CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-PDD)
Version 03 - in effect as of: 28 July 2006

CONTENTS

Annexes

SECTION A. GENERAL DESCRIPTION OF PROJECT ACTIVITY

A.1. Title of the project activity:

Title: Alashan Ayouqi 49.5MW Wind Farm

PDD Version: 3.0

Date: 11/10/2012

A.2. Description of the project activity:

Alashan Ayouqi 49.5MW Wind Farm (hereinafter referred to as the proposed project) is developed by Inner Mongolia Jie Yuan Wind Power Generation Co., Ltd. It is located in Hoh tolgoin, Alxa Right Banner, Alxa League, Inner Mongolia Autonomous Region, P.R.China. The proposed project involves the installation of 33 wind turbines, providing a total capacity of 49.5MW. The annual grid-connected output of the proposed project is estimated to be 112,217 MWh. The estimated annual GHG emission reductions are 100,531 tCO2e.

The purpose of the proposed project is to generate zero-emission wind power and supply it to the North China Power Grid (NCPG). For the proposed project:

- The scenario existing prior to the start of the implementation of the project activity is that electricity delivered to the NCPG by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources;
- The project scenario is the implementation of the proposed project, i.e., the installation and operation of 33 sets of wind turbines which will supply an average annual generation of 112,217 MWh to the NCPG and replace the same amount of electricity generated by fossil fuel fired power plants connected into the NCPG;
- The baseline scenario is the same as the scenario existing prior to the start of implementation of the project activity.

The proposed project will not only supply renewable electricity to the grid, but also contribute to sustainable development of the local community and the host country by means of:

- Increasing local government revenues and promoting local economy;
- Reducing GHG emissions and mitigating environment pollution caused by pollutant emission from fossil fuel-fired power plants;
- Creating permanent and temporary employment opportunity for the local residents;
- Regulating local energy source composition by increasing renewable energy.

A.3. Project participants:

Name of Party involved (*) ((host) indicates a host Party)	Private and/or public entity(ies) project participants (*) (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
P. R. China (host)	Inner Mongolia Jie Yuan Wind Power Generation Co., Ltd.	No

Switzerland	Vitol S.A.	No
(*) In accordance with the CDM modalities and procedures, at the time of making the CDM-PDD public at the stage of validation, a Party involved may or may not have provided its approval. At the time of requesting registration, the approval by the Party (ies) involved is required.		

Please refer to Annex 1 for detailed contact information.

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

A.4.1.1. Host Party (ies):

P. R. China

A.4.1.2. Region/State/Province etc.:

Inner Mongolia Autonomous Region

A.4.1.3. City/Town/Community etc.:

Hoh tolgoin, Alxa Right Banner, Alxa League

A.4.1.4. Details of physical location, including information allowing the unique identification of this project activity (maximum one page):

The proposed project is located in Hoh tolgoin, Alxa Right Banner, Alxa League, Inner Mongolia Autonomous Region, P.R.China. Its centre of the geographical coordinates are east longitude +104.1563° and north latitude +40.3823°, and the altitude is between 1580 m and 1680 m. Figure 1 illustrates the location of the proposed project. Table below shows the individual geographical coordinates of the 33 sets of wind turbines.

Figure A-1 Location of the proposed project

Table A-1 The geographical coordinates of each wind turbine

No.	east longitude	north latitude
1	+104.0845°	+40.3808°
2	+104.0884°	+40.3810°
3	+104.0923°	+40.3808°
4	+104.0953°	+40.3806°
5	+104.0989°	+40.3806°
6	+104.1029°	+40.3804°
7	+104.1126°	+40.3802°
8	+104.1159°	+40.3794°

9	+104.1359°	+40.3832°
10	+104.1393°	+40.3837°
11	+104.1463°	+40.3812°
12	+104.1503°	+40.3808°
13	+104.1529°	+40.3811°
14	+104.1561°	+40.3811°
15	+104.1628°	+40.3810°
16	+104.1672°	+40.3808°
17	+104.1716°	+40.3806°
18	+104.1753°	+40.3801°
19	+104.1823°	+40.3803°
20	+104.1861°	+40.3806°
21	+104.1897°	+40.3792°
22	+104.1929°	+40.3794°
23	+104.1961°	+40.3794°
24	+104.1991°	+40.3794°
25	+104.2019°	+40.3801°
26	+104.2047°	+40.3805°
27	+104.2078°	+40.3806°
28	+104.2112°	+40.3817°
29	+104.2144°	+40.3825°
30	+104.2175°	+40.3839°
31	+104.2215°	+40.3839°
32	+104.2210°	+40.3863°
33	+104.2236°	+40.3880°

A.4.2. Category (ies) of project activity:

Sectoral Scope 1: Energy industries (renewable sources)

A.4.3. Technology to be employed by the project activity:

The electricity generated by the proposed project will displace part of the electricity from the NCPG. The NCPG is dominated by thermal power generation[1].

The scenario existing prior to the implement of the project activity:

Electricity delivered to the grid (NCPG) by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources.

Project scenario:

The proposed project is a newly constructed wind farm. The total installed capacity of the proposed project is 49.5 MW equipped with 33 sets of 1,500 kW wind turbines. The wind turbines will turn wind resource into clean electricity which will be exported to the NCPG. It will not produce CO_2 emission during the process. The expected annual electricity supplied to the NCPG is 112,217 MWh and the estimated annual GHG emission reductions are 100,531 tCO_2e. The electricity will replace the same amount of electricity generation by fossil fuel fired power plants connected into NCPG and reduce the CO_2 emissions.

Baseline scenario:

[1] <China Electric Power Yearbook> (2007~2009)

The baseline scenario is the same as the scenario existing prior to the start of implementation of the project activity.

The main technical parameters of wind turbines are shown in the following Table A-2

Table A-2 Main technical parameters of the wind turbine

Model	Jinfeng77/1500kW
Rated power (kW)	1,500
Unit	33
Rotor diameter (m)	77
Rated voltage (V)	690
Vane Amount	3
Speed of wind rotor(rpm)	1000-1800
Rated rotate Speed (r/min)	1500
Cut-in Speed(m/s)	3.0
Cut-out Speed(m/s)	22
Lifetime(year)	20

Data source: Equipment Purchasing Contract of the Project Activity

Annual equivalent full load hours of the project activity is estimated to be 2,267 hours, which is sourced from the Feasibility Study Report (FSR) issued by an independent and qualified engineering company. By calculation, the plant load factor (PLF) of the proposed project is 0.259 and the annual electricity generation is 112,217 MWh. The simplified flow diagram is shown in the following Figure:

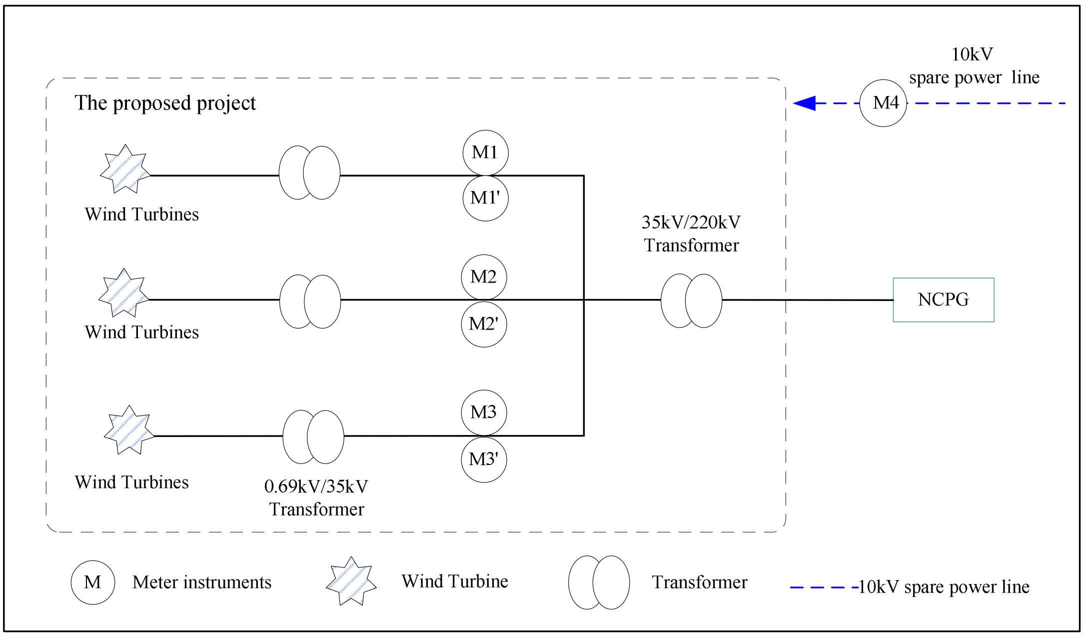

Figure A-2 Simplified flow diagram of the proposed project

The 33 wind turbines are divided into three groups, and each wind turbine will be equipped with one 690V/35kV transformer. The electricity output will be transmitted by 35kV transmission lines to the on-site 35/220kV transformer, then by 220kV transmission lines to the NCPG. Three electricity meters M1, M2 and M3 will be installed between the 0.69kV/35kV transformers and 35kV/220kV transformer at the project site, which can measure annual electricity exported to and imported from the grid by the proposed project. Each meter (M1, M2 and M3) has a backup meter (M1', M2' and M3') which will be installed at the same point of the main meter. The accuracy of the above meters will be no lower than 0.5S. The remaining meter M4 will be installed at 10kV spare power line, which can measure annual electricity imported from the grid by the proposed project in emergency, and the accuracy of this meter will be no lower than 1.0. All of the above meters are bidirectional meters. Only trained staffs are involved in the operation of the monitoring system.

According to the Feasibility Study Report and the Environmental Impact Assessment Report of the proposed project, the technology employed by the proposed project has been widely used in China and is environmentally safe.

There is no technology transferred from developed countries involved in this project activity.

A.4.4. Estimated amount of emission reductions over the chosen crediting period:

The proposed project adopts renewable crediting period. Annual emission reductions of the first crediting period of the proposed project are estimated to be 100,531 tCO_2e. For detailed calculation, please refer to section B. The total emission reductions of the project will be 703,717 tCO_2e during the first crediting period (05/11/2012-04/11/2019).

Years	**Annual estimation of emission reductions in tonnes of CO_2e**
05/11/2012-04/11/2013	100,531
05/11/2013-04/11/2014	100,531
05/11/2014-04/11/2015	100,531
05/11/2015-04/11/2016	100,531
05/11/2016-04/11/2017	100,531
05/11/2017-04/11/2018	100,531
05/11/2018-04/11/2019	100,531
Total estimated reductions (tonnes of CO_2e)	**703,717**
Total number of crediting years	7
Annual average over the crediting period of estimated reductions (tonnes of CO_2e)	100,531

A.4.5. Public funding of the project activity:

No public funds from countries in Annex Ⅰ are involved in the proposed project.

SECTION B. APPLICATION OF A BASELINE AND MONITORING METHODOLOGY

B.1. Title and reference of the approved baseline and monitoring methodology applied to the project activity:

The proposed project applies the approved consolidated baseline and monitoring methodology ACM0002 "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" (Version 12.3.0).

The methodology also refers to the latest approved versions of the following tools:

- Tool for the demonstration and assessment of additionality (Version 6.1.0);
- Tool to calculate the emission factor for an electricity system (Version 02.2.1).

For more information regarding the methodology and the tools as well as their consideration by the Executive Board, please refer to the website:

http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html

B.2. Justification of the choice of the methodology and why it is applicable to the project activity:

The approved methodology ACM0002 (Version 12.3.0) is applicable to the proposed project, because the proposed project meets all the applicability criteria stated in the methodology with relevance to wind power project.

- The proposed project is a renewable power generation project activity at a site where no renewable power plant was operated prior to the implementation of the project activity;
- The proposed project is a grid-connected project, which will be connected to the NCPG;
- The proposed project is the installation of a new wind power plant;
- The proposed project does not involve switching from fossil fuels to renewable energy sources at the site of the project activity;

Therefore, the approved consolidated baseline methodology, ACM0002 (Version 12.3.0) is applicable to the proposed project.

In addition, the proposed project activity meets the applicability conditions included in the "Tool to calculate the emission factor for an electricity system" (Version 02.2.1) referred below:

This tool may be applied to estimate the OM, BM and/or CM when calculating baseline emissions for a project activity that substitutes grid electricity, i.e. where a project activity supplies electricity to a grid.

The proposed project activity will supply electricity to the NCPG, and therefore this tool can be used to estimate the OM, BM and CM of the NCPG when calculating baseline emissions.

The project activity meets the applicability conditions included in the "Tool for the demonstration and assessment of additionality" (Version 6.1.0) referred below:

The document provides a general framework for demonstrating and assessing additionality and is applicable to a wide range of project types. Some project types may require adjustments to this general framework.

Project activities that apply this tool in context of approved consolidated methodology ACM0002, only need to identify that there is at least one credible and feasible alternative that would be more attractive than the proposed project activity.

The proposed project applies this tool in the context of approved consolidated methodology ACM0002 for demonstrating and assessing the additionality of the proposed project.

B.3. Description of the sources and gases included in the project boundary:

According to the methodology ACM0002 (Version 12.3.0), the spatial extent of the proposed project boundary includes the proposed project power plant and all power plants connected physically to the electricity system that the CDM project power plant is connected to. And in accordance with China DNA's notification[2], China is covered by 7 independent grids–Northeast China Power Grid, North China Power Grid, East China Power Grid, Central China Power Grid, Northwest China Power Grid, South China Power Grid and Hainan Local Grid.

Electricity generated by the proposed project will be delivered to the NCPG. The geographical area covered by the NCPG is composed of Beijing City, Tianjin City, Hebei Province, Shandong Province, Shanxi Province and Inner Mongolia Autonomous Region[2].

The project boundary can be illustrated by a schematic diagram, as shown in Figure 3.

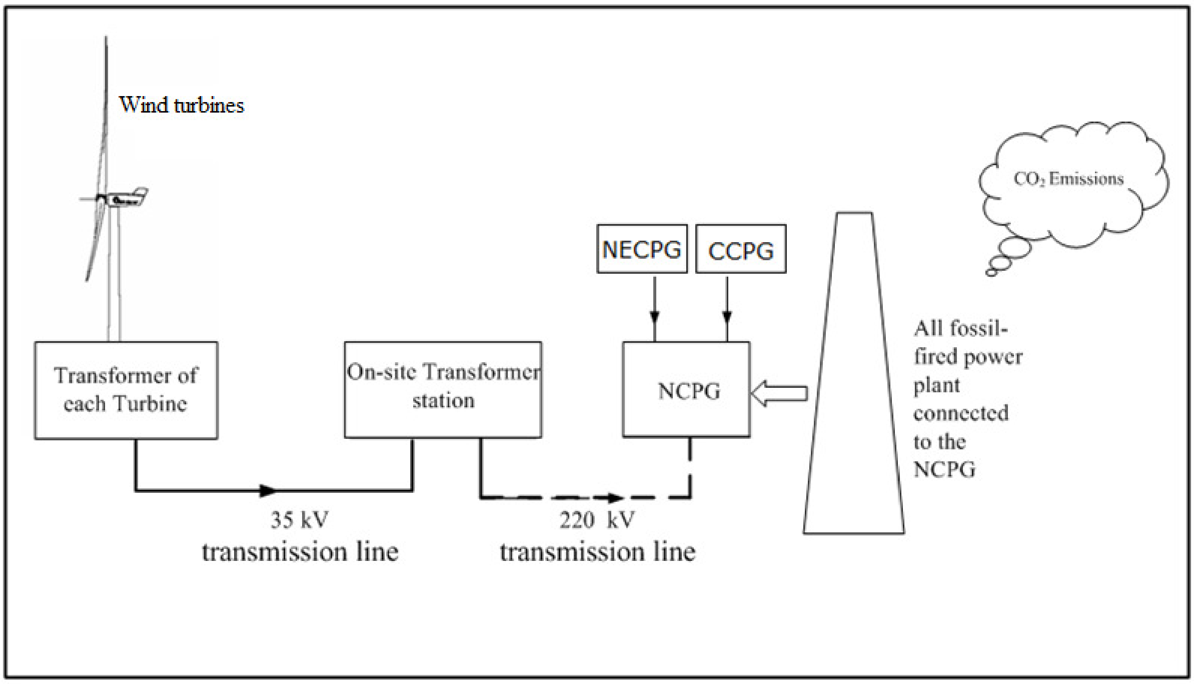

Figure B-1 Project boundary of the proposed project

For the purpose of calculating project emissions and baseline emissions, the emission sources and gases which are included in the project boundary are listed in the following Table B-1Table .

Table B-1 Emission sources included in the project boundary

Source		Gas	Included?	Justification / Explanation
Baseline	Emissions from electricity generation in fossil fuel fired power plants of the NCPG that are displaced due to the proposed project activity	CO_2	Yes	Main emission source and the only gas identified in the baseline methodology
		CH_4	No	Minor emission source

[2] http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File2720.pdf

		N_2O	No	Minor emission source
Project activity	Emissions caused by the proposed project activity	CO_2	No	According to ACM0002 (version 12.3.0), project emission is considered as zero for a wind power project.
		CH_4	No	According to ACM0002 (version 12.3.0), project emission is considered as zero for a wind power project.
		N_2O	No	According to ACM0002 (version 12.3.0), project emission is considered as zero for a wind power project.

B.4. Description of how the baseline scenario is identified and description of the identified baseline scenario:

The proposed project activity is the installation of a new grid-connected wind power plant, which will be connected to the NCPG. According to ACM0002 (Version 12.3.0), the baseline scenario is as follows:

Electricity delivered to the grid (NCPG) by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the "Tool to calculate the emission factor for an electricity system" (Version 02.2.1).

According to ACM0002, baseline emissions are equal to the power generated by the project that is delivered to the NCPG multiplied by the baseline emission factor. The baseline emission factor ($EF_{grid,CM,y}$) is calculated as a combined margin (CM), which consists of the weighted average of operating margin (OM) emission factor and build margin (BM) emission factor. The key parameters used for emission reductions calculation are sourced from China DNA's Notification[3].

For detailed information, please see Annex 3.

B.5. Description of how the anthropogenic emissions of GHG by sources are reduced below those that would have occurred in the absence of the registered CDM project activity (assessment and demonstration of additionality):

Prior consideration of CDM before the construction of the proposed project

On the base of additionality demonstration, an overview of the key events and actions in the development of the proposed project is listed in Table 3.

The Feasibility Study Report (FSR) of the proposed project was completed by a third party in August 2007. As per FSR, it can be found that the project would not be financially attractive, the project IRR would be below the benchmark if there were not additional income from the sale of emission reductions; therefore the CDM income was crucial to help them overcome the financial barriers. With the financial analysis presented in FSR, the project sponsor decided to develop the proposed project as a CDM project, as the project IRR (post tax) can be higher than the project benchmark IRR (post tax) when considering the CDM revenue.

Following the "guideline on the demonstration and assessment of prior consideration of the CDM" (Version 03.0) made in the EB49 meeting, the project owner submitted the Prior Consideration of the

CDM Form about the proposed project to EB on 22/09/2011 and the Notification Form about the proposed project to the Chinese DNA on 29/09/2011.

Table B-2 Overview of key events in the development of the project

Date	Events
08/2010	Feasibility Study Report (FSR) of the proposed project was finished.
09/2010	Environmental Impact Assessment Report was finished.
01/11/2010	Received the Environmental Impact Assessment Report Approval.
09/12/2010	Feasibility Study Report (FSR) of the proposed project was approved.
20/12/2010	The project developer held a board meeting to decide to develop the proposed project as a CDM project.
30/04/2011	The equipment purchasing contract was signed, which is deemed as the project starting date.
05/05/2011	The general construction contract was signed.
20/05/2011	The purchasing contract of main transformer was signed.
07/2011	The project owner conducted the stakeholders' comments survey .
22/09/2011	The Prior Consideration of CDM Form was submitted to EB.
14/10/2011	Notification form about the proposed project was submitted to the Chinese DNA.

From the events and actions above, we can draw the conclusion clearly that CDM revenue has been seriously considered during the early planning stages of the proposed project. If the project can be registered as CDM project successfully, CDM revenue will eliminate the financial barrier to ensure the continued development and operation of the proposed project.

Demonstration and assessment of additionality

The additionality will be demonstrated by the "Tool for the demonstration and assessment of additionality" (Version 6.1.0). The tool includes the following steps:

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

According to the ACM0002 (Version 12.3.0), the baseline scenario of a new grid-connected renewable power plant is the following: "Electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the .Tool to calculate the emission factor for an electricity system".

According to relevant requirements of VVM, alternatives to the proposed project is not needed to be identified as the baseline scenario has been prescribed in the ACM0002 (Version 12.3.0) applied.

However, as per the additionality tool, the alternatives as follows should be included:

Alternative 1: The proposed project undertaken without being registered as a CDM project;

Alternative 2: NCPG provides equivalent electricity with that delivered to the grid by the proposed CDM project.

Step 2: Investment analysis

Sub-step 2a: Determine appropriate analysis method

According to "Tool for the demonstration and assessment of additionality (Version 6.1.0)", three options can be applied for the investment analysis: the simple cost analysis.

- Option I: the simple cost analysis;
- Option II: the investment comparison analysis;
- Option III: the benchmark analysis.

The simple cost analysis (Option I) is not applicable for the proposed project because the project activity will generate economic benefits from electricity sale other than CERs income.

The investment comparison analysis (Option II) is also not applicable for the proposed project because the baseline scenario, providing the same capacity or electricity output by the NCPG, is not a new investment project.

To conclude, the benchmark analysis (Option III) will be used to identify whether the financial indicator (such as IRR or NPV) of the proposed project is better than relevant benchmark value.

Sub-step 2b: Apply benchmark analysis (Option III)

According to the Interim Rules on Economic Assessment of Electrical Engineering Retrofit Projects[3] issued by State Power Corporation of China, the benchmark IRR (after tax) of power industry is 8%, which is widely used in wind power projects. The project is considered to be financially feasible when the project IRR is equal to or higher than the benchmark.

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

Based on the Feasibility Study Report (FSR) of the proposed project, the basic parameters for calculating financial indicators are shown in the following table:

Table B-3 Main parameters for calculation of financial indicators

Items	Unit	Value	Source
Installed capacity	MW	49.5	FSR
Annually electricity output	MWh	112,2171	FSR
Static total investment	Million RMB	490.86	FSR
Equity ratio		20%	FSR
Electricity tariff (incl. VAT)	RMB/kWh	0.54	FSR
Value added tax rate (VAT)		17%	FSR
Urban maintenance and construction tax rate		5%	FSR
Surtax for education rate		3%	FSR
Income tax rate		25%	FSR
Period of depreciation	Year	15	FSR
Depreciation rate		6.33%	FSR
Rate of residue value		5%	FSR
Project lifetime	Year	20	FSR
Long-term loan interest rate		6.80%	FSR
CER price	RMB/t CO_2e	100	Estimated

The financial indicators (Project IRR) with and without income from selling CERs are listed in the following Table B-4. Without income from selling CERs, the IRR of the proposed project is 6.42%, lower than the benchmark IRR 8% and the proposed project is financially unacceptable because of its low profitability. While considering such income, the IRR of the proposed project is 9.36%, higher than the benchmark, and the proposed project is financially acceptable.

[3] Issued by the Operation Department of Power Generation and Transmission, State Power Corporation, 2003

Table B-4 Comparison of financial indicators of different scenarios with benchmark

Items	Without income from CERs	Benchmark	With income from CERs
The Project IRR	6.42%	8%	9.39%

Sub-step 2d: Sensitivity analysis

The objective of this sub step is to show the conclusion regarding the financial attractiveness is robust to reasonable variations of the critical assumptions.

Four factors are considered in following sensitivity analysis:

1) Static total investment;
2) Annual O&M cost;
3) Electricity tariff;
4) Annual electricity output.

In China, the range of sensitivity analysis is normally chosen to be –10%～+10% in the project investment analysis, and it is proper for the proposed project according to "Tool for the demonstration and assessment of additionality (Version 6.1.0)".

Assuming the above four factors vary in the range of -10% to 10%, the project IRR of the proposed project (without income from selling CERs) varies to different extent, as shown in Table B-5 and Figure B-2.

Table B-5 Sensitivity analysis of the project

	-10%	-5%	0%	5%	10%
Static total investment	7.90%	7.14%	6.42%	5.75%	5.12%
Annual O&M Cost	6.67%	6.55%	6.42%	6.30%	6.17%
Electricity tariff	4.88%	5.66%	6.42%	7.15%	7.86%
Annual electricity output	4.88%	5.66%	6.42%	7.15%	7.86%

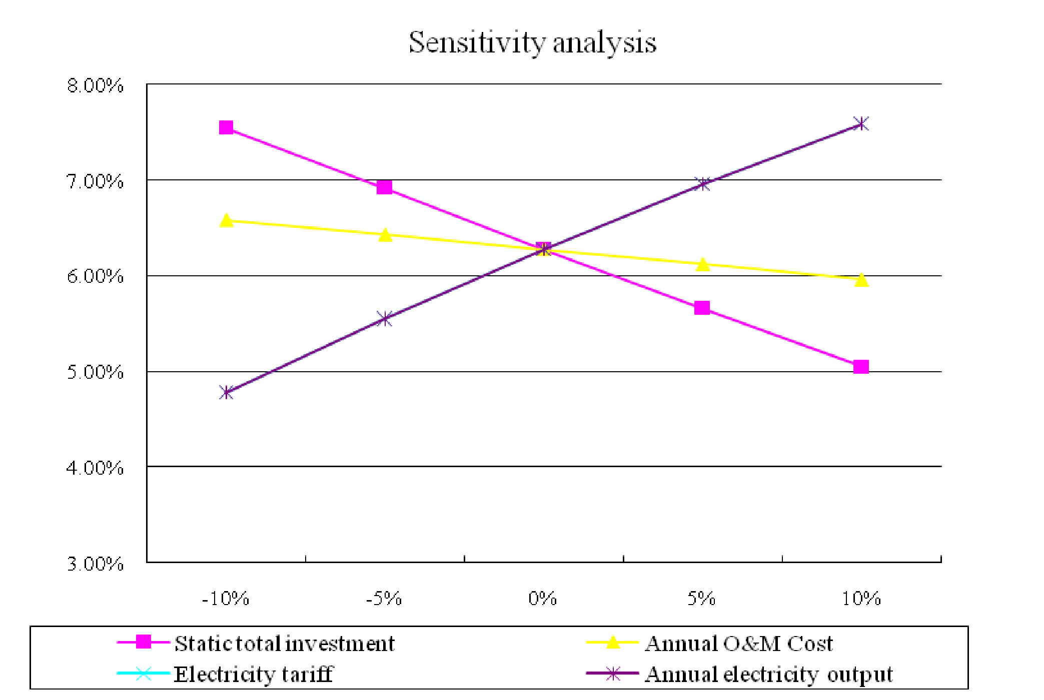

Figure B-2 Sensitivity analysis of the proposed project

Table B-6Table and Figure B-2 show that the IRR of the proposed project keeps lower than the benchmark when the four parameters fluctuate within the range from -10% to 10%.

Table B-6 Parameter variation when project IRR is equal to the benchmark

Variation of the parameters to make IRR reach the benchmark 8%	Static total investment	Annual O&M Cost	Electricity tariff	Annual electricity output
	-10.60%	-66.50%	11.05%	11.05%

The project IRR will reach the benchmark (8%) at the following assumptions, but it is very unlikely to happen due to:

- Only when the static total investment has a drop of 10.60%, can the project IRR reach the benchmark rate. However, as the prices of raw materials and manpower have been increasing in recent years, which results in the price of equipments and construction rising[4], a significant reduction in the level of investment is unlikely. And, the already signed contracts (equipment contracts, construction contracts, etc.) (i.e. 397.12 Million RMB) has already higher than that estimated equipments and construction fees in the FSR (i.e. 349.28 Million RMB). Thus the data of total static investment in FSR and PDD is reliable. Therefore, it was not realistic for the developer to assume that static total investment could decrease by the required 10.60%.
- Only when the annual O&M cost has a drop of 66.50%, can the project IRR reach the benchmark rate. The O&M costs mainly include the raw material cost, maintenance cost and wages for the workers, insurance and miscellaneous cost etc. As per the Statistic Yearbook of China, the price of material and salaries of the employees are gradually increasing in China, which leads annual O&M cost gradually increasing. So, it's unlikely for the annual O&M cost to decrease 66.50% to reach benchmark IRR.

[4] http://www.cnelc.com/news/ShowArticle.asp?key=100088861&Page=1

- Only when the estimated electricity tariff increases by 11.05%, can the project IRR reach the benchmark rate. There is extremely unlikely for the tariff of the proposed project to have an increase of 11.05%. The tariff applied in the IRR calculation sources from FSR which has been approved in July 2009, the Notice on guiding the on-grid tariff for all China land-based wind power project was issued by NDRC (Doc No. [2009]1906). This Notice classify Chinese wind resource into four types and announce that the tariff for wind power project in Inner Mongolia is 0.54RMB/kWh (incl. VAT)[5]. Furthermore, the highest tariff of wind farm project in Inner Mongolia applied by the EB in its decision on registration of projects in People's Republic of China issued by CDM EB on 03/06/2011[6] is also 0.54 RMB/kWh (incl. VAT). What's more, the tariff is not changed from year 2009 to year 2012. So, the electricity tariff will not be changed to make the project IRR equal to or higher than the benchmark;
- Only when the annual electricity output increase by 11.05%, can the project IRR reach the benchmark rate. In the FSR, the expected annual electricity output of the proposed project are 112,216.5MWh, which were calculated on the basis of the on-site wind data measurements from 1st June, 2009 to 31st May, 2010 and the historical wind speeds between 1971 and 2000 measured by Alashan Meteorological Station[7]. The calculations of electricity output for the project were carried out using professional WAsP software designed for wind energy, which is used by wind developers and turbines manufacturers worldwide. As the calculation were based on on-site wind resource measurements data and historical data, assuming a sustained 11.05% of increase in annual electricity output is not reasonable.

In a word, when financial indicators change within reasonable range, the proposed project is not financially feasible without CDM support. Therefore, Alternative 1 is not feasible. Therefore the baseline scenario is alternative 4) continuation of the current situation (electricity will be generated by power plants connected to NCPG).

Step 3: Barrier analysis

The proposed project does not adopt barrier analysis.

Step 4: Common practice analysis

Sub-step 4a: Analyze other activities similar to the proposed project activity

In accordance with "Guidelines on Common Practice (version 02.0)" provided in Annex 8 of the 69th Meeting of the Executive Board, the common practice analysis for the proposed project activity is as follows:

Sub-step 1: Calculate applicable output range as +/- 50% of the design output or capacity of the proposed project activity.

The proposed project activity has an installed capacity of 49.5 MW.
Therefore the applicable output range for the common practice analysis is:
Installed Capacity: 24.75MW ~ 74.25MW

Sub-step 2: identify similar projects (both CDM and none CDM) which fulfill all of the following conditions:

(a) The projects are located in the applicable geographical area;
(b) The projects apply the same measure as the proposed project activity;
(c) The projects use the same energy source/fuel and feedstock as the proposed project activity, if a technology switch measure is implemented by the proposed project activity;
(d) The plants in which the projects are implemented produce goods or services with comparable

[5] http://www.ndrc.gov.cn/zcfb/zcfbtz/2009tz/t20090727_292827.htm
[6] http://cdm.unfccc.int/Reference/Notes/reg_note07.pdf
[7] Feasibility Study Report of the proposed project

quality, properties and application areas (e.g. clinker) as the proposed project plant;
(e) The capacity or output of the projects is within the applicable capacity or output range calculated in Step 1;
(f) The projects started commercial operation before the project design document (CDM PDD) is published for global stakeholder consultation or before the start date of proposed project activity, whichever is earlier for the proposed project activity.

The project applies above points (a), (f) and (c) to analyze in this step, details are as following:

(a) Applicable geographical area should be covered the entire host country. But in China, the investment environment for each region is different. Specifically in terms of available resources, labour costs and electricity tariffs, these can vary significantly in different parts of China, even different province of China. Please see the table below including some typical indicators in different province of China, which shows that there is significant difference among different regions in China. Therefore, it is not appropriate to consider activities in the whole of China and Inner Mongolia is selected as the appropriate geographical area for the common practice analysis.

Table B-7 The typical indicators in different provinces of China

Province	Annual Average Salary(RMB)[8]	Average GDP/person (RMB)[9]
Beijing	65,683	70,234
Tianjin	52,963	63,395
Hebei	32,306	24,583
Shanxi	33,544	20,779
Inner Mongolia	35,507	37,287
Shandong	33,729	35,893
Shanghai	71,874	77,205
Jiangsu	40,505	43,907
Zhejiang	41,505	44,895
Anhui	34,341	16,656
Fujian	28,666	33,106
Liaoning	35,057	34,193
Jilin	29,399	25,906
Heilongjiang	29,603	21,593
Henan	30,303	21,073
Hubei	32,588	22,050
Hunan	30,483	19,355
Jiangxi	29,092	15,921
Sichuan	33,112	17,289
Chongqing	35,326	20,219
Shaanxi	34,299	20,497

8 The annual average salary of provinces and whole China in 2010 Available at: 110 law consultant net issued on May 26, 2011. http://www.110.com/ziliao/article-219727.html
9 The ranking of the provincial GDP in China Available at : http://zhidao.baidu.com/question/225894808.html

Gansu	29,588	12,882
Qinghai	37,182	18,346
Ningxia	39,144	19,642
Xinjiang	32,361	19,119
Guangdong	40,358	39,978
Guangxi	31,842	16,576
Yunnan	30,177	13,687
Guizhou	31,458	9,214

(f) The project starting date is 30/04/2011 and the GSC date is 05/11/2011, thus projects started commercial operation before 30/04/2011 shall be identified as per point (f).

(c) On the basis of the statistic on China Electric Power Yearbook 2011 ,which included all the power plants started commercial operation before the end of 2010 and the website information, the electricity generation in Inner Mongolia are all from fuel fired power plants wind power plants and hydropower plants. As fuel fired power plants and hydropower plants have different energy source with wind power plants, fuel fired power plants and hydropower plants are not considered.

As analyzed above, wind power plants located in Inner Mongolia with capacity range of 24.75MW ~ 74.25MW and operated before 30/04/2011 shall be identified as similar projects.

Sub-Step 3: within the projects identified in Step 2, identify those that are neither registered CDM project activities, project activities submitted for registration, nor project activities undergoing validation. Note their number *Nall.*

According to "Guidelines on Common practice", 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 excluded from the analysis. Hence, there is only two projects identified as Table B-8.

Table B-8 Activities similar to the Project

Name	Commissioning date	Capacity (MW)	Note
Dali Phase III Wind Farm Project	2004	30MW	Demonstration Project supported by national debt fund[10]
Bailingmiao Wind Project	2007	50MW	Applying for Voluntary Emission Reduction under Golden Standard Voluntary Carbon Standard[11]

Data source: Installed Capacity of Wind Farms in China 2007-2010, issued by Chinese Wind Energy Association[12].

Therefore, Nall=2.

[10] http://www.chifeng.gov.cn/html/2008-11/3130.shtml

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

[12] http://www.cwea.org.cn/download/display_info.asp?cid=2&sid=&id=25
http://www.cwea.org.cn/download/display_info.asp?cid=2&sid=&id=31
http://www.cwea.org.cn/download/display_info.asp?cid=2&sid=&id=36
http://www.cwea.org.cn/download/display_info.asp?cid=2&sid=&id=39

Sub-Step 4: within similar projects identified in Step 3, identify those that apply technologies that are different to the technology applied in the proposed project activity. Note their number N_{diff}.

As indicated in Table 8 above, the only large scale project which is not CDM is the Dali and Bailingmiao projects which are also facing financial barriers and is receiving debt fund or Voluntary Emission Reduction. Therefore, they have a different environmental climate with the project activity.
.N_{diff}=2.

Step 5: calculate factor F=1-N_{diff}/N_{all} representing the share of similar projects (penetration rate of the measure/technology) using a measure/technology similar to the measure/technology used in the proposed project activity that deliver the same output or capacity as the proposed project activity.

F=1-N_{diff}/N_{all} =1-2/2=0
N_{all}-N_{diff} =0

In conclusion, F<0.2, N_{all}-N_{diff} <3, The proposed project activity is not a "common practice" within a sector in the applicable geographical area.

Sub-step 4b: Discuss any similar options that occurring
As analyzed above, there is an essential distinction between the proposed project and similar projects. It can therefore be concluded that similar hydropower projects implemented in Inner Mongolia did not face the same barriers as the proposed project. Therefore, the proposed project can not be considered common practice and should be deemed additional.

Conclusion of the assessment and demonstration of additionality

To summarize, "the Project is undertaken without being registered as a CDM project activity" is not financially attractive to investors, thus it is not feasible. Being registered as a CDM project, the CERs revenues can alleviate the identified barriers, therefore the Project is additional.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

Emission reductions by the proposed project can be calculated based on the ACM0002 (Version 12.3.0) and the methodological tool "Tool to calculate the emission factor for an electricity system" (Version 02.2.1). The details are shown below:

1. Project emissions (PE_y **)**

According to ACM0002 (Version 12.3.0), the emission of wind power project activity is zero.

2. Baseline emissions (BE_y **)**

Baseline emissions include only CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity. ACM0002 assumes that all project electricity generation above baseline levels would have been generated by existing grid-connected power plants and the addition of new grid-connected power plants. The baseline emissions are to be calculated as follows:

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

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 latest version of the "Tool to calculate the emission factor for an electricity system" (tCO_2/ MWh)

The proposed project activity is the installation of a new grid-connected renewable power plant at a site where no renewable power plant was operated prior to the implementation of the proposed project activity, then:

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

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)

The methodological tool "Tool to calculate the emission factor for an electricity system" (Version 02.2.1) determines the CO_2 emission factor for the displacement of electricity generated by power plants in an electricity system (the NCPG), by calculating the "combined margin" emission factor (CM) of the NCPG. The CM is the result of a weighted average of two emission factors pertaining to the NCPG: the "operating margin" (OM) and the "build 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 CDM project activity. The build margin is the emission factor that refers to the group of prospective power plants whose construction and future operation would be affected by the proposed CDM project activity.
The following six 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 (BM) emission factor.
- Step 6: Calculate the combined margin (CM) emission factor.

Step1: Identify the relevant electricity systems

In accordance with Chinese DNA's announcement of "2010 Baseline Emission Factors for Regional Power Grids in China"[2], the NCPG is selected as the project electricity system, which is composed of Beijing City, Tianjin City, Hebei Province, Shandong Province, Shanxi Province and Inner Mongolia Autonomous Region. As there is electricity imported from the Northeast China Power Grid (hereinafter referred as NECPG) and the Central China Power Grid (hereinafter referred as CCPG) by the NCPG, the NECPG and the CCPG are selected as the connected electricity systems.

For the purpose of determining the build margin emission factor, the spatial extent is limited to the project electricity system, except where recent or likely future additions to transmission capacity enable significant increases in imported electricity. In such cases, the transmission capacity may be considered a build margin source.

For the proposed project, the spatial extent for determining the build margin emission factor is limited to the project electricity system, i. e. the NCPG, as there are no recent or likely future additions to transmission capacity that would enable significant increases in imported electricity. The data in Annex 3 shows that imports are relatively small and have not changed significantly in the period covered. Therefore, the transmission capacity is not considered a build margin source.

For the purpose of determining the operating margin emission factor, use one of the following options to determine the CO_2 emission factor(s) for net electricity imports from a connected electricity system:

(a) 0 tCO_2/MWh; or

(b) The weighted average operating margin (OM) emission rate of the exporting grid, determined as described in Step 4 (d) below; or

(c) The simple operating margin emission rate of the exporting grid, determined as described in Step 4 (a), if the conditions for this method, as described in Step 3 below, apply to the exporting grid; or

(d) The simple adjusted operating margin emission rate of the exporting grid, determined as described in Step 4 (b) below.

According to Chinese DNA's "2011 Baseline Emission Factors for Regional Power Grids in China"[2], Option (c) is selected to determine the CO_2 emission factors for net electricity imports from the NECPG and the CCPG.

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.

Following the guideline of the DNA, and the statistical data available, Option I is chosen.

Step3: Select a method to determine the operating margin (OM)

The calculation of the operating margin emission factor ($EF_{grid,OM,y}$) is based on one of the following methods:

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[13] 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 low-cost/must-run resources only constitute 0.76%, 0.67%, 0.74%, 0.90% and 1.19%[14] of total generation of NCPG from the year 2004 to 2008, respectively, which are far less than 50% of total grid generation in the five most recent years. Therefore, the simple OM method (option a) is used to calculate OM emission factor for the proposed project.

[13] Low-cost/must-run resources are defined as power plants with low marginal generation costs or power plants that are dispatched independently of the daily or seasonal load of the grid. They typically include hydro, geothermal, wind, low-cost biomass, nuclear and solar generation. If coal is obviously used as must-run, it should also be included in this list, i.e. excluded from set of plants.

[14] China Electric Power Yearbooks (2005:P474; 2006: P572; 2007:P638; 2008:P733, 2009:P695)

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

- 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 emission 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. For off-grid power plants, use a single calendar year within the 5 most recent calendar years prior to the time of submission of the CDM-PDD for validation.
- 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 emission factor to be updated annually during monitoring. If the data required to calculate the emission factor for year y is usually only available later than six months after the end of year y, alternatively the emission factor of the previous year y-1 may be used. If the data is usually only 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 proposed project, "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.

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.

The simple OM may be calculated with the following two options:

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

Option B: Based on net electricity generation, the average efficiency of each power unit and the fuel type consumption of the project electricity system,

Option B can only be used if:

(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 data of fuel consumption, net electricity generation and the average efficiency of each power unit are unavailable in China, thus option A cannot be used. Nevertheless, the data of 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 are available, and, 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, therefore, Option B is chosen for the proposed project,

Under Option B, the simple OM emission factor of the NCPG is calculated based on the net electricity supplied to the grid by all power plants serving the system, not including low-cost/must-run power plants/units, and based on the fuel type(s) and total fuel consumption of the project electricity system, as follows:

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

Where:

$EF_{grid,OMsimple,y}$	= 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 type 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 (tCO_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	= The three most recent years for which data is available at the time of submission of the CDM-PDD to the DOE for validation (ex ante option)

With above option, the simple operating margin CO_2 emission factor ($EF_{grid,OMsimple,y}$) of the NCPG is calculated as 0.9803 tCO_2/MWh. The detailed information is listed in the Annex 3.

$EF_{grid,OMsimple,y}$ =0.9803 tCO_2/MWh

Step 5: Calculate the build margin (BM) emission factor

In terms of vintage of data, one of the following two options can be chosen to calculate the build margin emission factor:

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.

For the proposed project, option 1 is chosen to calculate build margin (BM) emission factor. And the capacity additions from retrofits of power plants are not included in the calculation of the build margin emission factor.

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 power generation data is available, calculated as follows:

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

Where:

$EF_{grid,BM,y}$ = 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 power generation data is available

As the specific data regarding to fuel consumption and electricity generation additions by each power source is unavailable in China, the BM calculation in this PDD adopts the modified methods derived from the "2010 Baseline Emission Factors for Regional Power Grids in China"[2], which was published by the Chinese DNA on 20th Oct., 2011 and accepted by EB[15].

Therefore for the proposed project: First, calculate the share of different power generation technology in recent capacity additions; second, calculate the weight for capacity additions of each power generation technology; and finally, calculate the emission factor use the efficiency level of the best technology commercially available in China.

Because the generating capacity of the coal-fired, oil-fired and gas-fired technology can not be separated from the existing statistical data, the BM calculation in this PDD adopts the following method: First, use the available data in the energy balance tables on the most recent year, then calculate the proportion of CO_2 emissions from solid, liquid and gaseous fuels corresponding to the total emissions of CO_2 emissions. Second, the proportion used as the weight, based on the emission factors of the optimal efficient and commercial technologies, calculate the emission factor of the thermal power in the NCPG. Finally, this thermal emission factor is multiplied by the proportion of thermal power added capacity in the newly installed 20% capacity, the result is BM emission factor.

According to "Tool to calculate the emission factor for an electricity system" and EB accepts, the main steps related formulas for BM calculation are as follows:

Sub-step 5-1: Calculation of weights of CO_2 emissions by coal-fired, oil-fired and gas-fired plants in total CO_2 emissions of NCPG.

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

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

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

Where:

$F_{i,j,y}$	= The amount of fuel i (in a mass or volume unit) consumed by province j in year y
$NCV_{i,y}$	= The net calorific value of the fuel type i in year y (GJ/mass or volume unit)
$EF_{CO_2,i,j,y}$	= The CO_2 emission factor of fuel type i in year y (tCO_2/GJ)
$COAL$, OIL and GAS	= The aggregation of various kinds of coal, oil, and gas as fossil fuels

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[15] Deviation for projects in China (DNV, 7 Oct 05), see http://cdm.unfccc.int/Projects/Deviations

COAL, OIL, and GAS is the aggregation of various kinds of coal, oil, and gas as fossil fuels

Sub-step 5-2: Calculate the emission factor of thermal power generation of the NCPG

$EF_{Thermal,y}$ is calculated as a weighted emission factor as the following formula:

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

Where:

$EF_{Coal,Adv,y}$, $EF_{Oil,Adv,y}$ and $EF_{Gas,Adv,y}$ are the emission factor proxies of efficiency level of the best coal-fired, oil-based and gas-based power generation technology commercially available in China.

Based on the above calculation principle for BM, basic data and parameters, the calculation process for BM is shown in Annex 3.

Sub-step 5-3: Calculation of Build Margin (BM) emission factor of NCPG

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

Where:

$CAP_{Total,y}$ = The total amount of newly added installed capacity

$CAP_{Thermal,y}$ = The increased installed capacity of the thermal power generation

Base on the formulas above, the result is:

$EF_{grid,BM,y}$ = 0.6426tCO_2/MWh

For the detailed information, please see the Annex 3.

Step 6: Calculate the combined margin emission factor

The calculation of the combined margin (CM) emission factor ($EF_{grid,CM,y}$) is based on one of the following methods:

(a) Weighted average CM; or

(b) Simplified CM.

The weighted average CM method (option a) should be used as the preferred option.

The simplified CM method (option b) can only be used if:

- The project activity is located in a Least Developed Country (LDC) or in a country with less than 10 registered projects at the starting date of validation; and
- The data requirements for the application of step 5 above cannot be met.

The proposed project uses method (a): Weighted average CM to calculate the combined margin emission factor, as follows:

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

Where:

$EF_{grid,BM,y}$ = Build margin CO_2 emission factor in year y (tCO_2/MWh)

$EF_{grid,OM,y}$ = Operating margin CO_2 emission factor in year y (tCO_2/MWh)

ω_{OM} = Weighting of operating margin emission factor (%)

ω_{BM} = Weighting of build margin emission factor (%)

The following default values should be used for w_{OM} and w_{BM}:

- Wind and solar power generation project activities: w_{OM} = 0.75 and w_{BM} = 0.25 (owing to their intermittent and non-dispatchable nature) for the first crediting period and for subsequent crediting periods;

- All other projects: w_{OM} = 0.5 and w_{BM} = 0.5 for the first crediting period, and w_{OM} = 0.25 and w_{BM} = 0.75 for the second and third crediting period, unless otherwise specified in the approved methodology which refers to this tool.

The proposed project is a wind power generation project, so w_{OM} = 0.75 and w_{BM} = 0.25.

Applying the default weights for the proposed project, we calculate a Baseline Emission Factor as follows:

$EF_{grid,CM,y}$ = 0.9803*0.75+ 0.6426*0.25=0.895875 tCO_2/MWh

3. Leakage

According to ACM0002 (Version 12.3.0), no leakage emissions are considered.

4. Emission reductions (ERy)

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_2/yr)

B.6.2. Data and parameters those are available at validation:

Data / Parameter:	$OXID_i$
Data unit:	%
Description:	The Oxidation factor of fuel i
Source of data used:	2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value applied:	See Annex3 for details
Justification of the choice of data or description of measurement methods and procedures actually applied :	2006 IPCC Guidelines for National Greenhouse Gas Inventories
Any comment:	-

Data / Parameter:	$FC_{i,y}$
Data unit:	Mass or volume unit
Description:	The amount of fuel i (in a mass or volume unit) consumed by relevant power sources m in year(s) y
Source of data used:	China Energy Statistical Yearbook (2008-2010)
Value applied:	See Annex 3 for details
Justification of the choice of data or description of measurement methods and procedures actually applied :	China Energy Statistical Yearbook (2008-2010)
Any comment:	-

Data / Parameter:	$NCV_{i,y}$
Data unit:	GJ/mass or volume unit of a fuel

Description:	The net calorific value (energy content) per mass or volume unit of a fuel i in year(s) y
Source of data used:	China Energy Statistical Yearbook 2010
Value applied:	See Annex 3 for details
Justification of the choice of data or description of measurement methods and procedures actually applied :	China Energy Statistical Yearbook (2008-2010)
Any comment:	-

Data / Parameter:	$EF_{CO2,i,y}$
Data unit:	tCO_2/GJ
Description:	The CO_2 emission factor per unit of energy of the fuel i in year y
Source of data used:	2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value applied:	See Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	2006 IPCC Guidelines for National Greenhouse Gas Inventories
Any comment:	-

Data / Parameter:	EG_y
Data unit:	MWh
Description:	Net electricity generated and delivered to NCPG in year y
Source of data used:	China Electric Power Yearbook 2008~2010
Value applied:	See Annex 3 for details
Justification of the choice of data or description of measurement methods and procedures actually applied :	China Electric Power Yearbook (2008~2010)
Any comment:	-

Data / Parameter:	$GENE_{best,coal}$
Data unit:	
Description:	Best electricity supply efficiency for coal fired plant
Source of data used:	Notification on Determining Baseline Emission Factor of China's Grid[2]
Value applied:	39.45%
Justification of the choice of data or description of measurement methods and procedures actually applied :	Official statistical data
Any comment:	-

Data / Parameter:	$GENE_{best,oil/gas}$
Data unit:	
Description:	Efficiency level of the best technology commercially available in China for gas-fired and oil-fired power generators
Source of data used:	Notification on Determining Baseline Emission Factor of China's Grid[2]
Value applied:	51.77%
Justification of the choice of	Official statistical data

data or description of measurement methods and procedures actually applied :	
Any comment:	-

Data / Parameter:	$CAP_{j,y}$
Data unit:	MW
Description:	Installed capacity in province j in year y of NCPG
Source of data used:	China Electric Power Yearbook 2008~2010
Value applied:	See annex 3 for details
Justification of the choice of data or description of measurement methods and procedures actually applied :	China Electric Power Yearbook (2008~2010)
Any comment:	-

B.6.3. Ex-ante calculation of emission reductions:

According to the calculation method in B.6.1, the results are as follows:

Baseline emissions

Emission factors of the NEPG are shown in Table B-9.

Table B-9 Emission factors of the NCPG

Emission factors	Unit: tCO_2e/MWh
$EF_{grid,OM,y}$	0.9803
$EF_{grid,BM,y}$	0.6426
$EF_{grid,CM,y}$	0.895875

According to the Feasibility Study Report of the proposed project, the estimated annual electricity generation delivered to the power grid is:

$EG_{PJ,y} = EG_{facility,y}$ = 100,531MWh

$BE_y = EG_{PJ,y} \times EF_{grid,CM,y} = EG_{facility,y} \times EF_{grid,CM,y}$ = 112,217MWh *0.895875 tCO_2e/MWh

= 100,531tCO_2e

Project emissions

According to ACM0002 (version 12.3.0), the emission of wind power project activity is zero, i.e.

$$PE_y = 0$$

Leakage

According to ACM0002 (version 12.3.0), no leakage emissions are considered, i.e.

$$LE_y = 0$$

Emission reductions

The annual emission reductions of the project during the first crediting period are estimated to be:

$ER_y = BE_y - PE_y$ =100,531 tCO_2e/year-0 tCO_2e/year = 100,531tCO_2e/year

B.6.4. Summary of the ex-ante estimation of emission reductions:

Year	Estimation of Project activity Emission (tonnes of CO_2e)	Estimation of baseline emission (tonnes of CO_2e)	Estimation of leakage (tonnes of CO_2e)	Estimation of Emission reductions (tonnes of CO_2e)
05/11/2012-04/11/2013	0	100,531	0	100,531
05/11/2013-04/11/2014	0	100,531	0	100,531
05/11/2014-04/11/2015	0	100,531	0	100,531
05/11/2015-04/11/2016	0	100,531	0	100,531
05/11/2016-04/11/2017	0	100,531	0	100,531
05/11/2017-04/11/2018	0	100,531	0	100,531
05/11/2018-04/11/2019	0	100,531	0	100,531
Total (tonnes of CO_2e)	0	**731,255**	0	**703,717**

B.7. Application of the monitoring methodology and description of the monitoring plan:

B.7.1. Data and parameters monitored:

Data / Parameter:	$EG_{export,y}$
Data unit:	MWh
Description:	Electricity exported to the grid by the proposed project in year y.
Source of data:	Electricity meters
Value of data applied for the purpose of calculating expected emission reductions in section B.5	$EG_{export,y}$=$EG_{export,y,1}$+$EG_{export,y,2}$+$EG_{export,y,3}$ = 1 MWh
Description of measurement methods and procedures to be applied:	This parameter will be calculated by $EG_{export,y,1}$, $EG_{export,y,2}$, $EG_{export,y,3}$, which will be measured by meters M1, M2 and M3. The data will be continuously measured and monthly recorded. The data monitored and required for verification and issuance will be kept for two years after the end of the last crediting period or the last issuance of CERs for this project activity, whichever occurs later.
QA/QC procedures to be applied:	According to national standard, meters will be calibrated and checked at least once a year. The accuracy of the meter will be no lower than 0.5S. The data will be cross checked by electricity sales receipts or relevant commercial data.
Any comment:	-

Data / Parameter:	$EG_{import,y}$
Data unit:	MWh
Description:	Electricity imported from the grid by the proposed project in year y.
Source of data:	Electricity meters

Value of data applied for the purpose of calculating expected emission reductions in section B.5	$EG_{import,y}=EG_{import,y,1}+EG_{import,y,2}+EG_{import,y,3}$ =0 MWh
Description of measurement methods and procedures to be applied:	This parameter will be calculated by $EG_{import,y,1}$, $EG_{import,y,2}$, $EG_{import,y,3}$, which will be measured by meters M1, M2 and M3. The data will be continuously measured and monthly recorded. The data monitored and required for verification and issuance will be kept for two years after the end of the last crediting period or the last issuance of CERs for this project activity, whichever occurs later.
QA/QC procedures to be applied:	According to national standard, meters will be calibrated and checked at least once a year. The accuracy of the meter will be no lower than 0.5S. The data will be cross checked by electricity sales receipts or relevant commercial data.
Any comment:	-

Data / Parameter:	$EG_{im\text{-}spare,y}$
Data unit:	MWh
Description:	Electricity imported from the spare power line in emergency in year y.
Source of data:	Electricity meter
Value of data applied for the purpose of calculating expected emission reductions in section B.5	$EG_{im\text{-}spare,y}$ =0 MWh
Description of measurement methods and procedures to be applied:	This parameter will be measured by meter M4. The data will be continuously measured and monthly recorded. The data monitored and required for verification and issuance will be kept for two years after the end of the last crediting period or the last issuance of CERs for this project activity, whichever occurs later.
QA/QC procedures to be applied:	According to national standard, meter will be calibrated and checked at least once a year. The accuracy of the meter will be no lower than 1.0.
Any comment:	-

Data / Parameter:	$EG_{facility,y}$
Data unit:	MWh/yr
Description:	Quantity of net electricity generation supplied by the proposed project to the grid in year y.
Source of data	Project activity site
Value of data applied for the purpose of calculating expected emission reductions in section B.5	1 MWh(ex-ante estimated data)
Description of measurement methods and procedures to be applied:	This parameter will be calculated by $EG_{export,y}$, $EG_{import,y}$, $EG_{im\text{-}spare,y}$, which will be measured by meters M1, M2, M3 and M4. $EG_{facility,\ y}=EG_{export,\ y}-EG_{import,\ y}-EG_{im\text{-}spare,y}$ The data will be continuously measured and monthly recorded. The data monitored and required for verification and issuance will be kept for two years after the end of the last crediting period or the last

	issuance of CERs for this project activity, whichever occurs later.
QA/QC procedures to be applied:	According to national standard, meters will be calibrated and checked at least once a year.

B.7.2. Description of the monitoring plan:

The approved monitoring methodology ACM0002 (Version 12.3.0) is used for developing the monitoring plan. Monitoring plan must be implemented according to the monitoring plan. Calculation of emission reductions of the proposed project within the crediting period is complete, consistent, clear and accurate. The plan will be implemented by the project developer.

1. Project Integrate Management

The project owner will take the responsibility for the monitoring plan implementation. A CDM working team is established which consists of project manager, monitoring section, audit section. The project manager is responsible for the implementation of the monitoring activity. There are 2 departments organized for monitoring section and audit section. Monitoring section is to monitor, collect and archive the data according to the Monitoring and Management Manual, while the audit section is to audit the work of the Monitoring Section and execute the QC/QA procedures according to the Monitoring and Management Manual. The monitoring system flowchart of this project is shown in Figure B-3.

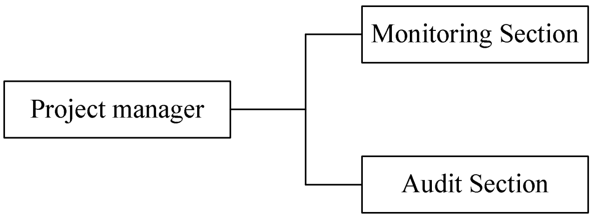

Figure B-3 Monitoring system flowchart of this project

The relevant training will be implemented by the project owner and the equipment manufacturer before operation of the proposed project.

2. Date to be monitored

The baseline emission factor is calculated ex-ante. The main data will be monitored including:

$EG_{facility,y}$: Net electricity supplied by the proposed project to the grid in year y;

$EG_{export,y}$: Electricity exported to the grid by the proposed project which will be measured by M1, M2 and M3 in year y;

$EG_{import,y}$: Electricity imported from the grid by the proposed project which will be measured by M1, M2 and M3 in year y;

$EG_{im\text{-}spare,y}$: Electricity imported from the spare power line in emergency by the proposed project and the phase Ⅱ project which will be measured by M4 in year y. To be conservative, the total amount of $EG_{im\text{-}spare,y}$ is regarded as the imported electricity which was consumed by the proposed project

The net power delivered to the grid by the proposed project in year y ($EG_{facility,y}$) is calculated as below:

$$EG_{facility,y} = EG_{export,y} - EG_{import,y} - EG_{im\text{-}spare,y}$$

Where:

$$EG_{export,y} = EG_{export,y,1} + EG_{export,y,2} + EG_{export,y,3}$$

$EG_{import,y}=EG_{import,y,1}+EG_{import,y,2}+EG_{import,y,3}$

For calculation of the emission reduction by the proposed project, only the net electricity produced by the proposed project ($EG_{facility,y}$) will be used.

3. Metering System

The 25 wind turbines are divided into three groups, and each wind turbine will be equipped with one 690V/35kV transformer. The electricity output will be transmitted by 35kV transmission lines to the on-site 35/220kV transformer, then by the 220kV transmission line to the NCPG. Three electricity meters M1, M2 and M3 will be installed between the 0.69kV/35kV transformers and 35kV/220kV transformer at the project site, which can measure annual electricity exported to and imported from the grid by the proposed project. Each meter (M1, M2 and M3) has a backup meter (M1', M2' and M3') which will be installed at the same point of the main meter. The accuracy of the above meters will be no lower than 0.5S. The remaining meter M4 will be installed at 10kV spare power line, which can measure annual electricity imported from the grid by the proposed project in emergency, and the accuracy of this meter will be no lower than 1.0. All of the above meters are bidirectional meters. Only trained staffs are involved in the operation of the monitoring system. The simplified electrical grid connection diagram is shown in the following Figure B-4:

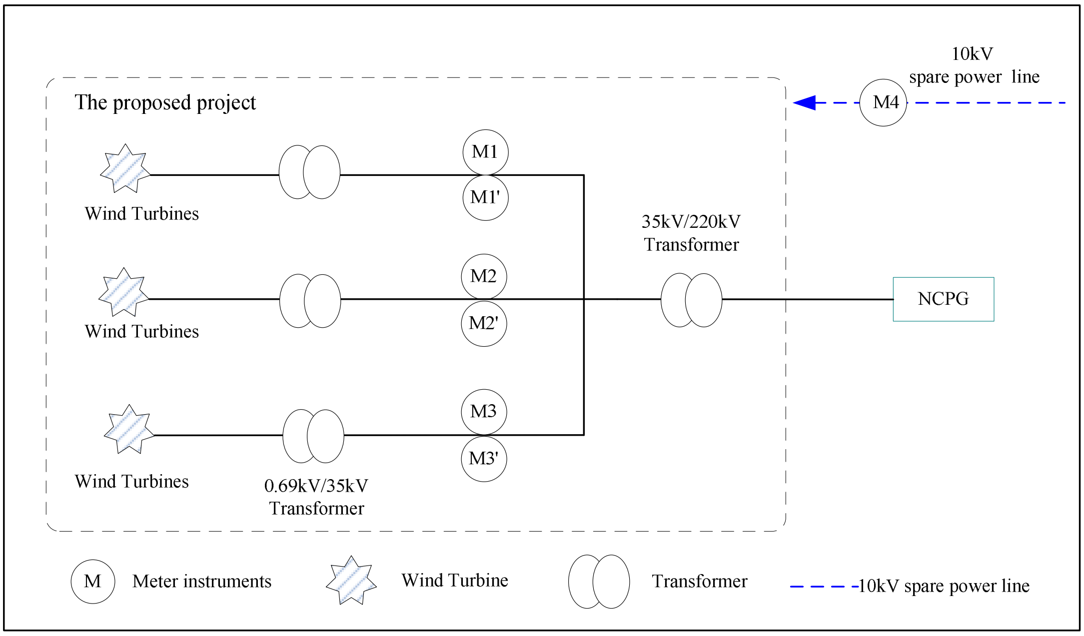

Figure B-4 Simplified electrical grid connection diagram

The meters will be properly installed and operated to ensure their accuracy in consistent with the requirement from technical administrative code of electric energy metering (DL/T448－2000). The total measurement result of M1/M1', M2/M2' and M3/M3', after considering about the whole line loss rate, will be cross checked with records for sold electricity, the conservative value will be used for ER calculation..

4. Quality Assurance and Quality Control

The quality assurance and quality control procedures for recording, maintaining and archiving data shall be improved as part of this CDM project activity according to CDM EB rules and real practice in terms of the need for verification of the emission reductions on an annual basis according to this PDD.

1) Calibration

The metering equipments will be properly calibrated and checked by an independent third party at least once a year, to ensure its accuracy. The accuracy of the metering equipments shall be no lower than 0.5S.

The relative recording files will be supplied to the project owner. These recording files will be preserved by the project owner and provide to DOE in Verification.

2) Emergency

- If the reading of a certain main meter (M1,M2,M3) in a certain month is so inaccurate as to be out of the error range or the meter does not work normally, the grid-connected generation shall be read by its backup meter (M1', M2', M3').
- If the readings of main meter and backup meter are beyond allowable error, the project owner and power grid company shall jointly prepare a reasonable and conservative estimate of correct reading.

5. Information collection and management

It is the responsibility for the project owner to provide necessary information and data for validation and verification. The measurement of the whole production data is controlled and stored by the project owner.

On-duty staff will watch the operation status of metering equipments everyday on site. Furthermore, the designated staff will collect the measured electricity data and complete the corresponding records. The data from these records will be digested and analyzed and the results will be reported to project manager.

All physical documents including the readings in electronic and/or manual form of the meters, electricity transaction notes will be stored by the project owner and kept one copy in order to facilitate the verification of DOE. The monthly records of power supplied to the grid and received from the grid, relevant accounting documents and electricity transaction notes and the results of calibration shall be collected in a central place by the project owner.

All data collected as part of monitoring will be kept for two years after the end of the last crediting period or the last issuance of CERs for this project activity, whichever occurs later.

6. Monitoring Report

The Project owner will annually prepare a monitoring report which will include among others metering values of power supplied to and received from the grid, copies of sales/billing receipts, a report on calibration and a calculation of emission reductions.

B.8. Date of completion of the application of the baseline study and monitoring methodology and the name of the responsible person(s)/entity (ies):

The application of the baseline study and monitoring methodology of the Project was completed on 11/10/2012 by:

Entity: Libra CDM I&M Co., Ltd

Email: kevinz@libracdm.com

The person/entity is not project participant listed in Annex 1.

(The organization above is not the project participants listed in Annex 1)

SECTION C. DURATION OF THE PROJECT ACTIVITY / CREDITING PERIOD

C.1. Duration of the project activity:

C.1.1. Starting date of the project activity:

30/04/2011

C.1.2. Expected operational lifetime of the project activity:

20 years and 0 month.

C.2. Choice of the crediting period and related information:

C.2.1. Renewable crediting period:

C.2.1.1. Starting date of the first crediting period:

05/11/2012

C.2.1.2. Length of the first crediting period:

7 years and 0 month.

C.2.2. Fixed crediting period:

N/A

C.2.2.1. Starting date:

N/A

C.2.2.2. Length:

N/A

SECTION D. ENVIRONMENTAL IMPACTS

D.1. Documentation on the analysis of the environmental impacts, including transboundary impacts:

The Environmental Impact Assessment of the proposed project was approved by the Inner Mongolia Environmental Protection Administration on 01 November, 2010. Main contents of the Environmental Impact Assessment are summarized as follows:

Impact on Noise Environment

The noises will be produced by the constructing equipments and transporting vehicle during construction period. The construction will be arranged by daylight mostly, and the proposed project is far from the residential area, so the constructing noise will not interrupt the residents. And the noise will disappear when the project finishes construction. The measurements as arranging the transport time reasonably, limiting the speed and no tooting of the vehicles in some environmental sensitive area will be carried out to reduce the noise impact of the transporting vehicle. The low-noise wind turbines will be employed to reduce the noise impact during operation period.

Impact on Air Environment

The powder and dust produced in the constructing process are the main factors for the air pollution during construction period. Sprinkling, covering the raw material and so on will be carried out to reduce the impact. The tail gas of transporting vehicles and constructing equipments will impact on part environment, but the impact will be over when the project finishes the construction.

Impact on Waste Water

The wastewater during construction period is mainly domestic sewage. But the amount of domestic wastewater will be very little. Therefore, there is no impact on the water environment.

Impact on Solid Waste

The possible impacts are the solid waste produced by builders and staff, and the waste earth from digging of the foundation in the construction phase. The amount of household solid waste will be very little, which will not have impact on the environment. Besides, the solid waste will be collected and moved to the landfill site of the nearest city. The waste earth from the digging should be firstly used for refilling.

Impact on Ecosystem Environment

The impact on the ecological environment is mainly happened during construction period. The excavation, transport and the storage of equipments and materials will lead to the destruction of vegetation and changes of earth's surface structure. The construction area will be strictly arranged. The recovery measurements will be carried out to protect environment.

The project site is not the birds migrating channel, so there is no harm for the birds.

Impact on Social-Economic

The project is estimated to supply 112,216.5MWh of power to the NCPG annually, and will achieve emission reduction of 100,531 tCO_2e. So the project generates eco-friendly, GHG free power that contributes to sustainable development of the region. Moreover, the project activity will relieve the electricity short-supply situation.

There is no immigration due to the proposed project.

Conclusion

The proposed project does not have any major adverse impacts on the environment during its construction and operation phase.

D.2. If environmental impacts are considered significant by the project participants or the host Party, please provide conclusions and all references to support documentation of an environmental impact assessment undertaken in accordance with the procedures as required by the host Party:

The EIA report for the proposed project indicated that the proposed project would not bring significant impacts on environment.

SECTION E. STAKEHOLDERS' COMMENTS

E.1. Brief description how comments by local stakeholders have been invited and compiled:

The project developer invited the comments of local stakeholders by issuing questionnaires. The project owner carried out the survey on the local residents and the representative of government officials during EIA compiling stage. The survey was conducted through distributing and collecting responses to a questionnaire which was designed by project developer.

A1l page questionnaire were designed to be easily filled in the following sections:

1) Project introduction

Alashan Ayouqi 49.5MW Wind Farm is located in Hoh tolgoin, Alxa Right Banner, Alxa League, Inner Mongolia Autonomous Region, P.R.China. It involves the installation of 33 turbines, providing a total capacity of 49.5 MW. The proposed project will help reduce greenhouse gas (GHG) emissions generated from the high-growth, coal-dominated power generation in the NCPG, and it can also bring good environmental and social benefits.

2) Respondent's basic information

Name, age, educational background career and other information

3) Questions on:

- What level do you know about the proposed project?
- Impacts of the project on local environment;
- Do you think which negative impact on the environment may be caused by the project?
- Impacts of the project to local economic development and society;
- What impacts on your life may be caused by the project?
- Other suggestions

4) Space for the respondents' signature and date.

Questionnaires have been distributed according to the principle of both representation and randomness in order to reflect the public opinions and comments in a fair and real manner.

The investigated stakeholders include the individuals from the construction site and the nearby Emuting Gaole. The investigation has taken full account into the public advice of different ages, education levels and occupations.

E.2. Summary of the comments received:

50 valid responses from 50 questionnaires were collected and the following is a summary of the key findings:

Table 10 Structure of the investigated persons

No.	Item		Numbers (Person)	Ratio (%)
1	Sex	Male	31	62
		Female	19	48
2	Age	~29	25	50
		30~39	13	26

		40~	12	24
3	Educational background	junior middle school	19	38
		Senior high school	18	36
		college	13	26
4	Career	Farmer	33	66
		Worker	11	22
		Government official	3	6
		Others	3	6

Summary of the survey：

Comments from the questionnaires show that 100% of the investigated stakeholders agree with the project construction, and none of them objects.

The results are shown as follows:

Table 11 Results of questionnaires

Questions	Options	Numbers (Person)	Ratio (%)
What level do you know about the proposed project?	Know very well	28	56
	Know a little	22	54
	Know nothing	0	0
Impacts of the project on local environment;	Positive effect	46	92
	Negative impact	1	2
	No impact	3	6
Do you think which negative impact on the environment may be caused by the project? (Multiple Choice)	Noise of the construction and operation	0	0
	Construction waste water	0	0
	Impact of dust on air quality	0	0
	Construction waste	0	0
	land occupation	0	0
	Ecological environment	0	0
What impacts on local economic society may be caused by the project?	Beneficial	50	100
	Adverse	0	0
	No impact	0	0
What impacts on your life may be caused by the project? (Multiple Choice)	Increasing family income	20	40
	Ensuring power supply	23	46
	Increasing job opportunities	21	42
	Improving air quality	12	24
	Increasing local tourism resources	2	4
	Others	0	0

E.3. Report on how due account was taken of any comments received:

The survey shows that the project has strong local support amongst the public. All the interviewees support the construction of the project.

Most of them believe that the proposed project will have positive effect on relieving the situation of the short supplement of electricity, creating job opportunities and decreasing the environment pollution. We can also find that the noise caused by construction and operation of the project is concerned by the investigated stakeholders. However, as per the environmental impact assessment report, the site of the project is far from city and countryside. Moreover, the turbines chosen are relatively low-noise machine, so there is little impact on local residents' life.

Besides, The EIA approved by the Inner Mongolia Environmental Protection Administration indicated some effective measures that can be taken by the project owner to reduce or avoid the negative effect caused by the project. The project owner will take these measures listed in the EIA into effect during construction and operation, so as to achieve environmental benefits, social benefits and economic benefits.

All of the investigated stakeholders agree with the project construction. Therefore there has been not necessary to modify the plans due to comments received.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

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There is no public funding from Annex I Parties involved in the project activity.

Annex 3

BASELINE INFORMATION

Database used for combined margin emissions factor calculation.

Baseline Information: North China Power Grid (including Beijing City, Tianjin City, Hebei Province, Shanxi Province, Shandong Province, Inner Mongolia Autonomous Region).

Table 3- 1 Low calorific values, CO_2 emission factors

Fuel	Low Calorific Value	Emission Factor ($kgCO_2/TJ$)
Raw Coal	20,908 kJ/kg	87,300
Cleaned Coal	26,344 kJ/kg	87,300
Mould coal	20,908 kJ/kg	87,300
Other Washed Coal	8,363 kJ/kg	87,300
Coke	28,435 kJ/kg	95,700
Crude Oil	41,816 kJ/kg	71,100
Gasoline	43,070 kJ/kg	67,500
Diesel Oil	42,652 kJ/kg	72,600
Fuel Oil	41,816 kJ/kg	75,500
Other Oil Products	41,816 kJ/kg	72,200
Other Coking Product		
	38,931 kJ/m^3	54,300
Natural Gas	16,726 kJ/m^3	37,300
Coke Oven Gas	5,227 kJ/m^3	37,300
Other Gas	50,179 kJ/kg	61,600
LPG	46,055 kJ/kg	48,200
Refinery Gas	20,908 kJ/kg	87,300

Data Source: The net calorific values are quoted from <China Energy Statistical Yearbook 2010>, Page 285.The emission factors and oxidation factors are quoted from <Revised 2006 IPCC Guidelines for National Greenhouse Gas Inventories>, Volume 2 Energy.

Step 1: Calculation of the Operating Margin Factor of the North China Power Grid

Table 3- 2 Operating Margin Emission Factor ($EF_{grid,OM,y}$) of North China Power Grid in 2007

Fuel	Unit	Beijing	Tianjin	Hebei	Shanxi	Inner Mongolia	Shandong	Subtotal	Emission Factor (kgCO$_2$/TJ)	Average Low Calorific Value (MJ/t,kJ/m^3)	CO$_2$ Emission(tCO$_2$e) K=G×I×J/100000 (mass unit)
		A	B	C	D	E	F	G=A+…+F	I	J	K=G×I×J/10000 (volume unit)
Raw Coal	10^4t	816.17	1753.99	7716.13	7510.06	10434.25	11884.83	40115.43	87300	20908	732,214,267
Cleaned Coal	10^4t						18.43	18.43	87300	26344	423,859
Other Washed Coal	10^4t	5.76		156.89	478.81	48.57	756.84	1446.87	87300	8363	10,563,452
Mould coal	10^4t	7.93					42.86	50.79	87300	20908	927,054
Coke	10^4t			0.02			4.09	4.11	95700	28435	111,843
Coke Oven Gas	10^8m^3	0.07	0.72	3.13	25.46	2.58	13.61	45.57	37300	16726	2,843,020
Other Gas	10^8m^3	11.8	7.6	88.38	72.8	28.17	29.64	238.39	37300	5227	4,647,821
Crude Oil	10^4t							0	71100	41816	0
Gasoline	10^4t			0.01				0.01	67500	43070	291
Diesel Oil	10^4t	0.33		2.35		0.62	5.08	8.38	72600	42652	259,490
Fuel Oil	10^4t	4.74		0.18			2.35	7.27	75500	41816	229,522
LPG	10^4t							0	61600	50179	0
Refinery Gas	10^4t	0.06		2.85			1.65	4.56	48200	46055	101,225
Natural Gas	10^8m^3	5.03	0.73		0.54	4.22	0.01	10.53	54300	38931	2,225,993
Other Oil Products	10^4t	1.72						1.72	75500	41816	51,929
Other Coking Products	10^4t	4.74						4.74	95700	28435	128,986

Other Energy	10^4tce	11.94		77.25	360.26	30.75	163.48	643.68	0	0	0
Total											754,728,750

Data Source: <China Energy Statistical Yearbook 2008>

Table 3- 3 Thermal Power to North China Power Grid in 2007

Province	Electricity Generation	Electricity Generation	Used by the Power Plant	Supplied Electricity
	(10^8 kWh)	(MWh)	(%)	(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

Data Source: <China Electric Power Yearbook 2008>

Table 3- 4 Power transferred from the Northeast Power Grid and Central China Power Grid to the North China Power Grid in 2007

Imported Power Generation from Northeast Power Grid in 2007 (MWh)	Emission Factor of Northeast Power Grid (tCO_2e/ MWh)	Emission of the Imported Power Generation from Northeast Power Grid in 2007 (tCO_2e)
1,789,750	1.081860481	1936260
Imported Power Generation from Central China Power Grid in 2007 (MWh)	Emission Factor of Central China Power Grid (tCO_2e/ MWh)	Emission of the Imported Power Generation from Central China Power Grid in 2007 (tCO_2e)
803,000	1.101973512	884885

Data Source: <China Energy Statistical Yearbook 2008>

Table 3- 5 Operating Margin Emission Factor ($EF_{grid,OM,y}$) of North China Power Grid in 2008

Fuel	Unit	Beijing	Tianjin	Hebei	Shanxi	Inner Mongolia	Shandong	Subtotal	Emission Factor	Average Low Calorific Value	CO_2 Emission(tCO_2e)
									($kgCO_2$/TJ)	(MJ/t,kJ/m^3)	K=G×I×J/100000 (mass unit)
		A	B	C	D	E	F	G=A+…+F	I	J	K=G×I×J/10000 (volume unit)
Raw coal	10^4t	755.75	1800.12	7353.33	7854.39	12607.82	12360.75	42732.16	25.8	100	87,300
Washed coal	10^4t						23.88	23.88	25.8	100	87,300
Other washed coal	10^4t	5.05		134.52	582.39	66.2	691.21	1479.37	25.8	100	87,300
Moulded coal	10^4t	5.66			32.49		45.38	83.53	26.6	100	87,300
Coke	10^4t			0.02			6.07	6.09	29.2	100	95,700
Coke oven gas	10^8m^3	0.11	0.86	8.37	24.55	3.55	16.2	53.64	12.1	100	37,300
Other gas	10^8m^3	10.4	9.08	187.54	36	34.32	29.76	307.1	12.1	100	37,300
Crude oil	10^4t					0.02		0.02	20	100	71,100
Gasoline	10^4t							0	18.9	100	67,500
Diesel oil	10^4t	0.15		3.08		0.35		3.58	20.2	100	72,600
Fuel oil	10^4t	2.56		0.25				2.81	21.1	100	75,500
LPG	10^4t							0	17.2	100	61,600
Refinery gas	10^4t	0.44		2.93				3.37	15.7	100	48,200
Natural gas	10^8m^3	11.09	0.7		0.97	2.12		14.88	15.3	100	54,300
Other petroleum products	10^4t	1.45						1.45	20	100	72,200

Other coking products	10^4t	7.97		7.61				15.58	25.8	100	95,700
Other energy	10^4t standard coal	4.9	2.34	61.02	466	63.72	141.71	739.69	0	0	0

Data Source: <China Energy Statistical Yearbook 2009>

Table 3- 6 Thermal Power to North China Power Grid in 2008

Province	Electricity Generation	Electricity Generation	Used by the Power Plant	Supplied Electricity
	(10^8 kWh)	(MWh)	(%)	(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

Data Source: <China Electric Power Yearbook 2009>

Table 3- 7 Power transferred from the Northeast Power Grid and Central China Power Grid to the North China Power Grid in 2007

Imported Power Generation from Northeast Power Grid in 2008 (MWh)	Emission Factor of Northeast Power Grid (tCO_2e/ MWh)	Emission of the Imported Power Generation from Northeast Power Grid in 2008 (tCO_2e)
5,286 ,140	1.10489	5840603.2

Data Source: <China Energy Statistical Yearbook 2009>

Table 3-8 Operating Margin Emission Factor ($EF_{grid,OM,y}$) of North China Power Grid in 2009

Fuel	Unit	Beijing	Tianjin	Hebei	Shanxi	Inner Mongolia	Shandong	Subtotal	Emission Factor	Average Low Calorific Value	CO_2 Emission(tCO_2e)
									($kgCO_2$/TJ)	(MJ/t,kJ/m3)	K=G×I×J/100000 (mass unit)
		A	B	C	D	E	F	G=A+…+F	I	J	K=G×I×J/10000 (volume unit)
Raw Coal	10^4t	665.16	1870.36	7623.94	8024.02	12538.57	12654.05	43376.1	25.8	100	87,300
Cleaned Coal	10^4t						11.7	11.7	25.8	100	87,300
Other Washed Coal	10^4t	6.15		247.51	586.04	104.69	862.02	1806.41	25.8	100	87,300
Mould coal	10^4t	3.73					31.83	35.56	26.6	100	87,300
Coke	10^4t						10.43	10.43	29.2	100	95,700
Coke Oven Gas	10^8m^3	0.13	1.27	8.72	19.48	3.35	11.69	44.64	12.1	100	37,300
Other Gas	10^8m^3	10.23	13.43	228.32	35.89	48.35	37.21	373.43	12.1	100	37,300
Crude Oil	10^4t					0.13		0.13	20	100	71,100
Gasoline	10^4t						0.01	0.01	18.9	100	67,500
Diesel Oil	10^4t	0.1		2.38		2.64	3.07	8.19	20.2	100	72,600
Fuel Oil	10^4t	0.82		0.19		0.02	2.63	3.66	21.1	100	75,500
LPG	10^4t							0	17.2	100	61,600
Refinery Gas	10^4t	0.83		3.95			3.44	8.22	15.7	100	48,200
Natural Gas	10^8m^3	13.55	0.63		4.39	2.03	0.03	20.63	15.3	100	54,300
Other Oil Products	10^4t	1.52					23.18	24.7	20	100	72,200
Other Coking Products	10^4t	6.62		7.79			5.52	19.93	25.8	100	95,700
Other Energy	10^4tce		2.11	62.14	570.3	90.63	137.68	862.86	0	0	0
Total											

Data Source: <China Energy Statistical Yearbook 2010>

Table 3- 9 Power transferred from the Northeast Power Grid and Central China Power Grid to the North China Power Grid in 2009

Imported Power Generation from Northeast Power Grid in 2009 (MWh)	Emission Factor of Northeast Power Grid (tCO_2e/ MWh)	Emission of the Imported Power Generation from Northeast Power Grid in 2009 (tCO_2e)
6,982,610	1.06915	829,865,579

Data Source: <China Energy Statistical Yearbook 2010>

Table 3-10 Thermal Power to North China Power Grid in 2009

Province	Electricity Generation	Electricity Generation	Used by the Power Plant	Supplied Electricity
	(10^8 kWh)	(MWh)	(%)	(MWh)
Beijing	241	24,100,000	6.55	22,521,450
Tianjin	413	41,300,000	6.8	38,491,600
Hebei	1733	173,300,000	6.92	161,307,640
Shanxi	1850	185,000,000	8.1	170,015,000
Inner Mongolia	2135	213,500,000	7.82	196,804,300
Shandong	2858	285,800,000	7.43	264,565,060
Total		923,000,000		853,705,050

Data Source: <China Electric Power Yearbook 2010>

Table 3- 2 Operating Margin Emission Factor ($EF_{grid,OM,y}$) of North China Power Grid

	Unit	2008	2007	2006
Total supplied electricity	MWh	860,687,660	808,083,490	778,939,080
Total CO_2 emissions	tCO_2e	829,856,679	812,079,729	757,552,268
EF_{OM}	tCO_2e/MWh	0.96418	1.00495	0.972543666
Average EF_{OM}	tCO_2e/MWh	0.		

Step2: Calculation of the Build Margin Factor of the Northeast Power Grid

Table 3- 3 Calculating of the CO_2 emissions factor of fuel i (tCO_2e/MWh)

	Parameter	Efficiency of Power Supply	Emission Factor of Fuel ($kgCO_2/TJ$)	Emission Factor (tCO_2e/MWh)
		A	B	D=3.6/A/1,000,000×B
Coal-fired Power Plant	$EF_{Coal,Adv,y}$	39.45	87,300	0.7968
Gas-fired Power Plant	$EF_{Oil,Adv,y}$	51.77	75,500	0.5250
Oil-fired Power Plant	$EF_{Gas,Adv,y}$	51.77	54,300	0.3776

Data source: Notification on Determining Baseline Emission Factor of China's Grid, issued by China's DNA on 20, October, 2011

Table 3- 4 Calculating the percentage of CO_2 emission caused by of fuel i

		Beijing	Tianjin	Hebei	Shanxi	Shandong	Inner Mongolia	Total	Average low calorific value	Fuel emission factor	Carbon oxidation rate	CO2 emission (tCO2e)
Fuel type	Unit	A	B	C	D	E	F	G=A+…+E	H	I	J	K=G×H×I×J/ 100,000
Raw coal	10^4t	665.16	1,870.36	7,623.94	8,024.02	12,654.05	12,538.57	43,376.10	20,908	87,300	1	791,730,246
Washed coal	10^4t	0	0	0	0	11.7	0	11.70	26,344	87,300	1	269,080
Other washed coal	10^4t	6.15	0	247.51	586.04	862.02	104.69	1,806.41	8,363	87,300	1	13,188,417
Moulded coal	10^4t	3.73	0	0	0	31.83	0	35.56	20,908	87,300	1	649,065
Coke	10^4t	0	0	0	0	10.43	0	10.43	28,435	95,700	1	283,824
Other coking products	10^4t	6.62	0	7.79	0	5.52	0	19.93	28,435	95,700	1	542,341
Sub-total												806,662,974
Crude oil	10^4t	0	0	0	0	0	0.13	0.13	41,816	71,100	1	3,865
Gasoline	10^4t	0	0	0	0	0.01	0	0.01	43,070	67,500	1	291
Diesel oil	10^4t	0.1	0	2.38	0	3.07	2.64	8.19	42,652	72,600	1	253,606
Fuel oil	10^4t	0.82	0	0.19	0	2.63	0.02	3.66	41,816	75,500	1	115,550
Other petroleum products	10^4t	1.52	0	0	0	23.18	0	24.70	41,816	72,200	1	745,721
Sub-total												1,119,034
Natural gas	10^7m^3	135.5	6.3	0	43.9	0.3	20.3	206.30	38,931	54,300	1	4,361,086
Coke oven gas	10^7m^3	1.3	12.7	87.2	194.8	116.9	33.5	446.40	16,726	37,300	1	2,784,999
Other gas	10^7m^3	102.3	134.3	2283.2	358.9	372.1	483.5	3,734.30	5,227	37,300	1	7,280,656
LPG	10^4t	0	0	0	0	0	0	0.00	50,179	61,600	1	0
Refinery gas	10^4t	0.83	0	3.95	0	3.44	0	8.22	46,055	48,200	1	182,472
Sub-total												14,609,213
Total												822,391,221

Data Source: <China Energy Statistical Yearbook 2010>

Use formulae (4) to (6) in section B.6.1, $\lambda_{Coal,y}$ = 98.09%, $\lambda_{Oil,y}$ = 0.14%, $\lambda_{Gas,y}$ = 1.78%.

The final $EF_{Thermal,y}$ is calculated as follow:

$$EF_{Thermal,y} = \lambda_{Coal,y} \times EF_{Coal,Adv,y} + \lambda_{Oil,y} \times EF_{Oil,Adv,y} + \lambda_{Gas,y} \times EF_{Gas,Adv,y} = 0.7889 tCO_2e/MWh$$

Table 3- 14 Installed Capacities of NCPG in 2009

Installed Capacity	Unit	Beijing	Tianjin	Hebei	Shanxi	Inner Mongolia	Shandong	Total
Fuel-fired	MW	5,120	10,030	35,140	39,150	48,300	58,860	196,600
Hydro	MW	1,050	10	1,790	1,610	830	1,060	6,350
Nuclear	MW	0	0	0	0	0	0	0
Wind & Others	MW	50	0	1,360	120	6,420	860	8,810
Total	MW	6,220	10,040	38,290	40,880	55,550	60,780	211,760

Data Source: <China Electric Power Yearbook 2010>

Table 3- 15 Installed Capacities 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 & others	MW	0	0	700	0	2,300	370	3,370
Total	MW	5,810	7,490	32,110	36,040	48,870	57,350	187,670

Data Source: <China Electric Power Yearbook 2009>

Table 3- 16 Installed Capacities of NCPG in 2007

Installed Capacity	Unit	Beijing	Tianjin	Hebei	Shanxi	Inner Mongolia	Shandong	Total
Fuel-fired	MW	3900	6,920	29,020	30,950	39,870	54,140	164,800
Hydro	MW	1050	10	780	790	830	1,050	4,510
Nuclear	MW	0.00	0.00	0	0	0	0	0
Wind & Others	MW	3	0	410	0	1,096.50	210	1,719
Total	MW	4,952.70	6,930	30,210	31,740	41,796.50	55,400	171,029

Data Source: <China Electric Power Yearbook 2008>

Table 3- 5 Installed Capacity of NCPG from 2007 to 2009

	2007	2008	2009	Capacity addition from 2006 to 2008(1)	Capacity addition from 2007 to 2008(2)	Ratio to the total capacity addition
	A	B	C	D	E	F
Thermal power	164,800	179,040	196,600	39,270	21,422	81.46%
Hydro power	4,510	5,260	6,350	1,849	1,090	3.84%
Nuclear power	0	0	0	0	0	0.00%
Wind power & others	1,719	3,370	8,810	7,091	5,440	14.71%
Total	171,029	187,670	211,760	48,210	27,952	100.00%
Ratio to 2008's capacity	80.77%	88.62%	100.00%	22.77%	13.20%	

The Build Margin Emission Factor in North China Power Grid is:

$EF_{grid,BM,y}$ = 0.7889×81.46%=0.6426 tCO2e/MWh.

Table 3- 6 Baseline Emissions Factor of North China Power Grid (tCO_2e/MWh)

$EF_{grid,OM,y}$	0.9803
$EF_{grid,BM,y}$	0.6426
$EF_{grid,CM,y}$	0.895875

Annex 4

MONITORING INFORMATION

This plan will be carried out to monitor the electricity supply and the balance document between the grid company and the project owner. Please refer to B7.2 for the detailed description of monitoring plan.