Phase II wind power project[15] (Bailingmiao II)	50	2009	Registered as Voluntary Emission Reduction under Golden Standard Voluntary Carbon Standard
Honiton Xiwu Phase I wind farm project[16] (Xiwu I)	50	2010	Facing financial barriers, applying for Voluntary Emission Reduction under Golden Standard Voluntary Carbon Standard

Source: Statistics of Windfarm Installed Capacities in China 2007, 2008 and 2009, Chinese Wind Energy Association. *http://www.cwea.org.cn/download/display_list.asp?cid=2*
UNFCCC: http://cdm.unfccc.int/Projects/projsearch.html
NDRC China: <http://cdm.ccchina.gov.cn/web/index.asp>

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带格式的: 缩进: 左侧: 5.99 字符, 不调整西文与中文之间的空格

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The above Table indicates that four wind projects are implemented in the Inner Mongolia Autonomous Region without the assistance of CDM. The Sub-step 4b below is for a further discussion of essentially difference between those two projects and the project.

Sub-step 4b: Discuss any similar options that are occurring

Wind farms with comparable capacity to the project activity that are currently being developed are mostly developed under the CDM. Only four wind farms mentioned in the above table, namely: the Dali III project, the Bailingmiao I project, the Bailingmiao II project and the Xiwu I project are exceptional.

The Dali III project was funded by the National Debt Specific Fund to demonstrate the domestic manufacture of the wind turbines, which enjoys favorable treatments which is not avilable for the proposed Project. Thus it does not have the investment barriers as the project does. This differentiate in nature the Dali III project from the proposed Project activity as such support is no longer available.

[13] "National Debt Fund 30MW Project in Keshiketeng Banner," December 22, 2008, July 14, 2009 <http://www.chifeng.gov.cn/html/2008-11/3130.shtml>.

[14] https://gs1.apx.com/mymodule/ProjectDoc/EditProjectDoc.asp?id1=449

[15] https://gs1.apx.com/mymodule/ProjectDoc/EditProjectDoc.asp?id1=505

[16] https://gs1.apx.com/mymodule/ProjectDoc/EditProjectDoc.asp?id1=620

The Bailingmiao I project, the Bailingmiao II project and the Xiwu I project are invested by the foreign investors therefore it was not eligible to be considered as CDM project under the Chinese DNA rules. However, these projects also have investment barrier. Therefore, they had to seek and obtain additional financial support from the carbon market by its registration of Voluntary Emission Reduction under Golden Standard Voluntary Carbon Standard, to overcome the investment barrier. This differentiate in nature these three projects from the proposed Project activity as there is no foreign investment for the Project.

From the above analysis it can be concluded that the proposed Project would be confronted with substantial financial barriers without CDM revenues and thus unable to proceed, and the existence of the identified similar project activities does not contradict the claim that the proposed Project activity is financially unattractive as contended in Step 2. Therefore, the Project activity is not common practice in the Inner Mongolia Autonomous Region therefore sub-steps 4a and 4b of the tool for the demonstration and assessment of additionality are satisfied.

In conclusion, all the steps above are satisfied, the Project not implemented as a CDM project is not the baseline scenario, and the Project is additional

B.6. Emission reductions

B.6.1. Explanation of methodological choices

>>
The emission reductions of the Project are calculated according to the following methods:

Baseline emissions

$$BE_y = EG_{PJ,y} * EF_{grid,CM,y} \quad (1)$$

Where:

BE_y = Baseline emissions in year y, tCO_2/yr

$EG_{PJ,y}$ = Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y, MWh/yr

$EF_{grid,CM,y}$ = Combined margin CO_2 emission factor for grid connected power generation in year y calculated using the "Tool to calculate the emission factor for an electricity system(Version 02.2.1, EB 63)", tCO_2/MWh

Calculation of $EG_{PJ,y}$

$$EG_{PJ,y} = EG_{facility,y} \quad (2)$$

Where:

$EG_{PJ,y}$ = Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y, MWh/yr

$EG_{facility,y}$ = Quantity of net electricity generation supplied by the project plant/unit to the grid in year y, MWh/yr

Calculation of $EF_{grid,CM,y}$

The "Tool to calculate the emission factor for an electricity system" (version 02.2.1, EB63) determines the CO_2 emission factor for the displacement of electricity generated by power plants in

an electricity system, by calculating the "combined margin" emission factor (CM) of the electricity system. The CM is the result of a weighted average of two emission factors pertaining to the electricity system: the "operating margin" (OM) and the "building margin" (BM). The operating margin is the emission factor that refers to the group of existing power plants whose current electricity generation would be affected by the proposed CDM project activity. The build margin is the emission factor that refers to the group of power plants whose construction and future operation would be affected by the proposed CDM project activity.

The "Tool to calculate the emission factor for an electricity system" (version 02.2.1, EB63) provides procedures to determine the following parameters:

Parameter	SI Unit	Description
$EF_{CM,grid,y}$	$tCO_2/MW.h$	Combined margin CO_2 emission factor for the project electricity system in year y.
$EF_{BM,grid,y}$	$tCO_2/MW.h$	Build margin CO_2 emission factor for the project electricity system in year y.
$EF_{OM,grid,y}$	$tCO_2/MW.h$	Operating margin CO_2 emission factor for the project electricity system in year y.

The following seven steps are applied to calculate the emission factor for an electricity system:

STEP 1: Identify the relevant electricity systems.
STEP 2: Choose whether to include off-grid power plants in the project electricity system (optional).
STEP 3: Select a method to determine the operating margin (OM).
STEP 4: Calculate the operating margin emission factor according to the selected method.
STEP 5: Calculate the build margin emission factor.
STEP 6: Calculate the combined margin (CM) emission factor.

Step 1. Identify the relevant electric power system

As described in the section B.3, the Project boundary includes all power plants physically connected to the NCPG and the Project power plant itself. The NCPG is an electricity system which is defined by the spatial extent of the power plants that can be dispatched without significant transmission constrains.

According to instructions from China's DNA, the NCPG consists of Shandong Provincial Power Grid, Beijing City Power Grid, Tianjin City Power Grid, Hebei Provincial Power Grid, Shanxi Provincial Power Grid and Inner Mongolia Autonomous Region Power Grid. The NCPG has imported electricity from Northeast Power Grid (NEPG) and Central China Power Grid (CCPG). The electricity transfers from the NEPG and the CCPG to the NCPG are therefore taken into account when calculating the grid emission factor.

Step 2. Choose whether to include off-grid power plants in the project electricity system (optional)

Project participants may choose between the following two options to calculate the operating margin and
build margin emission factor:

Option I: Only grid power plants are included in the calculation.
Option II: Both grid power plants and off-grid power plants are included in the calculation.

For the Project, the Option I is selected to calculate emission factor of the NCPG.

Step 3. Select a method to determine the operating margin (OM)

The calculation of the operating margin emission factor ($EF_{grid,OM,y}$) can be based on one of the following methods, which are described under Step 4:

(a) Simple OM, or
(b) Simple adjusted OM, or
(c) Dispatch Data Analysis OM, or
(d) Average OM.

The simple OM method (Option a) can only be used if low-cost/must-run resources constitute less than 50% of total grid generation in: 1) average of the five most recent years, or 2) based on long-term averages for hydroelectricity production.

The Project is connected to the NCPG which is dominated by coal-fired power generation. Low-cost/must run power resources such as hydro, geothermal, wind, solar, nuclear and low cost biomass power only account for 0.76%, 0.75%, 0.79%, 0.88% and 1.21% of the total electricity generated by the NCPG in each respective year from 2004 to 2008[17]. Because the low-cost/must-run resources constitute less than 50% of total grid generation in the average of the five most recent years prior to the start of the Project, the Simple OM can be used.

For the simple OM, the emissions factor can be calculated using either of the two following data vintages:

(a) Ex ante option: If the ex ante option is chosen, the emission factor is determined once at the validation stage, thus no monitoring and recalculation of the emissions factor during the crediting period is required. For grid power plants, use a 3-year generation-weighted average, based on the most recent data available at the time of submission of the CDM-PDD to the DOE for validation.

(b) Ex post option: If the ex post option is chosen, the emission factor is determined for the year in which the project activity displaces grid electricity, requiring the emissions factor to be updated annually during monitoring. If the data required to calculate the emission factor for year y is available later than six months after the end of year y, the emission factor of the previous year (y-1) may be used. If the data is available 18 months after the end of year y, the emission factor of the year proceeding the previous year (y-2) may be used. The same data vintage (y, y-1 or y-2) should be used throughout all crediting periods.

For the project, ex ante option (a) is chosen to calculate the emission factor.

Step 4. Calculate the operating margin emission factor according to the selected method

The simple OM emission factor is calculated as the generation-weighted average CO_2 emissions per unit net electricity generation (tCO_2/MWh) of all generating power plants serving the system, not including low-cost/must-run power plants/units.

It can be calculated by one of the following ways:

Option A: Based on the net electricity generation and a CO_2 emission factor of each power unit;

Option B: Based on the total net electricity generation of all power plants serving the system and the fuel types and total fuel consumption of the Project electricity system.

The Option B can only be used if:

[17] China Electric Power Yearbook Editorial Board, China Electric Power Yearbook (2005～2009 Version) (China Electric Power Publishing House, 2005～2009).

(a) The necessary data for Option A is not available; and
(b) Only nuclear and renewable power generation are considered as low-cost/must-run power sources and the quantity of electricity supplied to the grid by these sources is known; and
(c) Off-grid power plants are not included in the calculation (i.e., if Option I has been chosen in Step 2).

As the above three requirements are met, the Option B is used to calculate the Project's simple OM.

$$EF_{grid,OMsimple,y} = \frac{\sum_i FC_{i,y} \times NCV_{i,y} \times EF_{CO2,i,y}}{EG_y} \qquad (3)$$

$EF_{grid,OMsimple,y}$ = Simple operating margin CO_2 emission factor in year y, tCO_2/MWh

$FC_{i,y}$ = Amount of fossil fuel type i consumed in the project electricity system in year y (mass or volume unit)

$NCV_{i,y}$ = Net calorific value (energy content) of fossil fuel types i in year y, GJ/mass or volume unit

$EF_{CO2,i,y}$ = CO_2 emission factor of fossil fuel type i in year y, t CO_2/GJ

EG_y = Net electricity generated and delivered to the grid by all power sources serving the system, not including low-cost/ must-run power plants/ units, in year y, MWh

i = All fossil fuel types combusted in power sources in the project electricity system in year y

y = Either the most recently three years for which data is available at the time of submission of the CDM-PDD to the DOE for validation, following the guidance on data vintage in step 2

Based on the amount of different fuels consumed, the power generation, the net caloric value, the oxidation rate and the emission factor, we can calculate the $EF_{grid,OM,y}$ of the year 2006-2008. The average emission factor is the 3-year generation-weighted average. For the Project, we adopt the $EF_{grid,OM,y}$ published by the Chinese DNA. It has a value of 0.9914 tCO_2/MWh. The details are shown in Appendix 4.

Step 5. Calculate the build margin emission factor

In terms of vintage of data, project participants can choose between one of the following two options:

Option 1. For the first crediting period, calculate the build margin emission factor ex-ante based on the most recent information available on units already built for sample group m at the time of CDM-PDD submission to the DOE for validation. For the second crediting period, the build margin emission factor should be updated based on the most recent information available on units already built at the time of submission of the request for renewal of the crediting period to the DOE. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used. This option does not require monitoring the emission factor during the crediting period.

Option 2. For the first crediting period, the build margin emission factor shall be updated annually, ex- post, including those units built up to the year of registration of the Project activity or, if information up to the year of registration is not yet available, including those units built up to the latest year for which information is available. For the second crediting period, the build margin emissions factor shall be calculated ex-ante, as described in option 1

above. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used.

The Project uses the Option 1 to calculate the build margin emission factor *ex-ante* based on the most recent information available on units already built for sample group *m* at the time of CDM-PDD submission to the DOE for validation.

As per the emission factor tool (version 02.2.1, EB63), the sample group of power units *m* used to calculate the build margin should be determined as per the following procedure, consistent with the data vintage Option 1 selected above:

(a) Identify the set of five power units, excluding power units registered as CDM project activities, that started to supply electricity to the grid most recently ($SET_{5\text{-}units}$) and determine their annual electricity generation ($AEG_{SET\text{-}5\text{-}units}$, in MWh);

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(b) Determine the annual electricity generation of the the project electricity system, excluding power units registered as CDM project activities ($AEG_{total,}$ in MWh). Identify the set of power units, excluding power units registered as CDM project activities, that started to supply electricity to the grid most recently and that comprise 20% of AEG_{total} (if 20% falls on part of the generation of a unit, the generation of that unit is fully included in the calculation) ($SET_{\geq 20\%}$) and determine their annual electricity generation ($AEG_{SET\text{-}\geq 20\%}$, in MWh);

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(c) From $SET_{5\text{-}units}$ and $SET_{\geq 20\%}$ select the set of power units that comprises the larger annual electricity generation (SET_{sample});

Identify the date when the power units in SET_{sample} started to supply electricity to the grid. If none of the power units in SET_{sample} started to supply electricity to the grid more than 10 years ago, then use SET_{sample} to calculate the build margin. In this case ignore steps (d), (e) and (f).

Otherwise:

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(d) Exclude from SET_{sample} the power units which started to supply electricity to the grid more than 10 years ago. Include in that set the power units registered as CDM project activities, starting with power units that started to supply electricity to the grid most recently, until the electricity generation of the new set comprises 20% of the annual electricity generation of the project electricity system (if 20% falls on part of the generation of a unit, the generation of that unit is fully included in the calculation) to the extent is possible. Determine for the resulting set ($SET_{sample\text{-}CDM}$) the annual electricity generation ($AEG_{SET\text{-}sample\text{-}CDM}$, in MWh);

If the annual electricity generation of that set is comprises at least 20% of the annual electricity generation of the project electricity system (i.e. $AEG_{SET\text{-}sample\text{-}CDM} \geq 0.2 \times AEG_{total}$), then use the sample group $SET_{sample\text{-}CDM}$ to calculate the build margin. Ignore steps (e) and (f).

Otherwise:

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(e) Include in the sample group $SET_{sample\text{-}CDM}$ the power units that started to supply electricity to the grid more than 10 years ago until the electricity generation of the new set comprises 20% of the annual electricity generation of the project electricity system (if 20% falls on part of the generation of a unit, the generation of that unit is fully included in the calculation);

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(f) The sample group of power units m used to calculate the build margin is the resulting set ($SET_{sample\text{-}CDM\text{-}>10yrs}$).

The build margin emissions factor is the generation-weighted average emission factor (tCO_2/MWh) of all power units *m* during the most recent year y for which electricity generation data is available, which in general should be calculated as follows:

$$EF_{grid,BM,y} = \frac{\sum_m EG_{m,y} \times EF_{EL,m,y}}{\sum_m EG_{m,y}} \quad (4)$$

$EF_{grid,BM,y}$	=	Build margin CO_2 emission factor in year y, tCO_2/MWh
$EG_{m,y}$	=	Net quantity of electricity generated and delivered to the grid by power unit *m* in year y, MWh
$EF_{EL,m,y}$	=	CO_2 emission factor of power unit m in year y, tCO_2/MWh
m	=	Power units included in the build margin
y	=	Most recent historical year for which electricity generation data is available

However, in China it is very difficult to obtain the data of the five existing power plants built most recently ($SET_{5\text{-units}}$; and $AEG_{SET\text{-}5\text{-units}}$, in MWh) or the power plants capacity additions in the electricity system that comprise 20% of the system generation ($SET_{\geq 20\%}$; and $AEG_{SET\text{-}\geq 20\%}$, in MWh) and that were built most recently.

As there is insufficient information to perform the above calculation the Project calculates $EF_{grid,BM,y}$ using the following conservative alternative method agreed by the CDM Executive Board[18].

<u>Sub-step 5a. The corresponding percentage of the CO_2 emissions from the power generation using coal, oil and gas</u>

$$\lambda_{Coal,y} = \frac{\sum_{i \in COAL,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,j,y}}{\sum_{i,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,j,y}} \quad (5)$$

$$\lambda_{Oil,y} = \frac{\sum_{i \in OIL,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,j,y}}{\sum_{i,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,j,y}} \quad (6)$$

$$\lambda_{Gas,y} = \frac{\sum_{i \in GAS,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,j,y}}{\sum_{i,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,j,y}} \quad (7)$$

$F_{i,j,y}$	=	The amount of fuel i consumed by relevant power sources j province in year y, t or m^3
$NCV_{i,y}$	=	Net calorific value of fossil fuel type i in year y, GJ/t or m^3

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[18] " Request for clarification on use of approved methodology AM0005 for several projects in China", 28 December 2009 http://cdm.unfccc.int/UserManagement/FileStorage/AM_CLAR_QEJWJEF3CFBP1OZAK6V5YXPQKK7WYJ

$EF_{CO_2,i,j,y}$	=	CO_2 emission factor of fossil fuel type i in year y, tCO_2/GJ

COAL, OIL and GAS represent the groups of solid, liquid and gas fuels respectively.

Sub-step 5b. Calculation of $EF_{Thermal,y}$

$$EF_{Thermal,y} = \lambda_{Coal,y} \times EF_{Coal,Adv,y} + \lambda_{Oil,y} \times EF_{Oil,Adv,y} + \lambda_{Gas,y} \times EF_{Gas,Adv,y} \quad (8)$$

$EF_{Coal,Adv,y}$, $EF_{Oil,Adv,y}$ and $EF_{Gas,Adv,y}$ are the emission factors of COAL, OIL, GAS-fired power with the best practised commercialized technology.

Sub-step 5c: Calculation of BM

$$EF_{grid,BM,y} = \frac{CAP_{Thermal,y}}{CAP_{Total,y}} \times EF_{Thermal,y} \quad (9)$$

$CAP_{Total,y}$	=	The total incremental installed capacity of various power sources in the grid
$CAP_{Thermal,y}$	=	The incremental installed capacity of fuel-fired power

According to NDRC's "2010 Announcement about Confirming Baseline Emission Factors for Factor of Regional Power Grids in China", the Project assumes the weighted average coal consumption of the 30 lowest consuming 2008 built coal-fired power plants with a total installed capacity of 600MW as the best practice coal power technology. The estimated coal consumption of such a power plant 600MW is 314.35gce/kWh, corresponding to 39.08% electricity generation efficiency.

According to the statistics of the China Electricity Council (CEC) about the 2008 built gas and oil power plant, the 200MW combined-cycle power plant are defined as the best practice gas and oil power technology, and select the gas and oil power plant with actual highest power supply efficiency for the estimation of the best practice technology. The coal consumption of the gas and oil plant is 238.74gce/KWH. This corresponds to 51.46 electricity generation efficiency.

On the basis of the above-mentioned calculation process, the $EF_{grid,BM,y}$ of the Project is calculated as $0.7495tCO_2/MWh$. Further details are provided in Appendix 4.

Step 6: Calculate the combined margin emissions factor

The combined margin emissions factor is calculated as follows:

$$EF_{grid,CM,y} = EF_{grid,OM,y} \times w_{OM} + EF_{grid,BM,y} \times w_{BM} \quad (10)$$

$EF_{grid,OM,y}$	=	Operating margin CO_2 emission factor in year y, tCO_2/MWh
$EF_{grid,BM,y}$	=	Building margin CO_2 emission factor in year y, tCO_2/MWh
w_{OM}	=	Weighting of operating margin emissions factor, %
w_{BM}	=	Weighting of build margin emissions factor, %

AS for the Project, in the crediting period, we adopt w_{OM} =0.75 and w_{BM} =0.25. Including the $EF_{grid,OM,y}$ and $EF_{grid,BM,y}$ calculated above, we get $EF_{grid,CM,y}$ =0.9309 tCO_2/MWh.

Project Emissions

According to ACM0002 (Version 12.1.0, EB 58), the Project emissions is zero.

Leakage

No leakage effects need to be accounted under this methodology.

Emission Reduction

Emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y \quad (11)$$

Where:

ER_y = Emission reductions in year y, tCO_2e/yr

BE_y = Baseline emissions in year y, tCO_2e/yr

PE_y = Project emissions in year y, tCO_2e/yr

Since PE_y is zero, ER_y can be calculated as follows:

$$ER_y = BE_y = EG_{PJ,y} * EF_{grid,CM,y} = EG_{facility,y} * EF_{grid,CM,y} \quad (12)$$

B.6.2. Data and parameters fixed ex ante

Data / Parameter	**$NCV_{i,y}$**
Unit	MJ/t or km^3
Description	Net calorific value (energy content) of fossil fuel types i consumed in the coal fired power plant connected to NCPG in year y
Source of data	China Energy Statistics Yearbook 2007-2009
Value(s) applied	Details can be seen in annex3
Choice of data or Measurement methods and procedures	Published by China's DNA
Purpose of data	Ex ante calculation of emission reductions
Additional comment	N/A.

Data / Parameter	**$OXID_i$**
Unit	%
Description	Oxidation factor of the fuel i.
Source of data	IPCC 2006 Guidelines for National Greenhouse Gas Inventories
Value(s) applied	Details can be seen in annex3
Choice of data or Measurement methods and procedures	IPCC default value.
Purpose of data	Ex ante calculation of emission reductions
Additional comment	N/A.

Data / Parameter	$EF_{CO2,i,y}$
Unit	tC/GJ
Description	CO_2 emission factor of fossil fuel type i consumed in the coal fired power plant connected to NCPG in year y
Source of data	IPCC 2006 Guidelines for National Greenhouse Gas Inventories
Value(s) applied	Details can be seen in annex3
Choice of data or Measurement methods and procedures	IPCC default value.
Purpose of data	Ex ante calculation of emission reductions
Additional comment	N/A.

Data / Parameter	$FC_{i,y}$
Unit	t or m^3
Description	Amount of fossil fuel type i consumed in the project electricity system in year y
Source of data	China Energy Statistics Yearbook 2007-2009
Value(s) applied	Details can be seen in annex3
Choice of data or Measurement methods and procedures	Published by China's DNA
Purpose of data	Ex ante calculation of emission reductions
Additional comment	N/A.

Data / Parameter	EG_y
Unit	MWh
Description	Net electricity generated and delivered to the NCPG by all power sources serving the system, not including low-cost/ must-run power plants/ units, in year y
Source of data	China Electric Power Yearbook 2007-2009
Value(s) applied	Details can be seen in annex3
Choice of data or Measurement methods and procedures	Published by China's DNA
Purpose of data	Ex ante calculation of emission reductions
Additional comment	N/A.

Data / Parameter	$F_{i,j,y}$
Unit	t
Description	The amount of fuel i consumed by relevant power sources j province of the NCPG in year y
Source of data	China Energy Statistics Yearbook 2009
Value(s) applied	Details can be seen in annex3
Choice of data or Measurement	Published by China's DNA

methods and procedures	
Purpose of data	Ex ante calculation of emission reductions
Additional comment	N/A.

Data / Parameter	$CAP_{Thermal,y}$
Unit	MW
Description	The incremental installed capacity of fuel-fired power in the NCPG
Source of data	China Electric Power Yearbook 2007-2009
Value(s) applied	Details can be seen in annex3
Choice of data or Measurement methods and procedures	Published by China's DNA
Purpose of data	Ex ante calculation of emission reductions
Additional comment	N/A.

Data / Parameter	$CAP_{Total,y}$
Unit	MW
Description	The total incremental installed capacity of various power sources in the NCPG
Source of data	China Electric Power Yearbook 2007-2009
Value(s) applied	Details can be seen in annex3
Choice of data or Measurement methods and procedures	Published by China's DNA
Purpose of data	Ex ante calculation of emission reductions
Additional comment	N/A.

Data / Parameter	$EF_{Coal,Adv,y}$
Unit	%
Description	Commercially available coal-fired power plant corresponding to the best practice in terms of efficiency
Source of data	Chinese DNA "2010 Bulletin on Baseline Emission Factors of the China's Regional Grids-the calculations of baseline Build Margin emission factor for the China Regional Grids"
Value(s) applied	39.08%
Choice of data or Measurement methods and procedures	National specific value
Purpose of data	Ex ante calculation of emission reductions
Additional comment	N/A.

Data / Parameter	$EF_{Oil,Adv,y}$/$EF_{Gas,Adv,y}$
Unit	%
Description	Commercially available oil and gas power plant corresponding to the

	best practice in terms of efficiency
Source of data	Chinese DNA “2010 Bulletin on Baseline Emission Factors of the China’s Regional Grids-the calculations of baseline Build Margin emission factor for the China Regional Grids”
Value(s) applied	51.46%
Choice of data or Measurement methods and procedures	National specific value
Purpose of data	Ex ante calculation of emission reductions
Additional comment	N/A.

B.6.3. Ex ante calculation of emission reductions

>>

1. Baseline Emissions

Calculation of the baseline emission factor:

Step 1. Calcualte the operating marging emission factor $EF_{grid, OM, y}$:

The value of $EF_{grid, OM, y}$ used in this PDD is 0.9914 tCO_2/MWh published by the Chinese DNA, which details are shown in Appendix 4;

Step 2. Calcualte the building marging emission factor $EF_{grid, BM, y}$:

The value of $EF_{grid, BM, y}$ used in this PDD is 0.7495tCO_2/MWh published by the Chinese DNA, which details are shown in Appendix 4;

Step 3. Calcualte the combined baseline emission factor $EF_{grid, CM, y}$:

$$
\begin{aligned}
EF_{grid,\ CM,\ y} &= \omega_{OM,\ y} \times EF_{grid,\ OM,\ y} + \omega_{BM,\ y} \times EF_{grid,\ BM,\ y} \\
&= 0.75 \times 0.9914 + 0.25 * 0.7495 \\
&= 0.9309 \quad tCO_2 / MWh
\end{aligned}
$$

Calculation of the baseline emissions:

According to the FSR, the annual net electricity generation supplied to NCPG from the proposed Project is $EG_{facility, y}$ = 103,297 MWh.

So the annual baseline emissions (BE_y) are:

$$BE_y = EG_{facility,\ y} \times EF_{grid,\ CM,\ y} = 103{,}297 \times 0.9309 = 96{,}159 \quad tCO_2$$

2. Project Emissions

PE_y = 0.

3. Emission Reductions

The average annual emissions reduction of the Project activity is:

$$ER_y = BE_y - PE_y = 96{,}159 - 0 = 96{,}159 \quad tCO_2$$

B.6.4. Summary of ex ante estimates of emission reductions

>>

The following table summaries the results of the ex-ante estimation of emission reductions:

Year	Baseline emissions (t CO_2e)	Project emissions (t CO_2e)	Leakage (t CO_2e)	Emission reductions (t CO_2e)
01/04/2012-31/03/2013	96,159	0	0	96,159
01/04/2013-31/03/2014	96,159	0	0	96,159
01/04/2014-31/03/2015	96,159	0	0	96,159
01/04/2015-31/03/2016	96,159	0	0	96,159
01/04/2016-31/03/2017	96,159	0	0	96,159
01/04/2017-31/03/2018	96,159	0	0	96,159
01/04/2018-31/03/2019	96,159	0	0	96,159
01/04/2019-31/03/2020	96,159	0	0	96,159
01/04/2020-31/03/2021	96,159	0	0	96,159
01/04/2021-31/03/2022	96,159	0	0	96,159
Total	961,590	0	0	961,590
Total number of crediting years	10			
Annual average over the crediting period	96,159	0	0	96,159

B.7. Monitoring plan

B.7.1. Data and parameters to be monitored

Data / Parameter	$ES_{j.i,\ export\ ,y}$ (j=I, II, III, IV, V, VI, VII, VIII; i=1, 2, 3, 4 for Phase I project, i=1, 2, 3 for the other 7 projects)
Unit	MWh
Description	Electricity exported to the grid by the Phase j project (j=I, II, III, IV, V, VI, VII, VIII) part i (i=1, 2, 3, 4 for Phase I project, i=1, 2, 3 for the other 7 projects) in year y.
Source of data	Measured by the separate bi-directional meter at each of the 35kV transmission line of the Phase j project's site with the accuracy of 0.5s.
Value(s) applied	Not applied for calculating expected emission reduction in section B.5.
Measurement methods and procedures	This parameter is measured by the project entity through the bi-directional electrical meter Mj.i. For details please refer to section B.7.3 below. Monitoring result will be recorded monthly.
Monitoring frequency	Continuous measurement and monthly recording
QA/QC procedures	Meters will be calibrated and checked yearly by qualified third party for accuracy in accordance with national standards JJG596-1999 and DL/T448－2000.
Purpose of data	Baseline emission calculation.
Additional comment	See Figure 4 and Section B.7.3 for more details.

Data / Parameter	$ES_{j.i,\ import\ ,y}$ (j=I, II, III, IV, V, VI, VII, VIII; i=1, 2, 3, 4 for Phase I

	project, i=1, 2, 3 for the other 7 projects)
Unit	MWh
Description	Electricity imported from the grid to the Phase j project (j=I, II, III, IV, V, VI, VII, VIII) part i (i=1, 2, 3, 4 for Phase I project, i=1, 2, 3 for the other 7 projects) in year y.
Source of data	Measured by the separate bi-directional meter at each of the 35kV transmission line of the Phase j project's site with the accuracy of 0.5s.
Value(s) applied	Not applied for calculating expected emission reduction in section B.5.
Measurement methods and procedures	This parameter is measured by the project entity through the bi-directional electrical meter Mj.i. For details please refer to section B.7.3 below. Monitoring result will be recorded monthly.
Monitoring frequency	Continuous measurement and monthly recording
QA/QC procedures	Meters will be calibrated and checked yearly by qualified third party for accuracy in accordance with national standards JJG596-1999 and DL/T448－2000.
Purpose of data	Baseline emission calculation.
Additional comment	See Figure 4 and Section B.7.3 for more details.

Data / Parameter	$ES_{total, , export, y}$
Unit	MWh
Description	Total electricity exported to the grid by all the 8 projects (including the Project) in year y
Source of data	Measured by the bi-directional gateway electrical meter M_g1 (and M_g2 as its back-up meter) at the 220kV Xingguang substation with the accuracy of 0.2s.
Value(s) applied	$ES_{total,export,y} = \sum_{j=I}^{VIII}\sum_{i=1}^{3} ES_{j,\ i,\ export,\ y}$
Measurement methods and procedures	The parameter $ES_{total, , export, y}$ is measured by the bidirectional gateway meter(s) M_g1 (and M_g2 as its back-up meter) at the 220kV Xingguang substation with the accuracy of 0.2s, and the bidirectional evaluation meter(s) M_e1 (and M_e2 as its back-up) at the wind farm's side of the 220kV Xingguang substation with the accuracy of 0.2s in accordance with national regulations. For details please refer to section B.7.3 below. Monitoring result will be recorded monthly.
Monitoring frequency	Continuous measurement and monthly recording by the project owner.
QA/QC procedures	Meters will be calibrated and checked yearly by qualified third party for accuracy in accordance with national standards JJG596-1999 and DL/T448－2000.. Meter data measurements will be cross-checked with electricity sales receipts.
Purpose of data	Baseline emission calculation.
Additional comment	See Figure 4 and Section B.7.3 for more details.

Data / Parameter	$ES_{total, import, y}$
Unit	MWh
Description	Total electricity imported from the grid by all the 8 projects (including the Project) in year y
Source of data	Measured by the bi-directional gateway electrical meter M_g1 (and M_g2 as its back-up meter) at the 220kV Xingguang substation with

	the accuracy of 0.2s.
Value(s) applied	0
Measurement methods and procedures	The parameter $ES_{total,\ ,\ export,\ y}$ is measured by the bidirectional gateway meter(s) M_g1 (and M_g2 as its back-up meter) at the 220kV Xingguang substation with the accuracy of 0.2s, and the bidirectional evaluation meter(s) M_e1 (and M_e2 as its back-up) at the wind farm's side of the 220kV Xingguang substation with the accuracy of 0.2s in accordance with national regulations. For details please refer to section B.7.3 below. Monitoring result will be recorded monthly.
Monitoring frequency	Continuous measurement and monthly recording by the project owner.
QA/QC procedures	Meters will be calibrated and checked yearly by qualified third party for accuracy in accordance with national standards JJG596-1999 and DL/T448－2000. Meter data measurements will be cross-checked with electricity sales receipts.
Purpose of data	Baseline emission calculation.
Additional comment	See Figure 4 and Section B.7.3 for more details.

Data / Parameter	$ES_{p\ ,\ export,\ y}$
Unit	MWh
Description	The amount of electricity exported to the grid from the wind farm connected to the transformer p (p=A, B, C, D, E) in year y
Source of data	Measured by the electrical meter M_p at the 220kV side of the 35~220kV on-site booster station with the accuracy of ~~0.5s (p=A; uni-directional) and~~ 0.2s (p=A, B, C, D, E; bi-directional) respectively.
Value(s) applied	Not applied for calculating expected emission reduction in section B.5.
Measurement methods and procedures	The parameter $ES_{p\ ,\ export,\ y}$ is measured by the electrical meters M_p (p=A, B, C, D, E) at 220kV side of the 35~220kV on-site booster station in accordance with national regulations. For details please refer to section B.7.3 below. Monitoring result will be recorded monthly.
Monitoring frequency	Continuous measurement and monthly recording by the project owner.
QA/QC procedures	Meters will be calibrated and checked yearly by qualified third party for accuracy in accordance with national standards JJG596-1999 and DL/T448－2000.
Purpose of data	Baseline emission calculation.
Additional comment	See Figure 4 and Section B.7.3 for more details.

Data / Parameter	$ES_{p\ ,\ import,\ y}$
Unit	MWh
Description	The amount of electricity imported from the grid to the wind farm connected to the transformer p (p=A, B, C, D, E) in year y
Source of data	Measured by the electrical meter M_p at the 220kV side of the 35~220kV on-site booster station with the accuracy of 0.2s (p=A, B, C, D, E; bi-directional).
Value(s) applied	Not applied for calculating expected emission reduction in section B.5.
Measurement methods and procedures	The parameter $ES_{p\ ,\ export,\ y}$ is measured by the electrical meters M_p (p=A, B, C, D, E) at 220kV side of the 35~220kV on-site booster station in accordance with national regulations. For details please

	refer to section B.7.3 below. Monitoring result will be recorded monthly.
Monitoring frequency	Continuous measurement and monthly recording by the project owner.
QA/QC procedures	Meters will be calibrated and checked yearly by qualified third party for accuracy in accordance with national standards JJG596-1999 and DL/T448－2000.
Purpose of data	Baseline emission calculation.
Additional comment	See Figure 4 and Section B.7.3 for more details.

Data / Parameter	$EG_{facility,y}$
Unit	MWh/yr
Description	Quantity of net electricity generation supplied by the Project to the grid in year y
Source of data	Measured based on the meters: M_g1 (with the meter M_g2 as its back-up meter), Mj.i (j=1, 2, …, 8; i=1, 2, 3, 4 for Phase I project where j=1, i=1, 2, 3 for the other 7 projects where j=2 ~ 7).
Value(s) applied	103,297
Measurement methods and procedures	The net electricity supplied by the proposed project to the grid is calculated with the formula showed in B.7.3. The result will be measured continuously and recorded monthly.
Monitoring frequency	Continuous measurement and monthly recording by the project owner.
QA/QC procedures	The data will be directly used for calculation of emission reductions.
Purpose of data	Baseline emission calculation.
Additional comment	See Figure 4 and Section B.7.3 for more details.

B.7.2. Sampling plan

>>
Not applicable.

B.7.3. Other elements of monitoring plan

>>
The monitoring plan aims to ensure that the emission reduction is realized during the crediting period. ACM0002 requires all data collected as part of the monitoring plan to be archived and kept for at least two years after the end of the crediting period.

1. The Monitored Data

The net electricity supplied to the grid will be monitored, calculated and recorded following the procedures below. All the data variables to be monitored are presented in Section B.7.1 of the PDD.

2. Monitoring Structure

The Project owner retains overall responsibility for daily monitoring and reporting. A CDM group will be established within the Project owner to carry out the required monitoring work. The project owner will appoint a CDM manager with responsibility for monitoring the data related to the calculation of emission reductions. Technical and financial teams will also be organized to assist the CDM manager, as displayed in Figure 7 below.

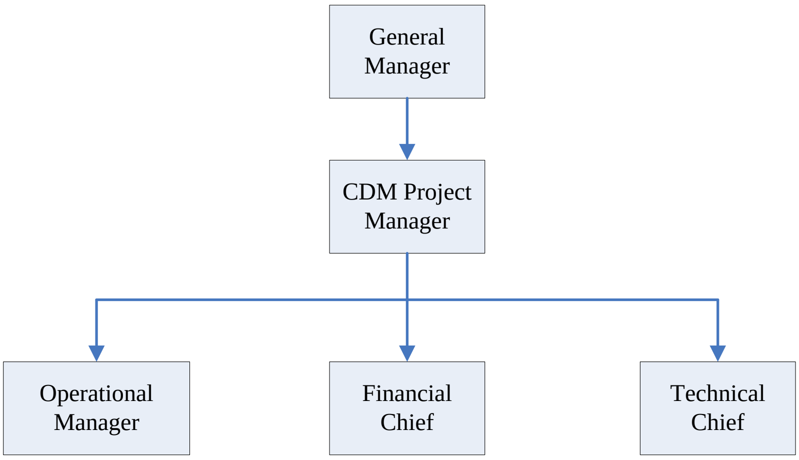

Figure 5 Structure of CDM group

The responsibilities of the Project staff are as follow:

- **General Manager**: to be responsible for the overall execution of the monitoring plan;
- **CDM project Manager**: to make sure each division of the monitoring team works as stipulated in the monitoring plan; report the monitoring work to general manager; responsible for periodic verification, etc.;
- **Operation Manager**: to be responsible for daily operation and electricity meter reading and recording;
- **Financial Chief**: to keep sales and/or purchase receipts, if any; and
- **Technical Chief**: to make sure that all the electricity meters are maintenance regularly according to industrial standard.

3. Installation of Monitoring Equipment

As described in Figure 4, the proposed Project will share the same gateway electrical meters at the Xingguang 220kV Substation with other seven projects developed by the same project owner. The two bi-directional gateway meters (M_g1 as main and M_g2 as its back-up meter) are installed at the 220kV side of the Xingguang 220kV Substation to monitor the total amount of electricity delivered to and purchased from the NCPG by the eight projects simultaneously and the net total amount of electricity supplied to the NCPG by the eight projects activity would be calculated based on the readings of those meters. Other two bi-directional evaluation meters (M_e1 as main and M_e2 as its back-up meter) are installed at the wind farms' side of the Xingguang 220kV Substation.

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When the main of the gateway meter is out of order, the readings from the back-up of the gateway meter will be used for calculation. In case of both the gateway meters falling out of order, the readings from the evaluation meters will be unsed for reference with consideration of historical transmission line losses.

In order to calculate the exact amount of electricity delivered to and purchased from the NCPG by the eight projects respectively, there has installed one electrical meter at each of

the 35kV transmission lines for each of the eight projects; 25 meters in total with 3 of them for the proposed Project:

- Huade Phase I project: *Huade Changshun 49.5MW Wind Power Project*, which is a registered CDM project (ref. No. 2093):
  Eletrical meters: M1.1, M1.2, M1.3, M1.4;
  Monitoring parameters: $ES_{I.1,\ export\ ,y}$, $ES_{I.2,\ export\ ,y}$, $ES_{I.3,\ export\ ,y}$, $ES_{I.4,\ export\ ,y}$; $ES_{I.1,\ import\ ,y}$, $ES_{I.2,\ import\ ,y}$, $ES_{I.3,\ import\ ,y}$, $ES_{I.4,\ import\ ,y}$.

- Huade Phase II project: Inner Mongolia China Water Group Huade *Sandaogou* Wind Farm 49.5MW Project:
  Eletrical meters: M2.1, M2.2, M2.3;
  Monitoring parameters: $ES_{II.1,\ export\ ,y}$, $ES_{II.2,\ export\ ,y}$, $ES_{II.3,\ export\ ,y}$; $ES_{II.1,\ import\ ,y}$, $ES_{II.2,\ import\ ,y}$, $ES_{II.3,\ import\ ,y}$.

- Huade Phase III project: Inner Mongolia China Water Group Huade *Heping* Wind Farm 49.5MW Project:
  Eletrical meters: M3.1, M3.2, M3.3;
  Monitoring parameters: $ES_{III.1,\ export\ ,y}$, $ES_{III.2,\ export\ ,y}$, $ES_{III.3,\ export\ ,y}$; $ES_{III.1,\ import\ ,y}$, $ES_{III.2,\ import\ ,y}$, $ES_{III.3,\ import\ ,y}$.

- Huade Phase IV project: Inner Mongolia China Water Group Huade *Niujiacun* Wind Farm 49.5MW Project:
  Eletrical meters: M4.1, M4.2, M4.3;
  Monitoring parameters: $ES_{IV.1,\ export\ ,y}$, $ES_{IV.2,\ export\ ,y}$, $ES_{IV.3,\ export\ ,y}$; $ES_{IV.1,\ import\ ,y}$, $ES_{IV.2,\ import\ ,y}$, $ES_{IV.3,\ import\ ,y}$.

- **The proposed Project: Huade Phase V project: Inner Mongolia China Water Group Huade *Niujiafangzi* Wind Farm 49.5MW Project :**
  Eletrical meters: M5.1, M5.2, M5.3;
  Monitoring parameters: $ES_{V.1,\ export\ ,y}$, $ES_{V.2,\ export\ ,y}$, $ES_{V.3,\ export\ ,y}$; $ES_{V.1,\ import\ ,y}$, $ES_{V.2,\ import\ ,y}$, $ES_{V.3,\ import\ ,y}$.

- Huade Phase VI project: Inner Mongolia China Water Group Huade *Sitaifangzi* Wind Farm 49.5MW Project:
  Eletrical meters: M6.1, M6.2, M6.3;
  Monitoring parameters: $ES_{VI.1,\ export\ ,y}$, $ES_{VI.2,\ export\ ,y}$, $ES_{VI.3,\ export\ ,y}$; $ES_{VI.1,\ import\ ,y}$, $ES_{VI.2,\ import\ ,y}$, $ES_{VI.3,\ import\ ,y}$.

- Huade Phase VII project: Inner Mongolia China Water Group Huade *Erligetu* Wind Farm 49.5MW Project :
  Eletrical meters: M7.1, M7.2, M7.3;
  Monitoring parameters: $ES_{VII.1,\ export\ ,y}$, $ES_{VII.2,\ export\ ,y}$, $ES_{VII.3,\ export\ ,y}$; $ES_{VII.1,\ import\ ,y}$, $ES_{VII.2,\ import\ ,y}$, $ES_{VII.3,\ import\ ,y}$.

- Huade Phase VIII project: Inner Mongolia China Water Group Huade *Cheliwusu* Wind Farm 49.5MW Project:
  Eletrical meters: M8.1, M8.2, M8.3;
  Monitoring parameters: $ES_{VIII.1,\ export\ ,y}$, $ES_{VIII.2,\ export\ ,y}$, $ES_{VIII.3,\ export\ ,y}$; $ES_{VIII.1,\ import\ ,y}$, $ES_{VIII.2,\ import\ ,y}$, $ES_{VIII.3,\ import\ ,y}$.

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These 25 meters Mj.i(j=I, II, …, VIII; i=1, 2, 3, 4 for Phase I project, i=1, 2, 3 for the other 7 projects) have been installed at the 35kV transmission lines of each of the eight projects listed above to measure the exported and imported electricity of each of the eight projects.

The formula to calculate the share of the proposed project is:

Formula <1>:

$$EG_{facility,y} = ES_{total,export,y} \times \frac{\sum_{i=1}^{3} ES_{V,\ i,\ export,\ y}}{\sum_{i=1}^{4} ES_{I,\ i,\ export,\ y} + \sum_{j=II}^{VIII}\sum_{i=1}^{3} ES_{j,\ i,\ export,\ y}} - ES_{total,import,y} \times \frac{\sum_{i=1}^{3} ES_{V,\ i,\ import,\ y}}{\sum_{i=1}^{4} ES_{I,\ i,\ import,\ y} + \sum_{j=II}^{VIII}\sum_{i=1}^{3} ES_{j,\ i,\ import,\ y}}$$

Where:

$EG_{facility,y}$: is quantity of net electricity generation supplied by the Project to the NCPG in year y.

$ES_{total,export,\ y}$: is the total amount of electricity exported to the grid from all the eight projects developed by the same project owner as listed above measured by the same gateway meter(s) M_g1 (and M_g2 as its back-up);

$ES_{total,\ import,\ y}$: is the total amount of electricity imported from the grid to all the eight projects developed by the same project owner as listed above measured by the gateway meter(s) M_g1 (and M_g2 as its back-up);

$ES_{j,\ i,\ export\ ,y}$: is the electricity exported to the grid by the Phase j project part i (j=I, II, III, …, VIII; i=1, 2, 3, 4 for Phase I project, i=1, 2, 3 for the other 7 projects) measured by the meter Mj.i (j=1, 2, 3, …, 8; i=1, 2, 3, 4 for Phase I project, i=1, 2, 3 for the other 7 projects) at the project site;

$ES_{j,\ i,\ import\ ,y}$: is the electricity imported from the grid to the Phase j project part i (j=I, II, III, …, VIII; i=1, 2, 3, 4 for Phase I project, i=1, 2, 3 for the other 7 projects) measured by the meter Mj.i (j=1, 2, 3, …, 8; i=1, 2, 3, 4 for Phase I project, i=1, 2, 3 for the other 7 projects) at the project site;

Five electrical meters (M_A, M_B, M_C, M_D and M_E) have been installed at the 220kV sides of each of the five main transformers at the wind farm on-site booster stations, serving as the back-up meters:

- Transformer A: the 50MVA main transformer #1 at Changshun 220kV booster station, involved with the Phase I project only;
  Electrical meter: M_A;
  Monitoring parameters: $ES_{\_A,\ export,\ y}$: the amount of electricity exported to the grid from the wind farm connected to the referred main transformer, i.e. the Phase I project only;

- Transformer B: the 50MVA main transformer #2 at Changshun 220kV booster station, involved with Phase II project (Sandaogou) only;
  Electrical meter: M_B;
  Monitoring parameters: $ES_{\_B,\ export,\ y}$: the amount of electricity exported to the grid from the wind farm connected to the referred main transformer, i.e. Phase II project (Sandaogou);
  $ES_{\_B,\ import,\ y}$: the amount of electricity imported from the grid to the wind farm connected to the referred main transformer, i.e. Phase II project (Sandaogou);

- Transformer C: the 100MVA main transformer #3 at Changshun 220kV booster station, involved with two of all the eight projects: Phase III project (Heping) and Phase IV project (Niujiacun);
  Electrical meter: M_C;

Monitoring parameters: $ES\_{C,\ export,\ y}$: the amount of electricity exported to the grid from the wind farms connected to the referred main transformer, i.e. Phase III project (Heping) and Phase IV project (Niujiacun);

$ES\_{C,\ import,\ y}$: the amount of electricity imported from the grid to the wind farms connected to the referred main transformer, i.e. Phase III project (Heping) and Phase IV project (Niujiacun);

- Transformer D: the 100MVA main transformer #1 at Niujiafang~~zi~~ 220kV booster station, involved with two of all the eight projects: **The Project (Phase V project, Niujiafangzi)** and *Phase VI* project (Sitaifangzi);
  Electrical meter: M_D;
  Monitoring parameters: $ES\_{D,\ export,\ y}$: the amount of electricity exported to the grid from the wind farms connected to the referred main transformer, i.e. **The Project (Phase V project, Niujiafangzi)** and *Phase VI* project (Sitaifangzi);
  $ES\_{D,\ import,\ y}$: the amount of electricity imported from the grid to the wind farms connected to the referred main transformer, i.e. **The Project (Phase V project, Niujiafangzi)** and *Phase VI* project (Sitaifangzi);

- Transformer E: the 100MVA main transformer #2 at Niujiafang~~zi~~ 220kV booster station, involved with two of all the eight projects: *Phase VII* project (Erligetu) and *Phase VIII* project (Cheliwusu);
  Electrical meter: M_E;
  Monitoring parameters: $ES\_{E,\ export,\ y}$: the amount of electricity exported to the grid from the wind farms connected to the referred main transformer, i.e. *Phase VII* project (Erligetu) and *Phase VIII* project (Cheliwusu);
  $ES\_{E,\ import,\ y}$: the amount of electricity imported from the grid to the wind farms connected to the referred main transformer, i.e. *Phase VII* project (Erligetu) and *Phase VIII* project (Cheliwusu);

In case of all the two gateway meters M_g1 and M_g2 and two evaluation meters M_e1 and M_e2, or any the electrical meters Mj.i (j≠5, 6; j=1, 2, 3, 4, 7, 8; i=1, 2, 3, 4 for Phase I project and i=1, 2, 3 for other projects) falling out of order, the readings from the above mentioned evaluation meters will be unsed for reference with consideration of historical transmission line losses. The formula to calculate the share of the proposed project is:

Formula <2>:

$$EG_{facility,y} = ES_{D,\ export,\ y} \times \frac{\sum_{i=1}^{3} ES_{V,\ i,\ export,\ y}}{\sum_{j=V}^{VI}\sum_{i=1}^{3} ES_{j,\ i,\ export,\ y}} - ES_{D,\ import,\ y} \times \frac{\sum_{i=1}^{3} ES_{V,\ i,\ import,\ y}}{\sum_{j=V}^{VI}\sum_{i=1}^{3} ES_{j,\ i,\ import,\ y}}$$

Where:

$EG_{facility,y}$: is quantity of net electricity generation supplied by the Project to the NCPG in year y.

$ES_{D,export,\ y}$: is the amount of electricity exported to the grid from the wind farms connecting to the referred main transformer #D;

$ES_{D,\ import,\ y}$: is the amount of electricity imported from the grid to the wind farms connecting to the referred main transformer #D;

The metering equipments will be properly configured and checked periodically according to the requirement from the *Technical administrative code of electric energy metering* (DL/T448 - 2000), *Verification regulation of electrical energy meters with electronics* (JJG596 - 1999) and the *AC power meter field calibration specifications* (JJG1055-1997). The metering equipments will be checked by the project owner and grid company before operation.

4. Data Collection and Handling

The grid company and the Project owner will record the total amount of the electricity exported to the NCPG, imported from the NCPG, and the net electricity generation supplied to the NCPG by all the eight projects from the gateway meters (M_g1 as main and M_g2 as its back-up meter) on the 20th ~~last~~ day of every month. The grid company will supply relevant meter readings and relevant documents to the Project owner, and the latter will provide invoices to the former, storing copies of the invoices.

All the other monitoring data will be recorded by the Project owner, and the data of $EG_{facility,y}$ will be calculated according to Formula <1> by the Project owner, also on the 20th ~~last~~ day of every month (please refer to the below Table 9 for details).

Monthly monitoring results will be signed off and approved by CDM Project Manager before it is accepted and stored. This internal audit will check complicance with operational procedures in the monitoring plan, and will also identify potential improvements to procedures to improve monitoring and reporting in future.

The Project owner will provide meter readings and invoice photocopies to DOE for verification.

Table 9 Data Collection and Handling

Monitoring Data	$ES_{j.i,\ export,y}$ & $ES_{j.i,\ import,y}$ (j=I, II, III, IV, V, VI, VII, VIII; i=1, 2, 3, 4 for Phase I project, i=1, 2, 3 for the other 7 projects)	$ES_{p,\ export,\ y}$ (p=A, B, C, D, E) $ES_{p,\ import,\ y}$ (p=A, B, C, D, E)	$ES_{total,\ ,\ export,\ y}$ & $ES_{total,\ ,\ import,\ y}$		$EG_{facility,y}$
Monitoring Equipments	25 meters: Mj.i (j=1, 2, …, 8; i=1, 2, 3, 4 for Phase I project, i=1, 2, 3 for the other 7 projects)	5 meters: M_~~A ~ M_E~~p (p=A~~; uni-directional / p=~~, B, C, D, E; bi-directional)	2 evaluation meters (M_e1 as main and M_e2 as its back-up meter)	2 gateway meters (M_g1 as main and M_g2 as its back-up meter)	Measured based on the meters: M_g1 (with the meter M_g2 as its back-up meter), Mj.i (j=1, 2, …, 8; i=1, 2, 3, 4 for Phase I project where j=1, i=1, 2, 3 for the other 7 projects where j=2 ~ 7).
Data Collection	The Project owner will record these data on the 20th ~~last~~ day of every month, and store the relevant documents.			The grid company and the Project owner will record these data on the 20th ~~last~~ day of every month The grid company will supply relevant meter readings and relevant documents to the Project owner, and the latter will provide invoices to the former, storing copies of the invoices.	The Project owner will performe calculation based on Formula <1> and the monitored results every month, and store the relevant documents.
Data Handling	Monthly monitoring results will be signed off and approved by CDM Project Manager before it is accepted and stored. This internal audit will check compliance with operational procedures in the monitoring plan, and will also identify potential improvements to procedures to improve monitoring and reporting in future. The Project owner will provide meter readings and invoice photocopies to DOE for verification.				

The above data collection and handling procedure is in accordance with the current regulation by the grid company. There may be some changes in the future in case there are regulation changes.

5. Procedures for Emergency

Once a monitoring meter in fault, it shall be replaced immediately with another calibrated meter by a professional engineer within one month. Failure events will be recorded in the site events log book. The fault meter shall be repaired and calibrated only by national designated institutions with meterting certificate.

(1) If the main gateway meter M_g1 reading exceeds the allowable error or the meter functions improperly, the net electricity supplied to NCPG by the Project shall be determined according to Formula <1> as follows:

- The total amount of electricity exported to or imported from the grid will be calculated according to the backup gateway meter M_g2, unless a test by either party reveals that it is inaccurate;

(2) If the errors of both the gateway meters M_g1 and M_g2 exceed the national or trade standard allowance levels or the meters function improperly, the quantity of net electricity supplied to the NCPG by the Project will be calculated according to Formula <1> as follows:

- The total amount of electricity exported to or imported from the grid will be calculated according to the main evaluation electricity meter M_e1 readings with consideration of the historical line loss rate, unless either party doubts the meter's accuracy;

(3) If the errors of both the gateway meters M_g1 and M_g2, as well as the main evaluation electricty meter M_e1 exceed the naional or trade standard allowance levels or the meters function improperly, the quantity of net electricity supplied to NCPG by the Project will be calculated according to Formula <1> as follows:

- The total amount of electricity exported to or imported from the grid will be calculated according to the back-up evaluation electricity meter M_e2 readings with consideration of the historical line loss rate, unless either party doubts the meter's accuracy;

(4) If the errors of all the two gateway meters M_g1 and M_g2 and the two evaluation meters M_e1 and M_e2, or any of the meters Mj.i (j≠5, 6; j=1, 2, 3, 4, 7, 8; i=1, 2, 3, 4 for Phase I project and i=1, 2, 3 for other seven projects) exceed the national or trade standard allowance levels or the meters function improperly, the quantity of net electricity supplied to NCPG by the Project will be calculated according to Formula <2> as follows:

- The readings from the meter at the 220kV sides of the main transformers connecting to the Project at the wind farm on-site booster station will be unsed, with consideration of historical transmission line losses.

Formula <2>:

$$EG_{facility,y} = ES_{D,\ export,\ y} \times \frac{\sum_{i=1}^{3} ES_{V,\ i,\ export,\ y}}{\sum_{j=V}^{VI}\sum_{i=1}^{3} ES_{j,\ i,\ export,\ y}} - ES_{D,\ import,\ y} \times \frac{\sum_{i=1}^{3} ES_{V,\ i,\ import,\ y}}{\sum_{j=V}^{VI}\sum_{i=1}^{3} ES_{j,\ i,\ import,\ y}};$$

(5) If the errors of any of the meters at 35kV lines Mj.i (j=5, 6; i=1, 2, 3) exceed the national or trade standard allowance levels or the meters function improperly, the electricity generation during the period of erroneous measurement and replacement of the fault meter shall not be accounted to calculate the emission reduction for conservative consideration.

For the above situation (2), (3) and (4):

- If the evaluation electricity meter does not have an acceptable level of precision, the project owner and the grid company will design a reasonable and conservative evaluation method together. In this event, the project owner will provide sufficient evidence to demonstrate the method's rationality and conservatism during the validation and verification processes.

- If the project owner and the grid company are unable to agree on the evaluation method, they will participate in an arbitration process to ensure the consistency of the evaluation method as provided for by their agreement

6. Meter Calibration

An agreement about the quality control procedures of electricity meters' measurement and calibration to ensure accuracy will be signed between the project owner and the grid company.

The electricity meters will be calibrated and checked annually for accuracy in accordance with the *Technical Administrative Code of Electric Energy Metering* (DL/T448-2000), *Verification regulation of electrical energy meters with electronics* (JJG596 - 1999) and the *AC power meter field calibration specifications* (JJG1055-1997). Calibration of gateway meters M_g1 and M_g2 will be carried out by the grid company. The grid company will supply calibration records to the project owner, which will be retained. The electricity meters will be jointly inspected and sealed by the parties concerned and not be interferrd by either party except in the presence of the other party. Calibration of all the other meters will be carried out by the Project owner, and the calibration records will be retained, too.

All installed meters will be tested by a third party within ten days after:

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

7. Data Management System

The monitoring data will be archived in both electronic and paper format at the end of each month, and will be preserved for two years after the end of the crediting period. Electronic files will be backed up onto CDs or disks, and paper files will be printed out. The CDM manager will collect the data in both written and electronic format on a monthly basis, and store additional copies of the data in a secure location to ensure its availability upon request.

The CDM manager will also provide documents about the Project and the index of monitoring report to facilitate the DOE's acquisition of information related to the Project's emission reductions. Paper files, such as maps, drawings, and EIA report will be referred to in conjunction with the monitoring plan in order to validate the information supplied.

8. The Monitoring Report

The Project's monitoring report will be submitted to the DOE upon completion. This will include information relating to the monitoring of the export and import of electricity to and from the power grid, emissions reduction calculations and the calibration and maintenance of monitoring equipment.

9. Training Program

The project developer has conducted systematic program to train all their related staff at the project site during the late stage of the construction of the wind farm, in order to ensure that these staff are capable of performing their designated tasks. The training program contrains turbine structures, CDM knowledge, operational regulations, data monitoring requirements, and data management regulations, etc.

B.7.4. Date of completion of application of methodology and standardized baseline and contact information of responsible persons/ entities

>>

Completion Date: 27/03/2012.
Responsible Person: Cyril Zhang.
Responsible Entity: Eco-tec Asia (UK) Co., Ltd.
Address: 18A Zhong Guan Chun South Street, B1505, New Logo International Building, Haidian District, Beijing.
Postcode: 100081.
Telephone: (86)-10-6215 6001 ext 806.
Facsimile: (86)-10-6215 6006.
E-mail: cyril.zhang@ecotec-asia.com

The person / entity is a project participant.

SECTION C. Duration and crediting period

C.1. Duration of project activity

C.1.1. Start date of project activity

>>

As analyzed in the section B.5 "Table 4 Implementation Timetable of the Project", and according to the definition of starting date of a CDM project activity from the *Glossary of CDM terms (Version 05, EB47)*, the Project's starting date is 30/05/2010, the date of wind turbines purchase contract and tower purchase contract being signed, which is the date of the earliest equipment purchase contracts signed among all the contracts for equipment or construction/operation services required for the project activity, and on which the real action of a project activity begins and the project participant has committed to expenditures related to the implementation or related to the construction of the Project.

C.1.2. Expected operational lifetime of project activity

>>

20 years

C.2. Crediting period of project activity

C.2.1. Type of crediting period

>>Fixed crediting period.

C.2.2. Start date of crediting period

>>

01/04/2012[19]

C.2.3. Length of crediting period

>>

Ten years

[19] If the registration date is later than 01/04/2012, the registration date will be adjusted to be the crediting period's start date.

SECTION D. Environmental impacts

D.1. Analysis of environmental impacts

>>

The project's Environmental Impact Assessment ("**EIA**") was compiled by Ulanqab Environmental Protection Science Research Institute. The EIA was then approved by the Environmental Protection Bureau of Inner Mongolia Autonomous Region on 20/10/2010. A summary of the environmental impacts contained in the EIA is presented below.

Construction Phase

<u>Air</u>

The Project's impacts on the air will mainly occur during construction phase. The main sources of air pollution will be powdery material stack and transportation. Measures taken to mitigate this air pollution will include:

- Forbidding to construct in strong windy days;
- Reducing the disturbed area on the ground;
- Slowing down the speed of the vehicles;

<u>Water</u>

Waste water generated in the construction phase will include construction waste water and domestic sewage. Construction waste water will be generated from washing and maintenance of the vehicles and machines, whose key pollution are SS and petroleum. Domestic sewage will be generated from the daily life of the builders, whose key pollution are CODcr、BOD_5、SS, animal and vegetable oils. Measures taken to mitigate this water pollution will include:

<u>Construction waster water</u>

- Construction waste water will be treated by oil separating tank and sedimentation tank, from which the supernatant can be discharged directly and the mud will be transported to the landfill with other construction solid wastes.
- Temporary settling basins will be built in backfill stacking site and construction mud sources. Muddy water will be discharged after be treated by settling basins.

<u>Domestic sewage</u>

- Canteen sewage will be treated by oil separating tank.
- Other domestic sewage will be treated by septic tank.

<u>Noise</u>

Construction machinery will generate noise. The main noise sources are pneumatic drill and concrete mixer. The noise of the Project will not have great negative effect on neighborhoods and wildlife according to the noise source intensity attenuation calculation.

<u>Solid Waste</u>

Solid waste generated by the builders' daily life, sludge generated by the waste water treatment facilities and spoil generated by the Project construction are included in the construction phase. Measures taken to mitigate this solid waste pollution will include:

- Solid waste generated by the builders' daily life will be collected and delivered to the approved landfill.
- Sludge also will be collected and delivered to the approved landfill after being dehydrated, concentrated and desiccated.
- Spoil will be delivered to the approved spoil ground.

Ecology

The main ecological impacts of the Project include soil erosion and water loss since ground vegetation be destroyed. According to analysis in the EIA, the Project has limited impacts on local vegetation and soil after grass being planted.

Operation Phase

Air

The Project has no negative impacts on the air during operation phase.

Water

Waste water generated in the operation phase mainly refers to domestic sewage. The domestic sewage will be treated by integrated sewage treatment instrument, such as LDZ-48 and the effluent can meet the discharge standard.

Noise

The main noise is sourced from the rotation of wind turbines during the operation phase. The noise of the Project will not have great negative effect on neighborhoods and wildlife according to the noise source intensity attenuation calculation.

Solid waste

The solid waste is mainly generated by the daily life of the workers during the operation phase and will be collected and delivered to the approved landfill.

Electromagnetic radiation

According to the analogical monitoring data, the power frequency electric field and magnetic field intensities fluctuation range of the 220kV substation (booster stations) are 1.22~1.25V/m and 0.015~0.985μT during the operation phase respectively, both of which are far below the recommended standard (power frequency electric field intensity: 4kV/m; power frequency magnetic field intensity: 0.1mT) of the *Technical Regulations On Environmental Impact Assessment of Electromagnetic Radiation Produced By 500kV Ultrahigh Voltage Transmission and transfer power Engineering* (HJ/T24-1998)[20].

[20] State Environmental Protection Administration, Technical Regulations On Environmental Impact Assessment of Electromagnetic Radiation Produced By 500kV Ultrahigh Voltage Transmission and transfer power Engineering (HJ/T24-1998) (19/11/1998).

Ecology

Grassland biomass

The grassland biomass will reduce due to the construction of the Project. After the Project is completed, the area been temporary occupied will be re-planted and the vegetation coverage will be lager than before. Therefore, the Project will not have great negative impacts on local eco-environmental quality.

Wild life

The project's impacts on birds mainly exist in two aspects: one is the rotation of the blades, the other is the noise generated by wind turbines. Measures taken to mitigate the impacts on birds will include:

- Enforcing the observation of birds' activity characteristics and adjusting the wind turbines operation plan.
- Adding lamplight to the wind turbines.

Landscape

The wind turbines and the beautiful natural landscape will constitute a unique human landscape after the construction of the Project. The local landscape will be improved greatly and bring opportunities for the development of the tourism industry, and promote the local economic and environmental development.

Conclusion

The Project's impacts on the environment will be controlled and mitigated in every respect. Overall the Project is not expected to have significant impact on the environment.

D.2. Environmental impact assessment

>>
The EIA approved by the Environmental Protection Bureau of Inner Mongolia Autonomous Region states that the project's environmental impact is not considered being significant.

SECTION E. Local stakeholder consultation

E.1. Solicitation of comments from local stakeholders

>>
CWG released an announcement in nearby villages on 08/03/2010 and invited local stakeholders to comment at a meeting about the Project on 15/03/2010. Thirty five stakeholders attended the meeting and asked to complete questionnaires. The composition of the stakeholders present at the meeting is displayed in Table 10 to Table 12 below.

Table 10 Stakeholder Composition by Occupation

Occupation	Number	Percentage
Government Official	5	14.29%
Labour	11	31.43%
Farmer	8	22.86%
Teacher	2	5.71%

Student	3	8.57%
Others	6	17.14%

Table 11 Stakeholder Composition by Age

18-25 years	5	14.29%
26-45 years	26	74.29%
46+ years	4	11.42%

Table 12 Stakeholder Composition by Education Level

Junior high school and below	15	42.86%
Senior high school	8	22.86%
Undergraduate and above	12	34.28%

The questionnaire asked the following six questions:

- Do you have any knowledge or understanding about wind farm projects?
- What is your attitude towards the Project?
- How will the Project affect your quality of living, studying and working?
- Will the Project have a negative impact on the environment?
- Will the Project have a negative impact on the ecosystem?
- How will the project impact on the local economy?

E.2. Summary of comments received

>>

Thirty five questionnaires were distributed to local stakeholders and all of the questionnaires were returned. The respondents' comments can be summarized as follows:

1. 71.42% of the respondents understand the information about wind farm project and the other 28.58% of the respondents know a little about that;
2. 97.14% of the respondents supported the construction of the Project and the other 2.86% of the respondents do not care about whether the Project is constructed or not;
3. 85.71% of the respondents believed that the construction of the Project would improve the quality of living, studying and working for local residents and the other 14.29% of the respondents think the Project's impact on improving the quality of living, studying and working for local residents is very limited;
4. 100% of the respondents believed the Project's construction would have no negative impact on the local environment;
5. 100% of the respondents believed the Project's construction would have no negative impact on the local ecosystem;
6. 91.43% of the respondents believed that the construction of the Project would assist local economic development and the other 8.57% of the respondents think the project's impact on assisting local economic development is very limited.

E.3. Report on consideration of comments received

>>

No negative comments were received from the local stakeholders. Therefore, the Project's design has not been modified.

SECTION F. Approval and authorization

>>

The project has already been approved by the DNA of both parties at present.

Appendix 1. Contact information of project participants and responsible persons/ entities

Project participant and/or responsible person/ entity	☒ Project participant ☐ Responsible person/ entity for application of the selected methodology (ies) and, where applicable, the selected standardized baselines to the project activity
Organization name	China Water Group Huade Wind Power Co., Ltd.
Street/P.O. Box	Renmin Street
Building	
City	Changshun Town, Huade County, Ulanqab City
State/Region	Inner Mongolia Autonomous Region
Postcode	013350
Country	P.R. China
Telephone	+86-0474-2278186
Fax	+86-0474-2278225
E-mail	gsjthdfd@163.com
Website	
Contact person	Gao Junsong
Title	Project Manager
Salutation	Mr.
Last name	Gao
Middle name	
First name	Junsong
Department	
Mobile	+86-1861 1081 186, +86-1369 4736 759
Direct fax	+86-0474-2278225
Direct tel.	+86-0474-2278186
Personal e-mail	gsjthdfd@163.com

Project participant and/or responsible person/ entity	☒ Project participant ☒ Responsible person/ entity for application of the selected methodology (ies) and, where applicable, the selected standardized baselines to the project activity
Organization name	Eco-Tec Asia (UK) Ltd.
Street/P.O. Box	18A, Zhong Guan Cun South Street, Haidian District
Building	B1505, New Logo International Building
City	Beijing
State/Region	
Postcode	100081
Country	P.R. China
Telephone	+86-10-62156001
Fax	+86-10-62156006
E-mail	
Website	
Contact person	Cyril Zhang
Title	Managing Director
Salutation	Mr.
Last name	Zhang
Middle name	
First name	Cyril
Department	
Mobile	+86-13910088707
Direct fax	+86-10-62156006
Direct tel.	+86-10-62156001 ext 806
Personal e-mail	Cyril.zhang@ecotec-asia.com

Appendix 2. Affirmation regarding public funding

There is no public funding from Annex I countries involved in the Project.

Appendix 3. Applicability of methodology and standardized baseline

There is no supplementary information.

Appendix 4. Further background information on ex ante calculation of emission reductions

Table A1-A6 below shows the data and calculation process of the OM emission factor of NCPG. Table A7-A12 show data used to calculation BM emission factor of NCPG.

Table A1 Operation Margin Emission Factor of NCPG in 2006

Fuel Type	Unit	Beijing	Tianjin	Hebei	Shanxi	Inner Mongolia	Shandong	Sub-total	Carbon content	OXID	Fuel emission factor	NCV	CO_2 emission(tCO_2e)
									(tC/TJ)	(%)	($kgCO_2$/TJ)	(MJ/t, km^3)	L=G×J×K/100000 (mass unit)
		A	B	C	D	E	F	G=A+B+C+D+E+F	H	I	J	K	L=G×J×K/10000 (volume unit)
Coal	10^4t	796.63	1639.2	6867.99	6968.88	8404.05	10930.66	**35607.41**	25.8	100	87,300	20,908	649,930,803
Cleaned coal	10^4t						39.77	**39.77**	25.8	100	87,300	26,344	914,643
Other washed coal	10^4t	6.36		214.13	371.14	61.77	544.6	**1198**	25.8	100	87,300	8,363	8,746,477
Coke	10^4t	7.97					27.77	**35.74**	26.6	100	87,300	20,908	652,351
Coke oven gas	10^8m^3						3.23	**3.23**	29.2	100	95,700	28,435	87,896
Other gas	10^8m^3	0.38	0.63	5.8	22.32	0.64	5.79	**35.56**	12.1	100	37,300	16,726	2,218,517
Crude oil	10^4t	20.66	6.58	69.72	13.79	22.76	7.22	**140.73**	12.1	100	37,300	5,227	2,743,772
Gasoline	10^4t					0.74		**0.74**	20	100	71,100	41,816	22,001
Diesel	10^4t			0.01				**0.01**	18.9	100	67,500	43,070	291
Fuel oil	10^4t	0.21		3.01		0.07	6.32	**9.61**	20.2	100	72,600	42,652	297,577
LPG	10^4t	6.38		0.08			4.1	**10.56**	21.1	100	75,500	41,816	333,391
Refinery gas	10^4t						0.01	**0.01**	17.2	100	61,600	50,179	309
Natural gas	10^8m^3			2.43			2.32	**4.75**	15.7	100	48,200	46,055	105,443
Other oil product	10^4t	3.41	0.73		0.53			**4.67**	15.3	100	54,300	38,931	987,216
Other coking product	10^4t						0.28	**0.28**	20	100	75,500	41,816	8,840
Other energy	10^4t ce							**0**	25.8	100	95,700	28,435	0
		6.83		47.11	230.76	12.51	132.29	**429.5**	0	0	0	0	0
												Sub-total	667,049,525

<China Energy Statistics Yearbook 2007>

Table A2 Thermal Power Generation of NCPG in 2006

Item	Electricity generation （10^8kWh）	Electricity generation （MWh）	Auxiliary electricity consumption (%)	Electricity delivered to the grid (MWh)
Beijing	207.05	20,705,000	7.51	19,150,055
Tianjin	359.24	35,924,000	6.86	33,459,614
Hebei	1438.88	143,888,000	6.63	134,348,226
Shanxi	1502.5	150,250,000	7.45	139,056,375
Inner Mongolia	1395.93	139,593,000	7.58	129,011,851
Shandong	2309.22	230,922,000	7.12	214,480,354
Total		721,282,000		669,506,473

<China Electric Power Yearbook 2007>

In addition, in year 2006, Northeast China Power Grid supplied 2,618,060MWh electricity to NCPG and the emission factor of Northeast China Power Grid was 1.14972; Central China Power Grid supplied 497,060MWh electricity to NCPG and the emission factor of Central China Power Grid was 1.12157. Therefore, total CO_2 emission of NCPG in 2006 is 670,617,037 tCO_2, total electricity delivered to NCPG is 672,621,593MWh, and thus the emission factor in 2006 is 0.99702.

Table A3 Operation Margin Emission Factor of NCPG in 2007

Fuel Type	Unit	Beijing	Tianjin	Hebei	Shanxi	Inner Mongolia	Shandong	Sub-total	Carbon content	OXID	Fuel emission factor	NCV	CO_2 emission(tCO_2e)
									(tC/TJ)	(%)	($kgCO_2/TJ$)	(MJ/t, km^3)	L=G×J×K/100000 (mass unit)
		A	B	C	D	E	F	G=A+B+C+D+E+F	H	I	J	K	L=G×J×K/10000 (volume unit)
Coal	10^4t	816.17	1753.99	7716.13	7510.06	10434.25	11884.83	**40115.43**	25.8	100	87,300	20,908	732,214,267
Cleaned coal	10^4t						18.43	**18.43**	25.8	100	87,300	26,344	423,859
Other washed coal	10^4t	5.76		156.89	478.81	48.57	756.84	**1446.87**	25.8	100	87,300	8,363	10,563,452
Coke	10^4t	7.93					42.86	**50.79**	26.6	100	87,300	20,908	927,054
Coke oven gas	10^8m^3			0.02			4.09	**4.11**	29.2	100	95,700	28,435	111,843
Other gas	10^8m^3	0.07	0.72	3.13	25.46	2.58	13.61	**45.57**	12.1	100	37,300	16,726	2,843,020
Crude oil	10^4t	11.8	7.6	88.38	72.8	28.17	29.64	**238.39**	12.1	100	37,300	5,227	4,647,821
Gasoline	10^4t							**0**	20	100	71,100	41,816	0
Diesel	10^4t			0.01				**0.01**	18.9	100	67,500	43,070	291
Fuel oil	10^4t	0.33		2.35		0.62	5.08	**8.38**	20.2	100	72,600	42,652	259,490
LPG	10^4t	4.74		0.18			2.35	**7.27**	21.1	100	75,500	41,816	229,522
Refinery gas	10^4t							**0**	17.2	100	61,600	50,179	0
Natural gas	10^8m^3	0.06		2.85			1.65	**4.56**	15.7	100	48,200	46,055	101,225
Other oil product	10^4t	5.03	0.73		0.54	4.22	0.01	**10.53**	15.3	100	54,300	38,931	2,225,993
Other coking product	10^4t	1.72						**1.72**	20	100	75,500	41,816	54,302
Other energy	10^4t ce	4.74						**4.74**	25.8	100	95,700	28,435	128,986
		11.94		77.25	360.26	30.75	163.48	**643.68**	0	0	0	0	0
												Sub-total	754,731,124

<China Energy Statistics Yearbook 2008>

Table A4 Thermal Power Generation of NCPG in 2007

Item	Electricity generation （10^8kWh）	Electricity generation （MWh）	Auxiliary electricity consumption (%)	Electricity delivered to the grid (MWh)
Beijing	223	22,300,000	7.51	20,625,270
Tianjin	399	39,900,000	6.53	37,294,530
Hebei	1633	163,300,000	6.67	152,407,890
Shanxi	1734	173,400,000	7.99	159,545,340
Inner Mongolia	1801	180,100,000	7.77	166,106,230
Shandong	2591	259,100,000	7.23	240,367,070
Total		838,100,000		776,346,330

<China Electric Power Yearbook 2008>

In addition, in year 2007, Northeast China Power Grid supplied 1,789,750MWh electricity to NCPG and the emission factor of Northeast China Power Grid was 1.08186; Central China Power Grid supplied 803,000MWh electricity to NCPG and the emission factor of Central China Power Grid was 1.10197. Therefore, total CO_2 emission of NCPG in 2007 is 757,552,268 tCO_2, total electricity delivered to NCPG is 778,939,080MWh, and thus the emission factor in 2007 is 0.97254.

Table A5 Operation Margin emission factor of NCPG in 2008

Fuel Type	**Unit**	**Beijing**	**Tianjin**	**Hebei**	**Shanxi**	**Inner Mongolia**	**Shandong**	**Sub-total**	**Carbon content**	**OXID**	**Fuel emission factor**	**NCV**	**CO_2 emission(tCO_2e)**
									(tC/TJ)	**(%)**	**($kgCO_2$/TJ)**	**(MJ/t, km^3)**	**L=G×J×K/100000 (mass unit)**
		A	**B**	**C**	**D**	**E**	**F**	**G=A+B+C+D+E+F**	**H**	**I**	**J**	**K**	**L=G×J×K/10000 (volume unit)**
Coal	10^4t	755.75	1800.12	7353.33	7854.39	12607.82	12360.75	**42732.16**	25.8	100	87,300	20,908	779,976,613
Cleaned coal	10^4t						23.88	**23.88**	25.8	100	87,300	26,344	549,200
Other washed coal	10^4t	5.05		134.52	582.39	66.2	691.21	**1479.37**	25.8	100	87,300	8,363	10,800,731
Coke	10^4t	5.66			32.49		45.38	**83.53**	26.6	100	87,300	20,908	1,524,647
Coke oven gas	10^8m^3			0.02			6.07	**6.09**	29.2	100	95,700	28,435	165,723
Other gas	10^8m^3	0.11	0.86	8.37	24.55	3.55	16.2	**53.64**	12.1	100	37,300	16,726	3,346,491
Crude oil	10^4t	10.4	9.08	187.54	36	34.32	29.76	**307.1**	12.1	100	37,300	5,227	5,987,440
Gasoline	10^4t					0.02		**0.02**	20	100	71,100	41,816	595
Diesel	10^4t							**0**	18.9	100	67,500	43,070	0
Fuel oil	10^4t	0.15		3.08		0.35		**3.58**	20.2	100	72,600	42,652	110,856
LPG	10^4t	2.56		0.25				**2.81**	21.1	100	75,500	41,816	88,715
Refinery gas	10^4t							**0**	17.2	100	61,600	50,179	0
Natural gas	10^8m^3	0.44		2.93				**3.37**	15.7	100	48,200	46,055	74,809
Other oil product	10^4t	11.09	0.7		0.97	2.12		**14.88**	15.3	100	54,300	38,931	3,145,563
Other coking product	10^4t	1.45						**1.45**	20	100	72,200	41,816	43,777
Other energy	10^4t ce	7.97		7.61				**15.58**	25.8	100	95,700	28,435	423,968
		4.9	2.34	61.02	466	63.72	141.71	**739.69**	0	0	0	0	0
												Sub-Total	806,239,126

<China Energy Statistics Yearbook 2009>

Table A6 Thermal Power Generation of NCPG in 2008

Item	Electricity generation （10^8kWh）	Electricity generation （MWh）	Auxiliary electricity consumption (%)	Electricity delivered to the grid (MWh)
Beijing	243	24,300,000	7.14	22,564,980
Tianjin	397	39,700,000	7.05	36,901,150
Hebei	1580	158,000,000	6.9	147,098,000
Shanxi	1762	176,200,000	8.22	161,716,360
Inner Mongolia	2008	200,800,000	7.96	184,816,320
Shandong	2689	268,900,000	7.14	249,700,540
Total		867,900,000		802,797,350

<China Electric Power Yearbook 2009>

In addition, in year 2008, Northeast China Power Grid supplied 5,286,140MWh electricity to NCPG and the emission factor of Northeast China Power Grid was 1.10489. Therefore, total CO_2 emission of NCPG in 2008 is 812,079,707 tCO_2, total electricity delivered to NCPG is 808,83,490MWh, and thus the emission factor in 2005 is 1.00495.

According to the analysis above, the weighted average operation margin emission factor of NCPG is 0.9914.

Table A7 Share of Emission from Coal, Oil and Gas Fuel in Electricity Generation in NCPG

Fuel type	Unit	Beijing A	Tianjin B	Hebei C	Shanxi D	Shandong E	Inner Mongolia F	Total G=A+…+F	NCV H	Emission factor I	OXID J	Emission K=G＊H＊I＊J/100,000
Coal	10^4t	755.75	1,800.12	7,353.33	7,854.39	12,360.75	12,607.82	42,732.16	20,908	87,300	1	779,976,613
Cleaned coal	10^4t	0	0	0	0	23.88	0	23.88	26,344	87,300	1	549,200
Other washed coal	10^4t	5.05	0	134.52	582.39	691.21	66.2	1,479.37	8,363	87,300	1	10,800,731
Model coal	10^4t	5.66	0	0	32.49	45.38	0	83.53	20,908	87,300	1	1,524,647
Coke	10^4t	0	0	0.02	0	6.07	0	6.09	28,435	95,700	1	165,723
Other coking product	10^4t	7.97	0	7.61	0	0	0	15.58	28,435	95,700	1	423,968
Sub-total								44,340.61				**793,440,881**
Crude oil	10^4t	0	0	0	0	0	0.02	0.02	41,816	71,100	1	595
Gasoline	10^4t	0	0	0	0	0	0	0	43,070	67,500	1	0
Diesel	10^4t	0.15	0	3.08	0	0	0.35	3.58	42,652	72,600	1	110,856
Fuel oil	10^4t	2.56	0	0.25	0	0	0	2.81	41,816	75,500	1	88,715
Other oil product	10^4t	1.45	0	0	0	0	0	1.45	41,816	72,200	1	43,777
Sub-total								7.86				**243,942**
Natural gas	10^7m^3	110.9	7	0	9.7	0	21.2	148.8	38,931	54,300	1	3,145,563
COG	10^7m^3	1.1	8.6	83.7	245.5	162	35.5	536.4	16,726	37,300	1	3,346,491
Other gas	10^7m^3	104	90.8	1875.4	360	297.6	343.2	3,071	5,227	37,300	1	5,987,440
LPG	10^4t	0	0	0	0	0	0	0	50,179	61,600	1	0
Refinery gas	10^4t	0.44	0	2.93	0	0	0	3.37	46,055	48,200	1	74,809
Sub-total								3,759.57				**12,554,302**
Total												**806,239,126**

<China Energy Statistics Yearbook 2009>

Based on table A7 and related formulas described in the PDD, $\lambda_{Coal,y}$=98.41%， $\lambda_{Oil,y}$=0.03%， $\lambda_{Gas,y}$=1.56% are obtained.

Table A8 Emission Factor of Best Technology

	Variables	Electricity supply efficiency (%) A	Emission factor of fuels （$kgCO_2/TJ$） B	OXID C	Emission factor (tCO_2/MWh) D=3.6/A/1,000,000×B×C
Coal-based power plants	$EF_{Coal,Adv}$	39.08	87,300	1	0.8042
Gas-based power plants	$EF_{Gas,Adv}$	51.46	75,500	1	0.5282
Oil-based power plants	$EF_{Oil,Adv}$	51.46	54,300	1	0.3799

Thus, the emission factor of thermal power is:

$$EF_{Thermal,y} = \lambda_{Coal,y} \times EF_{Coal,Adv,y} + \lambda_{Oil,y} \times EF_{Oil,Adv,y} + \lambda_{Gas,y} \times EF_{Gas,Adv,y} = 0.7975\ tCO_2/MWh$$

Table A9 Installed Capacity of NCPG in 2008

Installed capacity	Unit	Beijing	Tianjin	Hebei	Shanxi	Inner Mongolia	Shandong	Total
Thermal power	MW	4,760	7,490	29,870	35,250	45,740	55,930	179,040
Hydro power	MW	1,050	0	1,540	790	830	1,050	5,260
Nuclear power	MW	0	0	0	0	0	0	0
Wind power and other	MW	0	0	700	0	2,300	370	3,370
Total	MW	5,810	7,490	32,110	36,040	48,860	57,350	187,660

<China Electric Power Yearbook 2009>

Table A10 Installed Capacity of NCPG in 2007

Installed capacity	Unit	Beijing	Tianjin	Hebei	Shanxi	Inner Mongolia	Shandong	Total
Thermal power	MW	3,900	6,920	29,020	30,950	39,870	54,140	164,800
Hydro power	MW	1050	10	780	790	830	1,050	4,510
Nuclear power	MW	0	0	0	0	0	0	0
Wind power and other	MW	2.7	0	410	0	1,096.5	210	1,719.2
Total	MW	4,952.7	6,930	30,210	31,740	41,796.5	55,400	171,029.2

<China Electric Power Yearbook 2008>

Table A11 Installed Capacity of NCPG in 2006

Installed capacity	Unit	Beijing	Tianjin	Hebei	Shanxi	Inner Mongolia	Shandong	Total
Thermal power	MW	3,984	6,512	26,087	26,661	28,899	49,395	141,538
Hydro power	MW	1,053	5	785	790	818	553	4,004
Nuclear	MW	0	0	0	0	0	0	0

power								
Wind power and other	MW	24	24	218	0	565	106	937
Total	MW	5,061	6,541	27,090	27,451	30,282	50,054	146,479

<China Electric Power Yearbook 2007>

Table A12 Calculation of BM Emission Factor of NCPG

	Unit	Installed capacity in 2006 A	Installed capacity in 2007 B	Installed capacity in 2008 C	Capacity additions from 2006 to 2008 D=C-A	Capacity additions from 2007 to 2008 D=C-B	Share in total capacity additions
Thermal power	MW	141,538	164,800	179,040	46,111	17,847	93.98%
Hydro power	MW	4,004	4,510	5,260	520	9	1.06%
Nuclear power	MW	0	0	0	0	0	0.00%
Wind power and other	MW	937	1,719.2	3,370	2,433	1,651	4.96%
Total	MW	**146,479**	**171,029.2**	**187,660**	**49,064**	**19,508**	**100.00%**
Share in total installed capacity of 2008					26.15%	10.40%	

In conclusion, $EF_{grid,BM,y}$ =0.7975*93.98%=0.7495tCO_2/MWh

Thus, the baseline emission factor of NCPG is $EF_{grid,y}$ =0.75*0.9914+0.25*0.7495=0.9309 tCO_2/MWh

Annex 4

MONITORING INFORMATION

There is no supplementary information.

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