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

CONTENTS

SECTION A. General description of project activity

A.1. Title of the project activity:

Inner Mongolia Siziwangqi Bayin'aobao Wind Power Project

Document version number: 5.0

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A.2. Description of the project activity:

Inner Mongolia Siziwangqi Bayin'aobao Wind Power Project (hereinafter refers to the proposed project) is to build and operate a 49.5MW grid connected wind farm, located in Siziwangqi Town, Wulanchabu City, Inner Mongolia Autonomous Region, China. The proposed project installs totally 33 wind turbines with a nominal capacity of 1500 KW. The proposed project will deliver about 120.07 GWh per year to the Inner Mongolia Power Grid that is a part of the North China Power Grid. The electricity generated by the proposed project is expected to displace grid electricity generated from fossil fuels and reduces GHG emissions by an amount of approximately 129,134tCO_2e (tons of carbon dioxide equivalent) per year for the duration of the project activity. A reduction of approximately 903,938tCO_2e is forecast for the first 7-year crediting period.

Wind power is a priority development area as a green energy supply technology in China. The proposed project can improve energy security and environmental quality, and contribute to sustainable development in various ways:

- It is accorded with the government's energy policy objective, which promotes the local economy and creates local employment during the installation and operation periods;
- It reduces greenhouse gas emissions resulting from the power generation industry in China, compared to a business-as-usual approach;
- The successful implementation of the proposed project will be serving as a demonstration for wider deployment of wind power technology in local and national level.

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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)

China (host)	Longyuan(Siziwang) Wind Power Co., Ltd.	No
France	EDF Trading Limited	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 ofrequesting registration, the approval by the Party(ies) involved is required.		

Please see Annex 1 for detailed contact information

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A.4. Technical description of the project activity:

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A.4.1. Location of the project activity:

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A.4.1.1. Host Party(ies):

P.R.China

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

Inner Mongolia Autonomous Region

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A.4.1.3. City/Town/Community etc:

Siziwangqi Town, Wulanchabu City,

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

The proposed project is located in Siziwangqi Town, Wulanchabu City, Inner Mongolia Autonomous Region, China. The geographical co-ordinates are: longitude 110°20’00’’- 113°00’00’’, and northern latitude 41°10’00’’ -43°22’00’’, and altitude 1400m. Figure 1 illustrates the location of the proposed project.

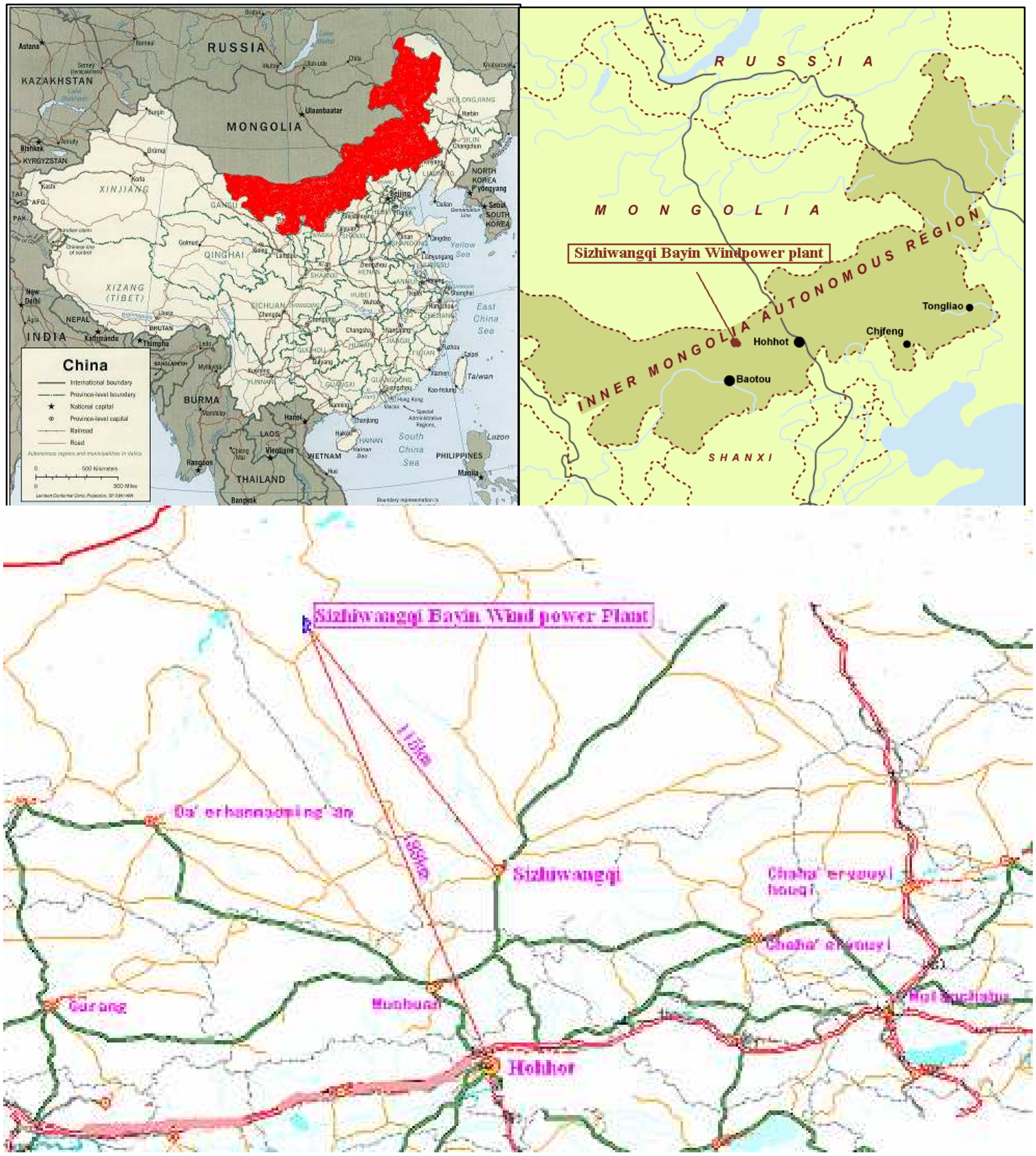

Figure 1 Location of the proposed project

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

Category: Renewable Energy in grid connected applications

Sectoral Scope 1: Energy Industries

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

The proposed project is to install totally 33wind turbines (Huarui SL 1500/77) with a nominal capacity of 1500 KW, providing a total capacity of 49.5 MW. Table 1 provides the mainly technical information of wind Turbines in the proposed project.

The technologies employed in the proposed project activity are advanced domestic technologies, which is no technology transfer activity involved. The main characteristics of domestic turbines are their robustness, adaptability, reliability and maximum performance on all types of sites and in all types of wind resources. Due to its advantage on fully utilizing wind resources and improving efficiency, this type of domestic turbines has been widely adopted in China.

Table 1 Technical Characteristics of Wind Turbines for the proposed project[1]

Rated power（kW）	1500
Rotor diameter（m）	77.4
Hub heights（m）	65
Rated wind speed（m/s）	11
Cut in-cut-out wind（m/s）	3/20
Generator type	Doubly fed machine
Export voltage（V）	690
Air brake	feathering
Extreme wind speed（m/s）	59.5
IEC	GL□

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

A renewable crediting period is selected for the proposed project activity. A reduction of approximately 903,938tCO_2e is forecast for the first 7-year crediting period in the table below.

Years	Annual estimation of emission reductions in tonnes of CO_2 e
2009	129,134
2010	129,134
2011	129,134
2012	129,134
2013	129,134
2014	129,134

[1] The feasibility study report of Inner Mongolia Siziwangqi Bayin'aobao Wind Power Project, Page5-2, Table5-1

2015	129,134
Total estimated reductions (tonnes of CO_2e)	903,938
Total number of crediting years	7
Annual average over the crediting period of estimated reductions (tonnes of CO_2e)	129,134

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A.4.5. Public funding of the project activity:

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

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SECTION B. Application of a baseline and monitoring methodology:

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

Baseline methodology:

ACM0002(Version 6): Consolidated baseline methodology for grid-connected electricity generation from renewable sources.

“Tool for the Demonstration and Assessment of Additionality (version 04)”.

Monitoring methodology:

Approved consolidated monitoring methodology ACM0002 (Version 6): “Consolidated monitoring methodology for zero-emissions grid-connected electricity generation from renewable sources”.

Reference: UNFCCC website: http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html

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

The above methodologies are applicable to the project activities under the following conditions:

- The proposed project is a grid-connected zero-emission renewable electricity capacity additions from wind source;
- The proposed project is not an activity that involves switching from fossil fuels to renewable energy at the site of the project activity;
- The geographic and system boundaries for the North China Power Grid can be clearly identified and information on the characteristics of the grid is publicly available.

The methodology will be used in conjunction with the approved consolidated monitoring methodology ACM0002 (Consolidated monitoring methodology for grid-connected electricity generation from renewable sources).

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

Emission sources:

According to the methodology ACM0002, a grid-connected wind power project like the proposed project is required to consider only CO_2 emission from the fossil fired power plants in the baseline secenario to simplify the calculation.

Spatial boundary:

The spatial extend of the project boundary includes all power plant connected to North China Power Grid. The North China Power Grid is the project electricity system, which is defined by the spatial extent of the power plants that can be dispatched without significant transmission constrains.

Using the boundary definitions of the Chinese NDRC[1], the North China Power Grid consists of two cities and four provinces including Beijing, Tianjin, Hebei, Shanxi, Shandong, and Inner Mongolia Autonomous Region.

	Source	Gas	Included?	Justification / Explanation
Baseline	North China Power Grid	CO_2	Yes	Major emission sources
		CH_4	No	Excluded for simplification. This is conservative.
		N_2O	No	Excluded for simplification. This is conservative.
Project Activity	Wind power	CO_2	No	According to ACM0002, the project emission of renewable energy project activity is not considered.
		CH_4	No	According to ACM0002, the project emission of renewable energy project activity is not considered.
		N_2O	No	According to ACM0002, the project emission of renewable energy project activity is not considered.

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

For project activities that do not modify or retrofit an existing electricity generation facility, the baseline scenario is the following:

> Electricity delivered to the grid by the project 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 below.

The proposed project is connected to the Inner Mongolia Grid, an integrated part of the North China Grid. So the North China Grid is considered as the "connected electricity system", which is defined as the "project boundary" of the proposed project. It includes the grids of Beijing, Tianjin, Hebei, Shanxi, Shandong, and Inner Mongolia Autonomous Region. Therefore, being a project with the boundary of North China Grid that does not modify or retrofit an existing electricity generation facility, the baseline scenario of the proposed project can be identified as the following:

> Electricity delivered to the grid by the proposed project would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources within the North China Grid, as reflected in the combined margin (CM) calculated described latter.

The analysis and description in B.5 and B.6 will support the baseline scenario shown above.

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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):

The feasibility study report of the proposed project was approved by Inner Mongolia Autonomous Region NDRC on 6th Apr. 2007, in which the IRR of the project was 8.33% with the expected tariff of 0.5597 RMB/kWh (Including VAT). Based on the approval and the expected IRR of the proposed project, the project owner started to perform the exploration plan after they received the approval of the project and prepare to the first stage of the construction including the confirmation of construction contract and shop drawing of the proposed project. During this period, the local NDRC provided the propositional letter on the expected tariff on 20th Apr.2007, by which the IRR of the project was only 6.99 %(the benchmark of 8%) with the propositional tariff of 0.5100 RMB/kWh (Including VAT). Base on the propositional tariff by the local NDRC, the directorate thought that the proposed project could not be considered as financially attractive. To implement the project with the IRR of 6.99 %, the project owner made great efforts to seek the additional supports after receiving the propositional letter. At the same time, the project owner also attempted to apply for the favourable policies for the project from the local government. The local government didn't agree the project owner's application, but the local NDRC recommended by word of mouth to consider the CDM support that can help the proposed project to obtain the revenues resulted in the CO_2 emission reduction, and advised the project owner to take part

in the Communion on CDM[2] and provided the governmental web to the project owner. Based on the information by the web, the project owner realized the importance of CDM and knew the procedures of CDM by the governmental web site about CDM[3]. Subsequently, the project owner invited the CDM consulting company to identify the proposed project. The CDM consulting company confirmed that the proposed project may be exploited as a CDM project and negotiated the consulting contract with the project owner[4]. After the project owner obtain the supports from CDM consulting company, the project owner overcame the investment obstacle of the proposed project and the proposed project began to be performed the construction *on 19th July 2007.*

The project uses the *Tool for the Demonstration and Assessment of Additionality (version 4)* to demonstrate the additionality .It is including the steps as follows:

Step1. Identification of alternatives to the project activity consistent with current laws and regulations.

The objective of this step is to identify realistic and credible alternatives to the project that can be the baseline scenario through the following sub-steps:

Sub-step 1a. Define alternatives to the project activity

To provide the same output or services comparable with the proposed CDM project activity, these alternatives are to include:

a) The proposed project not undertaken as a CDM project activity but as a commercial project;

b) The *Coal-fired* power plant with the same annual electricity output as the proposed project;

c) Other power plants using other sources of renewable energy with the same annual electricity output as the proposed project;

d) The North China Power Grid as the provider for the same annual electricity output as the proposed project.

In the North China Power Grid, besides wind energy, other kinds of energy like solar PV, geothermal, biomass and hydro are the possible grid-connected renewable energy technologies that could be applied

[2] The propositional letter for the Communion on CDM by the local NDRC

[3] http://cdm.ccchina.gov.cn/web/index.asp

[4] The contract of CDM consultation **for Inner Mongolia Siziwangqi Bayin'aobao Wind Power Project**

in China. Due to the technology development status and the high cost for power generation, solar PV, geothermal and biomass of the similar installed capacity as the proposed project are alternatives far from being attractive investment in the grid in China[5]. Only hydropower projects have an investment return that can compete over that of wind power projects in China. However, there is no exploitable hydro power resource as resulted in the lack of water resources in Inner Mongolia Autonomous Region[6]. Moreover, stockbreeding is the mainstays of the economy and the biomasses mainly used for the development of stockbreeding in Inner Mongolia Autonomous Region that is lack of biomasses to generate electricity[7].At the same tine, the proposed project owner is only dedicated to wind power development in Siziwangqi District, and has no experience and ability to develop other renewable energy power plants. So the **alternative** c) couldn't be considered as an alternative activity.

Sub-step1b. Consistency of mandatory laws and regulations

Based on the latest national power statistic, the operational hour of a coal fired power plant (5865 hours) is about 2.4 times more than that of the proposed project (2425.6 hours) with the same capacity[8]. Therefore, to provide the same output as the proposed project, the alternative coal-fired power plant will has the capacity less than 21 MW then will be categorized as the small scale coal power plant and should be forbidden to construct according to the regulations from NDRC(*No. 50 NDRC Bulletin of P.R.C*)[9]. Consequently, the scenario b) is not a feasible alternative scenario.

The applicable legal and regulatory requirement from the website of State Electricity Regulatory Commission (SERC) and National Development and Reform Commission (NDRC): http://www.serc.gov.cn/opencms/export/serc/laws/index.html and http://nyj.ndrc.gov.cn .

Outcome of Step 1: as illustrated above, the proposed project activity doesn't belong to baseline scenario and therefore it is additional. The baseline scenario of the proposed project activity is alternative4, i.e. provision of equivalent amount of annual power output by the grid (North China Power Grid) where the proposed project is connected into.

Step2. Investment analysis

[5] http://jjckb.xinhuanet.com/cjxw/2007-11/27/content_75467.htm; http://finance.people.com.cn/GB/1038/59942/59949/6294546.html
6 http://www.china5e.com/news/water/200501/200501100145.html
7 http://www.lvyou114.com/Nav/county_intro.asp?CountyID=345
8 China Electric Power Yearbook2006, page559
9 On Prohibition of 135MW and Smaller-scale Coal-fired Power Plants, General Office of State Council(http://www.gov.cn/gongbao/content/2002/content_61480.htm) and http://www.gov.cn/zwgk/2007-01/26/content_509911.htm

This step will determine whether the project is the economically or financially less attractive than other alternatives without the revenue from the sale of CERs.

Sub-step 2a. Determine appropriate analysis method

Tool for the Demonstration and Assessment of Additionality (version 4) provides three analysis methods to apply for the investment analysis: the simple cost analysis (option I), the investment comparison analysis (option II) and the benchmark analysis (option III).

For the proposed project, the simple cost analysis method is not applicable because the project activity will produce economic benefit (from electricity sale) other than CDM related income. The investment comparison analysis method is also not applicable because the baseline scenario is the North China Power Grid rather than a new investment project.

To conclude, the proposed project will use the benchmark analysis method (option III) based on total investment IRR to identify whether the financial indicators of the proposed project is better than relevant benchmark value.

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

In according with *Interim Rules on Economic Assessment of Electrical Engineering Retrofit Projects* issued by former State Power Corporation of China[10], the financial internal rate of return (IRR) as benchmark in China's power generation industry is 8% considering economic assessments of hydropower projects, fossil fuel fired projects, transmission and substation projects, especially the interest rate of commercial loans over five years. Nowadays China's existing wind power projects have also applied it as the benchmark IRR.

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

(1) Basic parameters for calculation of financial indicators

According to the feasibility study report of the proposed project, the parameters for calculation of financial indicators are shown in Table 2.

Table 2 Main parameters for calculation of financial indicators

Items	Unit	Amount	Data source
Capacity	MW	49.5	FS
Static total investment	Million RMB	438.43	FS
Annually output	GWh/year	120.07	FS
Operation cost	Million RMB	1258.7	FS

[10] http://www.law-lib.com/law/law_view1.asp?id=8867

Electricity Tariff (Including VAT)	RMB/kWh	0.5100	Propositional letter from local NDRC
Value Added Tax (VAT)	%	8.5	FS
Income tax	%	15	FS
Expected CERs Price	EUR/tCO_2	10.2	ERPA
Estimated operational lifetime of the project	Year	20	Technologic agreement
CERs crediting time	Year	7×3	Section C

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

In according with the benchmark analysis method, the proposed project will not be considered as financially attractive if its financial indicators (such as IRR) are lower than the benchmark rate.

Table 3 shows the IRR of the proposed project with and without CERs revenues. Without CERs revenues, the IRR on the total investment is 6.99%, lower than the benchmark rate 8%. Thus the proposed project is not considered as financially attractive. However, taking into account the CERs revenues, the IRR on the total investment is 10.12%, which is significantly improved and higher than the financial benchmark rate. Therefore, the proposed project with CERs revenues can be considered as financially attractive to the investors.

Table 3 Comparison of financial indicators with and without CERs revenues

Scenario	IRR (the benchmark of 8%)
Without CERs revenues	6.99
With CERs revenues	10.12

Sub-step 2d. Sensitivity analysis

The purpose of the sensitivity analysis is to examine whether the conclusion regarding the financial viability of the proposed project is sound and tenable with those reasonable variations in the assumptions. Four factors are considered in following sensitivity analysis:

1) Total investment
2) Annual operation and maintenance cost(**O&M cost**)
3) Tariff
4) Plant load factor(PLF)

The fuor financial parameters were identified as the main variable factors for sensitive analysis of financial attractiveness. Their impacts on IRR of total investment were analyzed in the below tables(Table 4 –Table7).

Table 4 Sensitivity of total investment IRR to **total investment**

IRR Range / Parameters	-10%	-7.5%	**-6.8%**	-5%	0%	2.5%	5%	7.5%
Total investment	8.51%	8.11%	**8.00%**	7.72%	6.99%	6.64%	6.31%	5.99%

Table 5 Sensitivity of total investment IRR to **O&M cost**

IRR Range / Parameters	**-34.3%**	-30%	-20%	-10%	0%	5%	10%
O&M cost	**8.0%**	7.88%	7.58%	7.29%	6.99%	6.83%	6.68%

Table 6 Sensitivity of total investment IRR to **tariff**

IRR Range / Parameters	-10%	-5%	0%	5%	**6.9%**	7.5%	10.0%
Tariff	5.45%	6.23%	6.99%	7.72%	**8.00%**	8.09%	8.44%

Table 7 Sensitivity of total investment IRR to **PLF**

IRR Range / Parameters	-10%	-5%	0%	5%	**6.9%**	7.5%	10.0%
PLF	5.45%	6.23%	6.99%	7.72%	**8.00%**	8.09%	8.44%

As shown in the above tables, the most important factor for financial attractiveness is the total investment. In the case that total investment decreases by about 6.8%, the IRR of the proposed project begins to exceed the benchmark. For the project, 89.54% of the total investment of the proposed project is used to the purchase and installation of electric equipments (wind turbines and transformers)[11]. Moreover, as prices, including those of the requirement equipment and commodities, have been increasing in recent years, a significant reduction in the level of investment is particularly unlikely[12].Hence, it is impossible to lower the expected total investment of the proposed project in the Feasibility Study Report. Within the reasonable range of total investment, the proposed project is always lack of financial attractiveness.

[11] The feasibility study report of Inner Mongolia Siziwangqi Bayin'aobao Wind Power Project (Page13-2).

[12] http://www.86wind.com/info/detail/4-5335.html

http://energy.people.com.cn/GB/5720709.html

The tariff is the next important factor affecting the financial attractiveness of the proposed project. In the case that the tariff increases by 6.9%, the FIRR of the proposed project begins to exceed the benchmark.. According to China's Management Rules on Tariff issued by NDRC[13], the tariff of the un-tendering projects should be determined by the government with reference to the tariff of tendering wind projects. Whereafter, the PPA of the tariff of power projects are determined by the grid company and project owners according to the guiding price of the government . As a whole, the tariff for newly built project is generally not allowed to be higher than the tariff provided in the latest guiding price .By this pricing principle, China government is gradually lowering down the wind power in-grid tariff[14]. In the Inner Mongolia Power grid , the tariff provided in guiding price of government for wind power projects has been maintained in the period from 2000 to 2006 at the level of 0.54-0.5325 RMB/kWh (include VAT) [15]. In 2007, a new guiding price approval was released and the tariff for wind power projects is decreased to 0.51 RMB/kWh (include VAT)[16]. The tariffs of newly built wind power projects are provided in the PPA according to the latest guiding price. Since the trend of tariff for wind power projects in the Inner Mongolia Power grid is decreasing, it is impossible to increase the tariff of the project by 6.9%.

According to the Chinese Renewable Energy Law enacted on January 1st 2006, wind power generation should be purchased fully by the grid[17], the sensitivity analysis of PLF is equivalent to the sensitivity analysis of electricity generated by the project. In the case that the PLF increases by 6.9%, the IRR of the proposed project begins to exceed the benchmark. Therefore, the PLF reflects the annual generation output of the proposed project, which depends on the average wind speed at the project site for a specific wind turbine. According to the feasibility study report of the proposed project, the annual output is estimated basing on the long term weather statistic data provided by local meteorological station and wind resources measurement, which first using professional software WAsP to select the rich wind source area, then using software WindFarmer to optimize the location of each turbine for maximize power generation. Moreover, the PLF value is positive correlation with the wind speed, the annual average wind speed of the project site tends to decrease and to gradually be stable over the past 30years

[13] Trial Measures for the Administration of the Pricing of, and the Sharing of Costs in Connection with, the Generation of Electricity Using Renewable Energy Resources, FAGAIJIAGE(2006) No.7

[14] http://www.eri.org.cn/manage/upload/uploadimages/eri200672795944.pdf

[15] http://www.86wind.com/info/detail/37-6774.html

[16] the National Development and Reform Commission issued the approval about the tariffs of the new wind plants[16] on 3rd *Dec* .2007.(http://www.sdpc.gov.cn/zfdj/jggg/dian/t20080218_193009.htm)

[17] http://www.gov.cn/ziliao/flfg/2005-06/21/content_8275.htm

for which data are available recently[18] as shown in Figure 2. Therefore, the probability that PLF is 6.9% higher than the estimated value is very small.

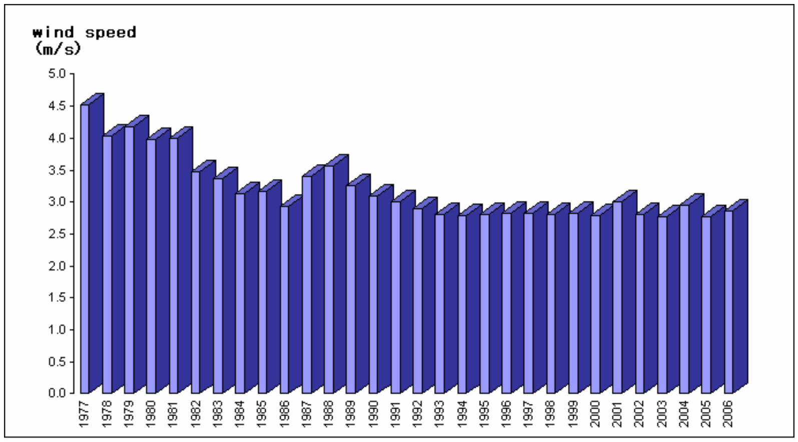

Figure 2 The Average Wind speed provided by local meteorological station

The impact of the annual O&M cost is the slightest. The FIRR of the proposed project could reach the benchmark when the annual O&M cost decreases by 34.3%. However, according to the Feasibility Study Report of the proposed project, the detailed operation costs is composed of four kinds of costs - maintenance costs, annual salaries for the employees, insurance premium of fixed assets and other costs.

In the recent years, the price of material and salaries of the employees and tax rates are gradually increasing in Chin[19], especially the price rising of steels[20] that is the main material of the proposed project. At the same time, the maintenance costs for accessorial equipments of wind turbines are also increasing, because the wind turbines demand exceeds supply in the whole world[21]. As above description, the annual O&M cost is gradually increasing during the operation period for the proposed project. Therefore, it is impossible that the annual O&M cost could decrease 34.3%, so the proposed project is always lack of financial attractiveness within the reasonable range of annual O&M cost.

Outcome of Step 2: as illustrated above, under the reasonable variations in the critical assumptions, the conclusion regarding the financial additionality is robust and supported by sensitivity analysis. So *the proposed CDM project activity is unlikely to be financially attractive.*

[18] The feasibility study report of Inner Mongolia Siziwangqi Bayin'aobao Wind Power Project, Page2-3.

[19] http://info.bm.hc360.com/2007/12/03102559376.shtml

http://www.chinadaily.com.cn/hqcj/2007-09/03/content_6075777.htm

[20] http://www.hnpi.net/fxyc/list.asp?id=950

[21] http://www.86wind.com/info/detail/4-5335.html

http://energy.people.com.cn/GB/5720709.html

Step 3. Barrier analysis

Investment analysis has argued that the project is the economically less attractive than other alternatives without the revenue from the sale of CERs. According to "*Tool for the Demonstration and Assessment of Additionality (version 4)*", this PDD skips the barrier analysis and argues the additionality.

Step 4. Common practice analysis

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

In 2005, wind power accounted for only 0.083% of the total installed capacity of the North China Power Grid[22], it is clear that wind power is not a common practice generally. Before 2002, China wind farm often received high tariffs as no bidding process was required and power companies and grid companies share the same interests[23]. So the wind power plants were demonstration projects and enjoyed higher price than the present project[24], which are essential distinctions between the present project and the parts of existing similar projects. Thus they had no restrictions in power grid connection.

According to the definitions of other activities similar to the proposed project activity in "Tool for the Demonstration and Assessment of Additionality (version 4)", the similar projects are considered similar if they are in the same country/region and/or rely on a broadly similar technology, are of a similar scale, and take place in a comparable environment with respect to regulatory framework, investment climate, access to technology, access to financing, etc.

Due to the North China Power Grid is the baseline **scenario for the proposed project, the** similar projects should been considered in the scope of the North China Power Grid. However, the North China Power Grid consists of two cities and four provinces including Beijing, Tianjin, Hebei, Shanxi, Shandong, and Inner Mongolia Autonomous Region, which is the area of 163 sq.km[25]. In the scope of North China Power Grid, two cities and four provinces had differences in the several aspects including the tariff and construction conditions and geographical environments and financing conditions[26]. According to the above analyses and the definitions of other activities similar to the proposed project activity in "Tool for

[22] China Electric Power Yearbook 2006

[23] http://61.159.10.158/detail.cfm?id=12524

http://www.grchina.com/gb/greenpower/advise-0-5.htm

[24] http://www.grchina.com/gb/greenpower/advise-0-5.htm

[25] http://www.ncpg.com.cn/dwjj.htm

[26] http://www.sdpc.gov.cn/zfdj/jggg/dian/t20080218_193009.htm

the Demonstration and Assessment of Additionality (version 4)”, the scope of the similar projects should limited in the Inner Mongolia Power grid and the similar projects determinated in this scope are more representational with the same grassland region and similar construction conditions and same geographical environments(wind recourses and climate).

A comparable size to the project activity is defined as the range from 50% to 150% of the rated capacity of the project plant mentioned in ACM0013[27]. According to the description for the comparable size to the project activity approved by EB, a similar scale to the proposed project is limited with the capacity of 25-75MW.

Table 8 Grid-connected wind farms similar to the project in Inner Mongolia Power grid

Project Title	Capacity(MW)	Remarks
Inner Mongolia Huitengxile wind power project	68.5	Demostration Project partly Supported by loan from Denmark government and Netherlands government
Inner Mongolia Keshiketeng Qi Dali wind power project	31.2	Demonstration Project Supported by national debt fund and loan from Denmark government
Inner Mongolia Bayinaobao wind power projects (I)	49.5	Obtained the CDM confirmation of DNA
Inner Mongolia Zhuozi 40MW Wind Power Project	40	Registered
Inner Mongolia mangniuhai wind farm project	49.3	Obtained the CDM confirmation of DNA
Inner Mongolia Northern Longyuan Huitengxile Wind Farm Project	40	Obtained the CDM confirmation of DNA
Inner Mongolia Cailiang wind farm project	49.5	Obtained the CDM confirmation of DNA
Inner Mongolia Bayannaoer Chuanjingsumu wind farm project	49.3	Obtained the CDM confirmation of DNA
Guohua Inner Mongolia Huitengliang Wind power project	48.75	Registered
Inner Mongolia Huitengliang 49.5MW Wind Power Project	49.5	Registered
Inner Mongolia Bayannaoer Chuanjingsumu phrase (II)wind farm project	49.5	Obtained the CDM confirmation of DNA
Inner Mongolia Bayin Hanggai 49.5MW wind farm project	49.5	Obtained the CDM confirmation of DNA
Inner Mongolia Huitengxile Jingneng 49.5MW Wind Power Project	49.5	Obtained the CDM confirmation of DNA

[27] http://cdm.unfccc.int/UserManagement/FileStorage/CDMWF_AM_JD73SPVZEDDN6IY8M6WFC7WIOBMNRN

Inner Mongolia Hangjin Yihewusu Wind Power Project	49.5	Obtained the CDM confirmation of DNA
Inner Mongolia Wulate 45MW Wind Power Project	45	Obtained the CDM confirmation of DNA

Data source：

http://www.nwtc.cn/Article/ShowArticle.asp?ArticleID=814
http://www.gd.xinhuanet.com/newscenter/ztbd/2007-10/18/content_11435955.htm

http://cdm.ccchina.gov.cn/web/index.asp

http://www.86wind.com/info/detail/37-6774.html

http://www.sdpc.gov.cn/zfdj/jggg/dian/t20080218_193009.htm

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

From the table above it can be found that all similar wind farms constructed have either received financial support (the two earliest projects) or were developed under CDM. Inner Mongolia Huitengxile wind power project was partly supported by loan from Denmark government and Netherlands government[28] ,and Inner Mongolia Keshiketeng Qi Dali wind power project was also a demonstration project supported by national debt fund and loan from Denmark government[29].However, such kind of support is no longer given in Inner Mongolia. The other wind farms are all applying for or have already received CDM registration. Many project developers have been encouraged by the positive news on the CDM registration of the first projects, and are now taking CDM revenue into account in their decision before construction and are applying for CDM registration.

To summarize, it can be proved that the proposed project activity is additional and not (part of) baseline scenario. Without the CDM revenues, the project activity would not be implemented smoothly. Instead, the equivalent electricity service will be provided by the North China Power Grid. As a result, the reduction of GHG emissions would not be realized. The above additionality analysis provides sufficient evidence that the registration of the CDM revenues can enable the project to overcome the barriers it faces.

In conclusion, the proposed project is additional.

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B.6. Emission reductions:

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B.6.1. Explanation of methodological choices:

[28] http://www.nwtc.cn/Article/ShowArticle.asp?ArticleID=814

[29] http://www.gd.xinhuanet.com/newscenter/ztbd/2007-10/18/content_11435955.htm

To determine baseline scenario emissions, firstly emission factors of Operating Margin ($EF_{OM,y}$) and Build Margin ($EF_{BM,y}$) were calculated based on the history data of the North China Power Grid, which include the installed capacity, electricity generation and different types of fuel consumptions of all the power plants connected into the North China Power Grid. Secondly, the baseline emission factor (EF_y) was calculated as a combined margin(CM) of the Operating Margin (OM) and Build Margin (BM) emission factors as described in following three steps. All the calculation in compliance with requirement of the baseline methodology (ACM0002), the details is listed in the following steps.

Step 1: Calculation the Operating Margin emission factor ($EF_{OM,y}$)

Calculation of OM emission factor should be based on one of the four following methods:

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

The justifications of the choice of methodology to calculate OM emission factor are as follows:

Method (a): Simple OM

Method (a) can only be used where low-cost/must run resources constitute less than 50% of total grid generation in: (1) average of the five most recent years, or (2) based on long-term normal for hydroelectricity production. Low operating cost and must run resources 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 the set of plants. From 2001to 2005, the low-cost/ must run resources such as hydropower, wind power and other renewable resources in the North China Power Grid accounts for about 1.0%, the sum of which is much less than 50%. Therefore, method (a) is applicable for the project.

Method (b): Simple adjusted OM

Method (b) requires the annual load duration curve of the power grid and the load data of every hour data during the whole year on the basis of the time order. As mentioned above, the dispatch data and detailed load curve data were not available publicly. Therefore, method (b) is not applicable for the project as well.

Method (c): Dispatch Data Analysis OM

If the dispatch data is available, method (c) should be the first methodological choice. This method requires the dispatch order of each power plant and the dispatched electricity generation of all the power plants in the power grid during every operation hour period. Since the dispatch data, power plants

operation data are considered as commercial secret materials and only for internal usage not available publicly. Thus, method (c) is not applicable for the project.

Method (d): Average OM

Method (d) will only be used when (1) low-cost/must run resources constitute more than 50% of total grid generation and detailed data to apply option (b) is not available, and (2) where detailed data to apply option (c) above is unavailable. From 2001 to 2005, the fired power in the North China Power Grid accounts for about 98%, and wind power or other sources low-cost/ must run resources constitute less 1%. Hence method (d) is not applicable for the project.

In conclusion, method (a) is the only reasonable and feasible method among the four methods for calculating the Operating Margin emission factor ($EF_{OM,y}$) of the project.

According to the ACM0002, the Simple OM emission factor ($EF_{OM,simple,y}$) is calculated as the generation-weighted average emissions per electricity unit (tCO_2/MWh) of all generating sources serving the system, not including low-operating cost and must-run power plants, the detailed formulas are as following:

$$EF_{OM,simple,y} = \frac{\sum_{i,j} F_{i,j,y} \times COEF_{i,j}}{\sum_{j} GEN_{j,y}} \quad (1)$$

Where:

$F_{i,j,y}$ is the amount of fuel i (in a mass or volume unit) consumed by relevant power sources j in year(s) y ,

j refers to the power sources delivering electricity to the grid, not including low-operating cost and must-run power plants, and including imports to the grid[30],

$COEF_{i,j,y}$ is the CO_2 emission coefficient of fuel i (tCO_2/ mass or volume unit of the fuel), taking into account the carbon content of the fuels used by relevant power sources j and the percent oxidation of the fuel in year(s) y , and

$GEN_{j,y}$ is the electricity (MWh) delivered to the grid by sources j .

The CO_2 emission coefficient $COEF_i$ is obtained as

$$COEF_i = NCV_i \times EF_{CO_2,i} \times OXID_i \quad (2)$$

Where:

NCV_i is the net calorific value (energy content) per mass or volume unit of a fuel i , (TJ/ mass or volume unit) , country-specific values are used[31].

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[30] As described above, an import from a connected electricity system should be considered as one power source j .

[31] China Energy Statistic Yearbooks

$OXID_i$ is the oxidation factor of the fuel i , the 2006 IPCC default values are used,
$EF_{CO_2,i}$ is the CO_2 emission factor per unit of energy of the fuel i (tCO_2e/TJ). $EF_{CO_2,i}$ of fossil fuels is from the 2006 IPCC default.

Based on the calculation results, the Operation Margin emission factor ($EF_{OM,y}$) of North China Power Grid is 1.1208 **tCO_2/MWh (http://cdm.ccchina.gov.cn).** The detailed data and calculation are listed in Annex 3.

Step2: Calculation the Build Margin emission factor ($EF_{OM,y}$)

According to the ACM0002, the baseline Build Margin emission factor was calculated using the following formula (3).

$$EF_{BM,y} = \frac{\sum_{i,m} F_{i,m,y} \times COEF_{i,m,y}}{\sum_{m} GEN_{m,y}} \qquad (3)$$

where:
$F_{i,m,y}$ is the amount of fuel *i* (in a mass or volume unit) consumed by *m* power plants in year(s) *y*,
$COEF_{i,m,y}$ is the CO_2 emission coefficient of fuel *i* (tCO_2/ mass or volume unit of the fuel), taking into account the carbon content of the fuels used by *m* power plants and the percent oxidation of the fuel in year(s) *y*,
$GEN_{m,y}$ is the electricity (MWh) delivered to the grid by *m* power plants.
According to the baseline methodology (ACM0002), the Build Margin emission factor $EF_{BM,y}$ *ex-ante* was selected to identify sample group for calculating Build Margin emission factor, which based on the most recent information available on plants already built for sample group *m* at the time of PDD submission. The sample group *m* consists of either

- The sample group *m* consists of either the five power plants that have been built most recently, or
- The power plant capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently.

However, no matter which option mentioned above was adopted for the proposed project, the same issue on data availability must be addressed. Currently, it is very difficult to get the capacity margin data of power plants in China, since these data as well as generation and fuel consumption data of each power plant are regarded as commercial secrets or only for internal usage. According to the guidance from EB, the following deviation was adopted to calculate the Build Margin emission factor.
(http://cdm.unfccc.int/UserManagement/FileStorage/AM_CLAR_QEJWJEF3CFBP1OZAK6V5YXPQK K7WYJ)

♦ Use of capacity additions for estimating the build margin emission factor for grid electricity.
♦ Use of weights estimated using installed capacity in place of annual electricity generation.

♦ Use the efficiency level of the best technology commercially available in the provincial/regional or national grid of China, as a conservative proxy, for each fuel type in estimating the fuel consumption to estimate the build margin (BM).

Following the EB's guidance the build margin is calculated as follows:

1. Due to breakdown data by power plants are not available while the aggregate data by different types of fuels are available, therefore, the *m* sample group will consist of capacity addition by power sources with same fuel instead of by power plants. For the proposed project the *m* sample group will consist of fossil fuel fired capacity addition, hydropower capacity addition and other capacity addition;
2. Assuming that all the power plants with same fuel type have equal annual operation hours, the starting year t_0 could be identified which fulfil the following constraint:

$$\sum_i CAP_{i,t-t_0} \geq 20\% \times \sum_i CAP_{i,t} \qquad (4)$$

   Where,

   t is the recent year of which the latest data is available;

   $CAP_{i,t-t0}$ is the capacity addition of type *i* from year t_0 to year *t*;

   $CAP_{i,t}$is the installed capacity of type *i* in year *t*;

   The capacity addition belonging to *m* sample group thus could be identified. For the proposed project, the most recent year of which data is available is 2005, while t_0=2003, the total capacity addition during 2003 to 2005 consisting of 27062.1MW of fossil fuel fired capacity, 195.6MW of the low-cost/ must run resources capacity, which accounts for 23.78% of total installed capacity in 2005 (See Annex 3 for detailed calculation).
3. To be conservative, zero emission factors were selected for hydropower capacity and other capacity. Moreover, since specific data on coal fired capacity, oil fired capacity, and gas fired capacity could not be separated from current statistical data on fossil fuel fired capacity, the following approach was adopted for calculating the emission factor of fossil fuel fired capacity addition:

Step 2a: calculating the respective percentages of CO2 emissions from coal fired power generation, oil fired power generation, and gas fired power generation against total CO2 emissions from fossil fuel fired power generation

with the energy balance sheet in China Energy Statistical Yearbook for the most recent year, calculating the respective percentages of CO_2 emissions from coal fired power generation, oil fired power generation, and gas fired power generation against total CO_2 emissions from fossil fuel fired power generation:

$$\lambda_{Coal} = \frac{\sum_{i \in COAL, j} F_{i,j,y} \times COEF_{i,j}}{\sum_{i,j} F_{i,j,y} \times COEF_{i,j}} \qquad (5)$$

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

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

where:

$F_{i,j,y}$ is the amount of fuel *i* (in a mass or volume unit) consumed by province *j* in year(s) *y*,

$COEF_{i,j,y}$ is the CO_2 emission coefficient of fuel *i* (tCO_2/ mass or volume unit of the fuel), taking into account the carbon content of the fuels consumed by province *j* and the percent oxidation of the fuel in year(s) *y*,

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

Step 2b: calculating the corresponding emission factor for fossil fuel fired power generation

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

where:

$EF_{Coal,Adv}$, $EF_{Oil,Adv}$ and $EF_{Gas,Adv}$ are the emission factors for the best commercially available technology of coal fired power generation, oil fired power generation, and gas fired power generation, respectively (See Annex 3 for detailed calculation).

Step 2c: Calculating the $EF_{BM,y}$ of local grid

Using the share of different type of capacity in total capacity addition as weight, the weighted average of emission factors of different type capacity is calculated as the Build Margin emission factor $EF_{BM,y}$ of North China Power Grid (See Annex 3 for detailed calculation):

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

where:

CAP_{Total} is the total capacity addition,

$CAP_{Thermal}$ is the fossil fuel fired capacity addition.

Following the three steps above, the Build Margin emission factor $EF_{BM,y}$ of the North China Power Grid is calculated to be: **0.9397tCO2/MWh (**http://cdm.ccchina.gov.cn**).** The detailed calculation and data were listed in the annex 3**.**

Data sources for $EF_{OM,y}$ and $EF_{BM,y}$ calculation: Data on installed capacity, power generation, and self-usage rate of power plants are from China Electric Power Yearbooks 2002-2006. The consumption data

of various types of fuels and their net caloric values are from China Energy Statistical Yearbooks 2002-2006. The CO_2 emission factors per unit of energy and the oxidation factors are from the 2006 IPCC Guidelines for National Greenhouse Gas Inventories.

Step3: Calculation the baseline emission factor (EF_y)

According to the baseline methodology (ACM0002), the baseline emission factor EF_y is calculated as the weighted average of the Operating Margin emission factor ($EF_{OM,y}$) and the Build Margin emission factor ($EF_{BM,y}$):

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

Where: the weights ω_{OM} and ω_{BM} are 75% and 25% respectively by the default, and $EF_{OM,y}$ and $EF_{BM,y}$ are calculated as described in Steps 1 and 2 above.

The Baseline Emission factor (EF_y) of the North China Power Grid was 1.0755 tCO_2/MWh. The detailed calculation and data were listed in the annex 3**.**

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

Data / Parameter:	*Fi,y*
Data unit:	t/m^3
Description:	Amount of fuel *i* consumed in year(s)
Source of data used:	China Energy Statistical Yearbook 2002-2006
Value applied:	See Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Since the detailed fuel consumption data by power plants are not publicly available, therefore the aggregated data by fuel types are used instead
Any comment:	

Data / Parameter:	*GENi,y*
Data unit:	MWh
Description:	Electricity (MWh) delivered to the grid excluding low operating cost/must run power plants in year *y*
Source of data used:	China Power Yearbook 2002-2006
Value applied:	See Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Since the detailed generation data by power plants are not publicly available, therefore the aggregated data by fuel types are used instead.

Any comment:	

Data / Parameter:	*NCVi*
Data unit:	TJ/t(m^3)
Description:	Net calorific value (energy content) per mass or volume unit of fuel *i*
Source of data used:	China Energy Statistical Yearbook 2002-2006
Value applied:	See Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	According to ACM0002, the national specific value shall be used preferentially
Any comment:	

Data / Parameter:	*OXIDi*
Data unit:	%
Description:	Oxidation factor of the fuel *i*
Source of data used:	2006 IPCC default value
Value applied:	See Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	The country specific values of oxidation factors in China are not available. As such IPCC default values are used instead.
Any comment:	

Data / Parameter:	$EF_{CO2,i}$
Data unit:	tCO_2/TJ
Description:	CO_2 emission factor per unit of energy of the fuel *i*
Source of data used:	2006 IPCC default value
Value applied:	See Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	The country specific values of fuel CO2 emission factor in China are not available. As such IPCC default values are used instead.
Any comment:	

Data / Parameter:	Coal fire power supply efficiency
Data unit:	%
Description:	the best commercially available technology of coal fired power generation
Source of data used:	http://cdm.ccchina.gov.cn/web/index.asp
Value applied:	35.82
Justification of the	According to EB guidance, the statistics by State Electricity Regulatory

choice of data or description of measurement methods and procedures actually applied :	Commission (SERC) on newly built thermal plants in 10th "Five-Year Plan" period can be used.
Any comment:	

Data / Parameter:	Oil and gas fire power supply efficiency
Data unit:	%
Description:	the best commercially available technology of oil and gas fired power generation
Source of data used:	http://cdm.ccchina.gov.cn/web/index.asp
Value applied:	47.67
Justification of the choice of data or description of measurement methods and procedures actually applied :	According to EB guidance, the statistics by State Electricity Regulatory Commission (SERC) on newly built thermal plants in 10th "Five-Year Plan" period can be used.
Any comment:	

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

According to the calculation results in B6.1, the emission reductions of the proposed project are calculated as follows:

Baseline emissions

Operating Margin emission factor ($EF_{OM,y}$) (tCO_2/MWh) ：1.1208

Build Margin emission factor ($EF_{BM,y}$) (tCO_2/MWh) ：0.9397

Baseline Emission factor (EF_y) (tCO_2/MWh) ：1.0755

Project emissions

According to the baseline methodology ACM0002, the GHG emission of the proposed project within the project boundary is zero,i.e.

$$PE_y = 0$$

Leakage

According to the baseline methodology ACM0002, the leakage of the proposed project is not considered,

$$L_y = 0$$

Project Emission Reductions

The emission reduction (*ERy)* by the project activity during a given year y is the difference between baseline emissions (*BEy*), project emissions (*PEy*) and emissions due to leakage (*Ly*), as follows:

$$ER_y = BE_y - PE_y - L_y$$

Where: according to the baseline methodology ACM0002, PE_y=0 and L_y=0. Therefore, the annual emission reductions of the project during the first crediting period are estimated to be:

$$ER_y = BE_y = EG_y \times EF_y$$

Annual generation (net of auxiliary power i.e. the on site electricity usage for the operation of the hydro station) is estimated as 120070MWh. Using the approach above, the annual emission reductions are estimated to be 129,134 tCO_2 .the proposed project activity is expected to achieve 903,938tCO_2 of net emission reductions during the first 7-year crediting period. (details in Annex3).

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

Year	Estimation of project activity emissions (tonnes of CO_2e)	Estimation of baseline emissions (tonnes of CO_2e)	Estimation of leakage (tonnes of CO_2e)	Estimation of overall emission reductions (tonnes of CO_2e)
2009	0	129,134	0	129,134
2010	0	129,134	0	129,134
2011	0	129,134	0	129,134
2012	0	129,134	0	129,134
2013	0	129,134	0	129,134
2014	0	129,134	0	129,134
2015	0	129,134	0	129,134
Total (tonnes of CO_2e)	0	903,938	0	903,938

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

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B.7.1. Data and parameters monitored:

Data / Parameter:	EG_y
Data unit:	MWh
Description:	Electricity generated by the project
Source of data to be used:	Measured and verified against sales data
Value of data applied for the purpose of calculating expected emission reductions in	120070

section B.5	
Description of measurement methods and procedures to be applied:	Directly measured by metering systems installed at the project site. The recording frequency will be hourly measured and monthly recorded. The proportion of data to be monitored is 100% and the data will be archived electronically and kept during the crediting period and 2 years after. Double check by receipt of sales. The metering devices are calibrated as stated in B.7.2
QA/QC procedures to be applied:	QA/QC procedures aren't being undertaken for date monitored. The data will be directly used to calculate emission reductions. The record of sales to the grid and other relevant records are used to ensure consistency.
Any comment:	

Data / Parameter:	$EG_{self-use}$
Data unit:	MWh
Description:	Electricity utilized by the project
Source of data to be used:	Measured and verified against sales data
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0
Description of measurement methods and procedures to be applied:	Directly measured by metering systems installed at the project site. The recording frequency will be hourly measured and monthly recorded. The proportion of data to be monitored is 100% and the data will be archived electronically and kept during the crediting period and 2 years after. Double check by receipt of electricity purchase. The metering devices are calibrated as stated in B.7.2
QA/QC procedures to be applied:	QA/QC procedures aren't being undertaken for date monitored. The data will be directly used to calculate emission reductions. The record of purchase from the grid and other relevant records are used to ensure consistency.
Any comment:	

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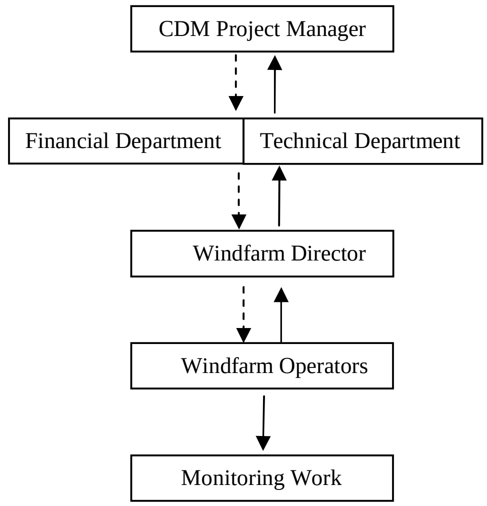
B.7.2. Description of the monitoring plan:

Monitoring plan is a division and schedule of a series of monitoring tasks. Monitoring tasks must be implemented according to the monitoring plan in order to ensure that the real, measurable and long-term greenhouse gas (GHG) emission reduction for the proposed project is monitored and reported.

1. Management structure and staff for implementation of monitoring plan

This monitoring plan will be implemented by professional staff authorized by the owner of the proposed project, i.e. Longyuan (Siziwang) Wind Power Co., Ltd. The management structure is illustrated as follows:



Windfarm Derector will collect the information and data required by the Monitoring Plan. The collected information will be documented and sent to the CDM manager and responsible staffs of the Longyuan (Siziwang) Wind Power Co., Ltd monthly. The CDM manager will in charge of the implementation of the Monitoring Plan and the confirmations on monitoring, calculation data and report to the General Manager of the company. Managers of the proposed project must maintain credible, transparent, and adequate data estimation, measurement, collection, and tracking systems to maintain the information required for an audit of an emission reduction project.

2. Monitoring train

The Management Group has all received sufficient training in terms of monitoring and verification. They have received general training on wind power project operation organized the project owner, including reading and calibration of the meter, recording of the readings, adjustment of readings, and reporting of readings. On the other hand, they have received CDM training organized by China Fulin Windpower Development Corporation, including validation, registration and verification. When necessary, the CDM Manager is responsible for organizing or attending trainings on Monitoring and Verification.

3. Calibration of Meters & Metering

An agreement should be signed between the proposed project owner and Inner Mongolia Electric Power Company that defines the metering arrangements and the required quality control procedures to ensure accuracy.

- An electronic multifunctional electricity meter and a back-up meter (accuracy degree is 0.2-0.5S, bidirectional,) are installed between the 35/110 k V transformer and Jiang'an substation of the Inner Mongolia Power Grid to measure and accout the electricities including EGy and EGself-use. For the meter readings, the positive readings are the Electricity supplied to the grid by the project ($EG_{y)}$ and negative readings is the Electricity utilized by the project ($EG_{self\text{-}use}$). Therefore, the net electricity

supply to the grid was calculated based on the meter readings for EG_y and $EG_{self-use}$. The net energy supply to the grid is the difference of EG_y and $EG_{self-use}$. Moreover, the meters system is installed between the proposed project and the 35/110 k V transformer for double checking the basic meter reading.

- The metering equipments will be properly configured and checked annually according to the requirement from Technical administrative code of electric energy metering (DL/T448 - 2000).

Calibration is carried out by the Inner Mongolia Electric Power Company with the records being provided to the proposed project owner, and these records will be maintained by the proposed project owner and the third party designated.

4. Monitoring

Grid-connected electricity generated by the proposed project will be monitored through metering equipment at the substation (interconnection facility connecting the facility to the grid). The data can also be monitored and recorded at the on-site control center using a computer system.

ID number *(Please use numbers to ease cross-referencing to table D.3)*	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e),	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic / paper)	For how long is archived data kept?	Comment
1.EG_y	Electricity supplied to the grid by the project	ammeter	MWh	*m*	hourly measured and monthly recorded	100%	electronic	During the crediting period and two years after	Electricity supplied by the project activity to the grid. rechecked by receipt of sales.
2. $EG_{self-use}$	Electricity utilized by the project	ammeter	MWh	*m*	hourly measured and monthly recorded.	100%	electronic	During the crediting period and two years after	rechecked by receipt of purchases

The specific steps to monitoring are listed below:

● The project owner reads the meter and records data on the same day of every month (which day to be determined).

● The project owner supplies readings to the local Electric Power Company.
● The local Electric Power Company provides electricity sales invoice to the project owner.
● The project owner provides the meter's data readings to DOE for verification.

The meter reading will be readily accessible for DOE. Calibration test records will be maintained for verification.

● If any errors are detected, the party owning the meter shall repair, recalibrate or replace the meter and give the other party sufficient notice to allow a representative to attend during any corrective activity.

● Should reading of the meter be inaccurate by more than the allowable error, or otherwise functioned improperly, the electricity supplied to the grid by the proposed project shall be determined by:

1) First, by reading the self-carried meters of wind turbines, unless a test by either party reveals they are inaccurate;
2) if the self-carried meters of wind turbines are not with acceptable limits of accuracy or are otherwise performing improperly, the project owner and the local Electric Power Company shall jointly prepare an estimate of the correct reading; and
3) If the project owner and t local Electric Power Company fail to agree the estimate of the correct reading, then the matter will be referred for arbitration according to agreed procedures.

5. 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. This is an on-going process that will be ensured through the CDM in terms of the need for verification of the emissions on an annual basis according to this PDD and the CDM manual.

6. Data Management System

This provides information on record keeping of the data collected during monitoring. Record keeping is the most important exercise in relation to the monitoring process. Without accurate and efficient record keeping, project emission reductions cannot be verified. Below follows an outline of how project related records will be managed.

Overall responsibility for monitoring greenhouse gas emissions reductions will rest with the CDM monitoring staff of the proposed project. The CDM manual sets out the procedures for tracking information from the primary source to data calculations, in paper format. If data and information are from internet, the website must be provided. Moreover, the credibility and reliability of those data and information from internet must be confirmed by the CDM developer. Physical documentation such as paper-based maps, diagrams and environmental assessment will be collated in a central place, together with this monitoring plan. In order to facilitate auditor's reference, monitoring results will be indexed. All paper-based information will be stored by Longyuan (Siziwang) Wind Power Co., Ltd and kept at least one copy.

The following table below outlines the key documents relevant to monitoring and verification of the emission reductions from the proposed project.

Table List of the key documents relevant to monitoring and verification

I.D.No.	Document Title	Main Content	Source
F-1	PDD, including the electronic spreadsheets and supporting documentation(assumptions, estimations, measurement, etc)	Calculation procedure of emission reduction and monitoring items	Proposed project owner or UNFCC website
F-2	Report on monitoring and checking of electricity supplied to the grid	Record based on monthly meter reading and electricity sale receipts	Proposed project owner
F-3	Report on maintenance and calibration of metering equipment	Reasons for maintenance and calibration and the precision after maintenance and calibration	Proposed project owner
F-4	Report on the qualifications of the operators	Technical post ,working experience etc.	Proposed project owner
F-5	the project management record (including date collection and management system)	Comprehensively and truly reflect the management and the operation of the proposed project	Proposed project owner

7. Verification and monitoring results

The verification of the monitoring results of the proposed project is a mandatory process required for all CDM projects. The main objective of the verification is to independently verify that the project has achieved the emission reductions as reported and projected in the PDD. It is expected that the verification will be done annually.

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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)

Date of completion of baseline study: 28/07/2008

Names of person/entity determining the baseline are listed as follows:

- Mr. Li Gang,
  Entity: China Fulin Windpower Development Corporation.
  Address: Floor 8th, Tower C, International Investment Building, No.6-9, North Ave.Fuchengmen, Xicheng District, 100034, Beijing,P.R.C.
  Telephone/Fax: +8610-66091326 / 66091396
  E-mail: Fulin_ligang@126.com

- Mr. SUN Bingzhi,
  Entity: China Fulin Windpower Development Corporation.
  Address: Floor 8th, Tower C, International Investment Building, No.6-9, North Ave.Fuchengmen, Xicheng District, 100034, Beijing,P.R.C.
  Telphone: +8610-66091379

E-mail: Sunsunng1019@sina.com

(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:

19/07/2007(Construction permission date)

>>

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

20 years

>>

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:

01/01/2009(The final starting date is the registered date)

>>

C.2.1.2. Length of the first crediting period:

7 years

>>

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:

In accordance with relevant environmental law and regulations, the Environmental Assessment Report of the project has been approved by the Environmental Protection Administration of Inner Mongolia Autonomous Region, referred as “Inner Mongolia Environment Construction (Table) [2006] No.69”. A summary of the report is illustrated as follows:

- **Main Potential Environmental Impacts Associated with the project**

– Impacts from the construction of the wind farm include construction noise, dust as well as water and soil loss etc;

– Impacts from noise and the electromagnetism pollutions of the turbines during the exploitation of the wind farm;

– Impacts on native vegetation and environment as a result of construction activities for windmill towers, transformers, and access roads;

– Impacts on Socio-Economy from the construction and operation of the project

- **Impacts on Air Environment**

Wind Power plants are known to contribute to zero atmospheric pollution as no fuel combustion is involved during any stage of the operation. However, the sources of air pollution are mainly due to the construction activities including the transportation of construction material, road construction and Improvement and cadre construction etc. The impacts on air environment are temporarily that the impact will be ended when the construction is completed. It is suggested that several measures shall be taken into account, such as the construction under strong wind weather is prohibited, reducing as much as possible the area of construction, spraying water when undertaking construction, and reducing the speed of vehicles in the field. Hence, air pollution caused by the project is not significant to the surrounding environment.

- **Impacts on Noise Environment**

The noise of the project in construction phase is from vehicles and machines on-site. According to the monitoring data from the construction site, the noise is at a level between 91-102 dB. Based on the formula of declining of sound emitted from a non-directional source, it is estimated that the maximum noise effective distance of the project is 50m in daytime and 300m at night. Moreover, the magnitude of the impacts during construction phase exists for a temporary period of time till the end of construction phase. However, operational noise from the rotating blades is expected to be minimal due to the higher background noise caused by strong winds. The closest residential area to the site of the Project is over

5km away. Therefore, the noise of the project will not have impact on nearby residents.

- **Impacts on Water and Solid Waste**

The wind-farm does not consume any water, nor does it generate any wastewater in the operation phase. The possible negative impacts are the household wastewater and solid waste produced by builders and staff, and the waste earth from digging of the foundation in the construction phase. Under normal conditions with highly automated monitoring and control system, the household wastewater will be first treated in a septic tank, and then be disinfected to discharge for circumjacent virescence. Moreover, 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. The rest of the waste earth should be placed in the low area of the site and replanted with grass. Following the suggestion, the water and solid waste should have no significant impact on the environment.

- **Impacts on telecommunications and television transmissions**

Since the substation will be constructed in the project, the electromagnetism impact of the project was resulted in the electric equipments, such as substation and transmits electric equipments. Based on the analogies of the built wind-farms, the result concludes that the operation of wind farm will not have electromagnetism impact on the nearby enterprises and residential areas that are 5 km away from the wind-farms. Therefore, the electromagnetism of this project in the operation phase doesn't impact the production and daily life of nearby enterprises and residents.

- **Impacts on Ecosystem Environment**

A serious potential concern for wind farms is their impact on vegetation, animals and migrating birds. The land on which the project activity takes place is barren and unfertile. Prior to the project activity the land had no beneficial use. The vegetation in the project area was substituted by grassland for livestock use and land for cultivation. So the minor quantity of solid / liquid discharge, likely to be generated during the construction phase has no noticeable impact on soil use and the project proponent has made arrangements to dispose them in an environmentally acceptable manner. Moreover, there are no migratory birds / endangered species in the region of project activity. Therefore, the activities to be carried out will not generate any negative impact on the ecological environment.

- **Socio-Economic Impacts**

The project reduces greenhouse gas emissions resulting from the power generation industry in China, compared to a business-as-usual approach. So the project generates eco-friendly, GHG free power that

contributes to sustainable development of the region. Moreover, the locals have benefited economically through land sales and revenues. The project activity not only helps the uplift of skilled and unskilled manpower in the region, but also improves employment rate and livelihood of local populace in the vicinity of the project.

- **Conclusion**

The project activity does not have any major adverse impacts on environment during its construction and operational phase. The project is definitely an environmentally more friendly way of providing power than others power plants.

>>

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 construction and operation of the proposed project have no significant environmental impacts, and the proposed project is definitely an environmentally more friendly way of providing power than others power plants.

>>

SECTION E. Stakeholders' comments

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

According to the requirement by the *Measures for Operation and Management of Clean Development Mechanism Projects in China* and PDD, the staff of Longyuan(Siziwang) Wind Power Co., Ltd. held an open public survey and a stakeholders conference on the local villagers and residents during May-June 2007. In the public survey and conference, the stakeholder representatives were respectively from the local government and the nearby village where the proposed project is located.

- Public survey: during May-June 2007, one-page questionnaire was used to carry out a survey on the local stakeholders.
- Stakeholder conference: the meeting was held in June 2007 in Siziwangqi
  County to explain CDM，better understand the stakeholders' interests and obtain their comments.

The public survey and the stakeholders conference was designed to comment as following sections:

1) The impacts of the proposed project on the local environment including construction noise, dust as well as water and soil loss etc;
2) The influents of proposed project on the land use and soil erosion；

3) The influences of the proposed project on the ecologic and social environment ;
4) The suggestions to the company regarding the proposed project;
5) Whether or not agree with the construction of the proposed project.

>>

E.2. Summary of the comments received:

The summary of the comments received is listed in the following sections:

- Summary of the stakeholder interviewed

The survey of the proposed project involved 43 representatives (30 questionnaires and 13 representatives), mainly from the local Development and Reform Bureau, the local Environmental Protection Bureau, the local Power Supply Corporation, and the nearby village. Among the stakeholder interviewed, there are 80% of males and 20% of females, education level of the stakeholder: primary level or below (23%); middle level (60%); high level (17%).

- Summary of the stakeholder comments received

No.	Discussional items	Options	Percentage (%)
1	Will the project improve the local development or increase job opportunities?	*Yeah*	95
		No	5
2	Will the project have negative impacts on their livelihood?	*Yeah*	9
		No	91
3	Are they satisfied with their life conditions and surrounding environment?	*Yeah*	85
		No	15
4	What the impacts on environment should be considered?	*Ecological environment*	45
		Noise pollution	70
		Water pollution	24
		Solid waste	10
		Air pollution	0
5	Will they support the construction of the project?	*Yeah*	100
		No	0

- Summary of the survey results

1) There are no adverse comments on the project activity, and mostly stakeholders interviewed were supportive of the proposed project.

2) The successful implementation of the proposed project will diversify local power mix, mitigate electricity shortage, and promote the development of local tourism and other tertiary industries.

3) The local villagers are satisfied with compensation by the project owner for occupation on part of land occupation.

4) Many of stakeholders interviewed suggested the project entity pay special attention to and make efforts to vegetation recovery, soil and water conservation and related facility construction.

>>

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

No negative comments have received on the proposed project. Moreover, the local stakeholders have strong positive comments on the effects that the proposed project will bring the local economy and society. However, to reduce the impacts on the local environment produced from the construction of the proposed project, the project owner should adopt relative measures as follow:

1) The project owner should guarantee and suitably add the investment of environmental protection.
2) The construction processes should be strictly implemented according to the national environment criterions.
3) The measures of environmental protection should been carried out to mitigate the environmental impacts according to the EIA report.

>>

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Project Entity:

Organization:	Longyuan(Siziwang) Wind Power Co.,Ltd
Street/P.O.Box:	Siziwangqi Town
Building:	—
City:	Wulanchabu City,
State/Region:	Inner Mongolia Autonomous Region,
Postfix/ZIP:	011800
Country:	P.R.China
Telephone:	+86-471-6201717
FAX:	+86-471-6201717
E-Mail:	Hanjl_1981@126.com
URL:	—
Represented by:	Jinlong Han
Title:	CDM manager
Salutation:	—
Last Name:	Han
Middle Name:	—
First Name:	Jinlong
Department:	—
Mobile:	13171330726
Direct FAX:	+86-471-6201717
Direct tel:	+86-471-6201717
Personal E-Mail:	Hanjl_1981@126.com

CERs Buyer:

Organization:	EDF Trading Limited
Street/P.O.Box:	71 High Holborn
Building:	—
City:	London
State/Region:	—
Postfix/ZIP:	WC1V 6ED
Country:	United Kingdom
Telephone:	+44 (0)20 7061 4207
FAX:	+44 (0)20 7061 5207
E-Mail:	Franck.bernard@edftrading.com
URL:	www.edftrading.com
Represented by:	Franck Bernard
Title:	Environmental Product Manager
Salutation:	Mr
Last Name:	Bernard
Middle Name:	—
First Name:	Franck
Department:	Department of Environmental Product
Mobile:	+44 (0)7879 688 379
Direct FAX:	+44 (0)20 7061 5207
Direct tel:	+44 (0)20 7061 4207
Personal E-Mail:	Franck.bernard@edftrading.com

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No public funding from Annex I countries is involved in the proposed project.

Annex 3

BASELINE INFORMATION

The Annex 3 provides the basic data and results of the baseline emission factor in the North China Power Grid (including net transfer of electricity from the Northeast China Power Grid). The information provided by the tables includes data, data resources and the underlying computation.

The key parameters for the emission factors calculation

The key parameters in OM and BM calculation include the net caloric values (NCVs), oxidation factors (OXIDs), and CO_2 emission factor per unit of energy (EF_{co2}s) of various types of fuels, and power supply efficiency of various power generation technologies.

Table A-1 NCVs, OXIDs, and $EFco_2$s of various types of fuels

Fuel	NCV	EF_{co2} (tc/TJ)	OXID
Coal	20908 kJ/kg	25.80	1
Washed coal	26344 kJ/kg	25.80	1
Other Washed Coal [1]	8363 kJ/kg	25.80	1
Coke	28435 kJ/kg	25.80	1
Crude oil	41816 kJ/kg	20.00	1
Gasoline	43070 kJ/kg	18.90	1
Kerosene	43070 kJ/kg	19.60	1
Diesel	42652 kJ/kg	20.20	1
Fuel oil	41816 kJ/kg	21.10	1
Other petroleum products[2]	38369 kJ/kg	20.00	1
Natural gas	38931 kJ/m^3	15.30	1
Coke oven gas[3]	16726 kJ/m^3	12.10	1
Other gas[4]	5227 kJ/m^3	12.10	1
LPG	50179 kJ/kg	17.20	1
Refinery gas	46055 kJ/kg	18.20	1

Data sources:

NCVs are from China Energy Statistical Yearbook 2006, P287.

[1] Other washed coal includes middlings and slimes. The NCV value of middlings is adopted here, which is conservative because the NCV value of slimes is higher than that of middlings.

[2] The NCV value of other petroleum products are not provided in China Energy Statistical Yearbooks. This Annex calculates it as 38369 kJ/kg, i.e., 1.3108 tce/t, on the basis of Energy Balance Sheets (physical quantity) and conversion factor against SCE

[3] The NCV value here adopts the lower limit of the NCV value range, i.e., 16726-17981 kJ/m^3, for coke oven gas provided in China Energy Statistical Yearbook 2006, P 287.

[4] The NCV value here adopts the lowest NCV value among those for gas by furnace, gas by heavy oil catalytic cracking, gas by heavy oil catalytic thermal cracking, gas by pressure gasification, and water coal gas, which are provided in China Energy Statistical Yearbook 2006, P 287.

EF_{co2} are from 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2, Chapter 1, table 1-3.
OXID are from 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2, Chapter 1, table 1-4.

Table A-2 Calculation of emission factor of advanced electricity generation technology

	Variable	Efficiency of electricity transmission A	Emission factor of fuel B	Carbon oxidation rate C	Emission factor of power plant D=3.6/A/1000*B*44/12
Coal-fired power plant	EF*coal,adv*	35.82%	25.8	1	0.9508
Gas-fired power plant	EF*gas,adv*	47.67%	15.3	1	0.4237
Oil-fired power plant	EF*oil,adv*	47.67%	21.1	1	0.5843

Step1 .Calculation of the Operating Margin Emission Factor ($EF_{OM,y}$)

According to the ACM0002 methodology, the Simple method OM was used to calculate the OM emission factors of the years 2003, 2004 and 2005, and then weighted average emission coefficient was calculated and selected as the $EF_{OM,y}$ for primary fuel input for thermal power supply to the North China grid.

The power data and processes for the calculation of the EF_{OM}，y in the North China grid were shown in tables below. The detailed calculation formulas are described in the section B6.

Table A-3, A-4, and A-5 provide annual thermal power electricity generation in North Power Grid from 2003 to 2005.

Table A-3 Thermal power electricity generation in North China Power Grid in 2003

Province	Generating capacity （MWh)	Rate of electricity consumption （%）	Power supply （MWh)
Beijing	18608000	7.52	17,208,678.40
Tianjin	32191000	6.79	30,005,231.10
Hebei	108261000	6.5	101,224,035.00
Shanxi	93962000	7.69	86,736,322.20
Inner Mongolia	65106000	7.66	60,118,880.40
Shandong	139547000	6.79	130,071,758.70
Total（MWh)			**425,364,905.80**

《China Electric Power Yearbook 2004》P709，P670

Table A-4 Thermal power electricity generation in North China Power Grid in 2004

Province	Generating capacity	Rate of electricity consumption	Power supply
	(MWh)	(%)	(MWh)
Beijing	18579000	7.94	17,103,827.40
Tianjin	33952000	6.35	31,796,048.00
Hebei	124970000	6.5	116,846,950.00
Shanxi	104926000	7.7	96,846,698.00
Inner Mongolia	80427000	7.17	74,660,384.10
Shandong	163918000	7.32	151,919,202.40
Total (MWh)			**489,173,109.90**

《China Electric Power Yearbook 2005》P472 ，P474

Table A-5 Thermal power electricity generation in North China Power Grid in 2005

Province	Generating capacity	Rate of electricity consumption	Power supply
	(MWh)	(%)	(MWh)
Beijing	20880000	7.73	19,265,976.00
Tianjin	36993000	6.63	34,540,364.10
Hebei	134348000	6.57	125,521,336.40
Shanxi	128785000	7.42	119,229,153.00
Inner Mongolia	92345000	7.01	85,871,615.50
Shandong	189880000	7.14	176,322,568.00
Total (MWh)			**560,751,013.00**

《China Electric Power Yearbook 2006》

Table A-6, A-7, and A-8 provide the electricity generation in Northeast Power Grid from 2003 to 2005. The main data sources come from China Electric Power Yearbook 2004, 2005 and 2006.

Table A-6 Total electricity and power supply of Northeast power grid in 2003

Province	Generating capacity	Rate of electricity consumption	Power supply	Hydroelectric output	Others output	Total
	(MWh)	(%)	(MWh)	(MWh)	(MWh)	(MWh)
Liaoning	79751000	7.17	74032853	2383000	202000	
Jilin	29739000	7.32	27562105	4080000	64000	
Heilongjiang	48493000	8.48	44380794	1105000	0	
Total (MWh)			**145975752**	**7568000**	**266000**	**153809752.1**

《China Electric Power Yearbook 2004 》

Table A-7 Total electricity and power supply of Northeast power grid in 2004

Province	Generating capacity	Rate of electricity consumption	Power supply	Hydroelectric output	Rate of electricity consumption	Power supply	Others output	Total
	(MWh)	(%)	(MWh)	(MWh)	(%)	(MWh)	(MWh)	(MWh)
Liaoning	84543000	7.21	78447450	3947000	1.33	3894504.9	264000	
Jilin	33242000	7.68	30689014	6147000	0.75	6100897.5	81000	
Heilongjiang	53482000	7.84	49289011	1338000	1.27	1321007.4	46000	
Total MWh)			**158425475**			**11316409.8**	**391000**	**170132885**

《China Electric Power Yearbook 2005 》

Table A-8 Total electricity and power supply of Northeast power grid in 2005

Province	Generating capacity	Rate of electricity consumption	Power supply	Hydroelectric output	Others output	Thermal output	**Total**
	(MWh)	(%)	(MWh)	(MWh)	(MWh)	(MWh)	(MWh)
Liaoning	89668000	7.03	83364339.6	5726000	245000	83697000	
Jilin	43395000	6.59	40535269.5	8002000	99000	35294000	

Heilongjiang	59900000	7.96	55131960	1800000	100000	58000000	
Total （MWh）			**179031569.1**				**179031569.1**

《China Electric Power Yearbook 2006》

Table A-9, A-10, and A-11 provide the calculation of the average emission factor of Northeast China Power Grid from 2003 to 2005. Table A-12, A-13, and A-14 provide the calculation of the simple OM emission factor of the North China Power Grid from 2003 to 2005.

Table A-9 The average emission factor of Northeast China Power Grid in 2003

Fuel	Unit	Liaoning	Jilin	Heilongjiang	Sub-Total	Carbon content （tc/TJ）	OXID （%）	NCV （MJ/t,m^3,tce）	CO_2 emissions（tCO_2e）
		A	B	C	D = A+B+C	E	F	G	H=D*E*F*G*44/12/100
Raw coal	Mt	35.5651	20.0666	27.6362	83.2679	25.8	100	20908	164695313.0
Clean coal	Mt	0.7083	0	0.03	0.7383	25.8	100	26344	1839948.7
Other washed coal	Mt	6.1704	0.159	0.5341	6.8635	25.8	100	8363	5429988.0
Coke oven gas	Billion m^3	0.166	0	0	0.166	12.1	100	16726	123184.8
Other gas	Billion m^3	0.531	0	0	0.531	12.1	100	5227	123141.3
Crude oil	Mt	0.0339	0	0	0.0339	20	100	41816	103954.6
Diesel	Mt	0.0032	0.0034	0	0.0066	20.2	100	42652	20850.0
Fuel oil	Mt	0.1487	0.007	0.0432	0.1989	21.1	100	41816	643474.2
LPG	Mt	0.0155	0	0	0.0155	17.2	100	50179	49051.6
Refinery gas	Mt	0.0403	0	0.0046	0.0449	18.2	100	46055	137995.8
Natural gas	Billion m^3	0	0.004	0.447	0.451	15.3	100	38931	984997.1
Other energy	Mtce	0.2938	0	0	0.2938	0		29271.2	0.0
Total									**174151899.2**
Average emmission factor									**1.13656**

Data sources: China Energy Statistical Yearbook 2004

Table A-10 The average emission factor of Northeast China Power Grid in 2004

Fuel	Unit	Liaoning	Jilin	Heilongjiang	Sub-Total	Carbon content (tc/TJ)	OXID (%)	NCV (MJ/t,m^3,tce)	CO_2 emissions (tCO_2e)
		A	B	C	D = A+B+C	E	F	G	H=D*E*F*G*44/12/100
Raw coal	Mt	41.442	23.109	30.848	95.399	25.8	100	20908	188689376.8
Clean coal	Mt	0.8475	0.0109	0.0488	0.9072	25.8	100	26344	2260871.6
Other washed coal	Mt	5.7767	0.1426	0.61	6.5293	25.8	100	8363	5165589.1
Coke oven gas	Billion m^3	0.483	0.291	0	0.774	12.1	100	16726	574367.5
Other gas	Billion m^3	5.733	0.419	0	6.152	12.1	100	5227	1426676.9
Crude oil	Mt	0	0	0	0	20	100	41816	0.0
Diesel	Mt	0.0204	0.0116	0.0024	0.0344	20.2	100	42652	108672.7
Fuel oil	Mt	0.1281	0.0178	0.0286	0.1745	21.1	100	41816	564536.2
LPG	Mt	0.0219	0	0	0.0219	17.2	100	50179	69305.2
Refinery gas	Mt	0.0979	0	0.0114	0.1093	18.2	100	46055	335923.0
Natural gas	Billion m^3	0	0.003	0.253	0.256	15.3	100	38931	559111.4
Other energy	Mtce	0.2697	0.0507	0	0.3204	0		29271.2	0
Total									**199754430.5**
Average emmission factor									**1.17411**

Data sources: China Energy Statistical Yearbook 2005

Table A-11 The average emission factor of Northeast China Power Grid in 2005

Fuel	Unit	Liaoning	Jilin	Heilongjiang	Sub-Total	Carbon content（tc/TJ）	OXID（%）	NCV（MJ/t,m3,tce）	CO_2 emissions（tCO2e）
		A	B	C	D = A+B+C	E	F	G	H=D*E*F*G*44/12/100
Raw coal	Mt	43.0541	24.4613	33.8321	101.3475	25.8	100	20908	200454895.9
Clean coal	Mt	0	0	0	0	25.8	100	26344	0.0
Other washed coal	Mt	5.2474	0.1926	0.2416	5.6816	25.8	100	8363	4494939.9
Coke oven gas	Billion m^3	0.103	0.357	0.068	0.528	12.1	100	16726	391816.6
Other gas	Billion m^3	1.262	0.837	0	2.099	12.1	100	5227	486767.7
Crude oil	Mt	0.0116	0	0	0.0116	20	100	41816	35571.5
Diesel	Mt	0.0118	0.0148	0.0057	0.0323	20.2	100	42652	102038.7
Fuel oil	Mt	0.0932	0.0246	0.0155	0.1333	21.1	100	41816	431247.4
LPG	Mt	0.0012	0	0	0.0012	17.2	100	50179	3797.5
Refinery gas	Mt	0.0548	0	0.0132	0.068	18.2	100	46055	208991.4
Natural gas	Billion m^3	0	0.084	0.224	0.308	15.3	100	38931	672681.0
Other energy	Mtce	0.1618	0	0	0.1618	0	100	29271.2	0.0
Total									**207282747.6**
Average emmission factor									**1.15780**

Data sources: China Energy Statistical Yearbook 2006

Table A-12 The fuel consumption and total emissions of North China Power Grid in 2003

Fuel	Unit	beijing	tianjin	hebei	shanxi	Inner Mongolia	shandong	Sub-Total	Carbon content	OXID	NCV	CO2 emissions (tCO2e)
									(tc/TJ)	(%)	(MJ/t,km3)	K=G*H*I*J*44/12/10000 (Quality units)
								G=A+B+C+D+E+				K=G*H*I*J*44/12/1000
		A	B	C	D	E	F	F	H	I	J	(Volume units)
Raw coal	10^4t	714.73	1052.74	5482.64	4528.5	3949.32	6808	22535.94	25.8	100	20908	445737636.11
Clean coal	10^4t						9.41	9.41	25.8	100	26344	234510.60
Other washed coal	10^4t	6.31		67.28	208.21		450.9	732.7	25.8	100	8363	5796681.31
Coke	10^4t					2.8		2.8	25.8	100	28435	75318.63
Coke oven gas	10^8m^3	0.24	1.71		0.9	0.21	0.02	3.08	12.1	100	16726	228559.67
Other gas	10^8m^3	16.92		10.63		10.32	1.56	39.43	12.1	100	5227	914399.71
Crude oil	10^4t						29.68	29.68	20	100	41816	910139.18
Gasoline	10^4t						0.01	0.01	18.9	100	43070	298.48
Diesel	10^4t	0.29	1.35	4		2.91	5.4	13.95	20.2	100	42652	440693.26
Fuel oil	10^4t	13.95	0.02	1.11		0.65	10.07	25.8	21.1	100	41816	834672.45
LPG	10^4t							0	17.2	100	50179	0.00
Refinery gas	10^4t			0.27			0.83	1.1	18.2	100	46055	33807.44
Natural gas	10^8m^3		0.5				1.08	1.58	15.3	100	38931	345076.60
Other oil products	10^4t							0	20	100	38369	0.00
other Coking products	10^4t							0	25.8	100	28435	0.00

Other energy	10^4tce	9.83					39.21	49.04	0	0	0	0.00
											Total	**455551793.4**

Data sources: China Energy Statistical Yearbook 2004

Table A-13 The fuel consumption and total emissions of North China Power Grid in 2004

Fuel	Unit	beijing	tianjin	hebei	shanxi	Inner Mongolia	shandong	Sub-Total	Carbon content	OXID	NCV	CO2 emissions（tCO2e）
									（tc/TJ）	（%）	（MJ/t,km3）	K=G*H*I*J*44/12/10000（Quality units）
		A	B	C	D	E	F	G=A+B+C+D+E+F	H	I	J	K=G*H*I*J*44/12/1000 (Volume units)
Raw coal	10^4t	823.09	1410	6299.8	5213.2	4932.2	8550	27228.29	25.8	100	20908	538547476.60
Clean coal	10^4t						40	40	25.8	100	26344	996856.96
Other washed coal	10^4t	6.48		101.04	354.17		284.22	745.91	25.8	100	8363	5901190.88
Coke	10^4t					0.22		0.22	25.8	100	28435	5917.89
Coke oven gas	10^8m^3	0.55		0.54	5.32	0.4	8.73	15.54	12.1	100	16726	1153187.45
Other gas	10^8m^3	17.74		24.25	8.2	16.47	1.41	68.07	12.1	100	5227	1578574.39
Crude oil	10^4t							0	20	100	41816	0.00
Gasoline	10^4t									100		0.00
Diesel	10^4t	0.39	0.84	4.66				5.89	20.2	100	42652	186070.49
Fuel oil	10^4t	14.66		0.16				14.82	21.1	100	41816	479451.38
LPG	10^4t							0	17.2	100	50179	0.00
Refinery gas	10^4t		0.55	1.42				1.97	18.2	100	46055	60546.05
Natural gas	10^8m^3		0.37		0.19			0.56	15.3	100	38931	122305.63
Other oil products	10^4t							0	20	100	38369	0.00

other Coking products	10^4t							0	25.8	100	28435	0.00
Other energy	10^4tce	9.41		34.64	109.73	4.48		158.26	0	0	0	0.00
											Total	549031577.7

Data sources: China Energy Statistical Yearbook 2005

Table A-14 The fuel consumption and total emissions of North China Power Grid in 2005

Fuel	Unit	beijing	tianjin	hebei	shanxi	Inner Mongolia	shandong	Sub-Total	Carbon content	OXID	NCV	CO2 emissions (tCO2e)
									(tc/TJ)	(%)	(MJ/t,km3)	K=G*H*I*J*44/12/10000 (Quality units)
		A	B	C	D	E	F	G=A+B+C+D+E+F	H	I	J	K=G*H*I*J*44/12/1000 (Volume units)
Raw coal	10^4t	897.75	1675.2	6726.5	6176.45	6277.23	10405.4	32158.53	25.8	100	20908	636062535.80
Clean coal	10^4t						42.18	42.18	25.8	100	26344	1051185.66
Other washed coal	10^4t	6.57		167.45	373.65		108.69	656.36	25.8	100	8363	5192725.19
Coke	10^4t					0.21	0.11	0.32	25.8	100	28435	8607.84
Coke oven gas	10^8m^3	0.64	0.75	0.62	21.08	0.39	0	23.48	12.1	100	16726	1742396.48
Other gas	10^8m^3	16.09	7.86	38.83	9.88	18.37	0	91.03	12.1	100	5227	2111027.27
Crude oil	10^4t					0.73	0	0.73	20	100	41816	22385.50
Gasoline	10^4t			0.01			0	0.01	18.9	100	43070	298.48
Diesel	10^4t	0.48	0	3.54	0	0.12	0	4.14	20.2	100	42652	130786.39
Fuel oil	10^4t	12.25	0	0.23	0	0.06	0	12.54	21.1	100	41816	405689.63
LPG	10^4t							0	17.2	100	50179	0.00
Refinery gas	10^4t			9.02				9.02	18.2	100	46055	277221.01
Natural gas	10^8m^3	0.28	0.08	0	2.76	0	0	3.12	15.3	100	38931	681417.08

Other oil products	10^4t							0	20	100	38369	0.00
other Coking products	10^4t							0	25.8	100	28435	0.00
Other energy	10^4tce	8.58	0	32.35	69.31	7.27	118.9	236.41	0	100	0	0.00
											小计	**647686276.3**

Data sources: China Energy Statistical Yearbook 2006

Table A-15 The OM factor of North China Power Grid

Years	Thermal generation delivered to North China Power Grid	Generation imported from Northeast China Power Grid[32]	Total generation	The emissions from North China Power Grid	The average emission factor of Northeast China Power Grid	The emissions from Northeast China Power Grid	Total emissions	OM
	A	B	C=A+B	D	E	F=B*E	G=D+F	H=G/C
2003	425364905.8	4244380	429609285.8	455551793.4	1.13656	4823987.207	460375780.6	1.07161506
2004	489173109.9	4514550	493687659.9	549031577.7	1.17411	5300570.574	554332148.3	1.12283979
2005	560,751,013.00	23423000	584174013	647686276.3	1.15780	27119149	674805425.3	1.1551445
Total			**1507470958.7**				**1689513354**	
Average OM								**1.1208**

[32] *China Electric Power Yearbook 2003, 2004, 2005*

Step 2. Calculation of the Build Margin Emission Factor （$EF_{BM,y}$ ）

According to the ACM0002 methodology, the Build Margin emission factor $EF_{BM,y}$ *ex-ante* was selected to identify sample group for calculating Build Margin emission factor. Based on the description of formulas in section B6, the Build Margin emission factor is calculated to be 0.9397 tCO_2/MW•h.

The power data and processes for the calculation of the $EF_{BM,y}$ in the North China grid were shown in table A-16 ~ A-20 . The detailed calculation formulas are described in the section B6.

Step 2a: calculating the respective percentages of CO_2 emissions from coal fired power generation, oil fired power generation, and gas fired power generation against total CO_2 emissions from fossil fuel fired power generation

Table A-16 Calculation of emission weight of solid fuel, liquid fuel and gas fuel in all fuel emission

Fuel	unit	Beijing	Tianjin	Hebei	Shanxi	Shandong	Inner Mongolia	Total	NCV(MJ/t,km³,tce)	Emission Factor (Tc/TJ)	Carbon oxidation rate(%)	CO_2 emission(tCO_2e)
		A	B	C	D	E	F	G=A+B+C+D+E+F	H	I	J	K=G*H*I*J*44/12/100
Raw coal	10^4t	897.75	1675.20	6726.50	6176.45	10405.4	6277.23	32158.53	20908	25.80	1	636,062,536
Clean coal	10^4t	0	0	0	0	42.18	0	42.18	26344	25.80	1	1,051,186
Other washed coal	10^4t	6.57	0	167.45	373.65	108.69	0	656.36	8363	25.80	1	5,192,725
coke	10^4t	0	0	0	0	0.11	0.21	0.32	28435	25.80	1	8,608
Sub-total												**642,315,054**
Crude oil	10^4t	0	0	0	0	0	0.73	0.73	41816	20.00	1	22,385
Gasoline	10^4t	0	0	0.01	0	0	0	0.01	43070	18.90	1	298
Kerosene	10^4t	0	0	0	0	0	0	0	43070	19.60	1	0
Diesel	10^4t	0.48	0	3.54	0	0	0.12	4.14	42652	20.20	1	130,786
Fuel oil	10^4t	12.25	0	0.23	0	0	0.06	12.54	41816	21.10	1	405,690
other petroleum product	10^4t	0	0	0	0	0	0	0	38369	20.00	1	0
Sub-total												**559,160**
Natural gas	10^7m^3	2.8	0.8	0	27.6	0	0	31.2	38931	15.30	1	681,417
COG	10^7m^3	6.4	7.5	6.2	210.8	0	3.9	234.8	16726	12.10	1	1,742,396
Other Gas	10^7m^3	160.9	78.6	388.3	98.8	0	183.7	910.3	5227	12.10	1	2,111,027
LPG	10^4t	0	0	0	0	0	0	0	50179	17.20	1	0
Refinery gas	10^4t	0	0	9.02	0	0	0	9.02	46055	18.20	1	277,221
Sub-total												**4,812,062**

Total												**647,686,276**

From above table and formulae (5),(6) and (7),the weights are as follows:

λ_{Coal} =99.17% , λ_{Oil} =0.08% , λ_{Gas} =0.74%

Step 2b: calculating the corresponding emission factor for fossil fuel fired power generation

$$EF_{Thermal} = \lambda_{Coal} \times EF_{Coal,Adv} + \lambda_{Oil} \times EF_{Oil,Adv} + \lambda_{Gas} \times EF_{Gas,Adv} = 0.9465 \ (tCO_2/MWh)$$

Step 2c: calculating the $EF_{BM,y}$ ***of local grid***

Table A-17 Installed capacity of North China Power Grid in 2005

Installed capacity	unit	Beijing	Tianjin	Hebei	Shanxi	Inner Mongolia	Shandong	Total
Thermal Power	MW	3833.5	6149.9	22333.2	22246.8	19173.3	37332	111068.7
Hydropower	MW	1025	5	784.5	783	567.9	50.8	3216.2
Nuclear	MW	0	0	0	0	0	0	0
Wind power and other	MW	24	24	48	0	208.9	30.6	335.5
Total	MW	4882.5	6178.9	23165.7	23029.8	19950.1	37413.4	114620.4

Data sources:《China Electric Power Yearbook2006》

Table A-18 Installed capacity of North China Power Grid in 2004

Installed capacity	unit	Beijing	Tianjin	Hebei	Shanxi	Inner Mongolia	Shandong	Total
Thermal Power	MW	3458.5	6008.5	19932.7	17693.3	13641.5	32860.4	93594.9
Hydropower	MW	1055.9	5	783.8	787.3	567.9	50.8	3250.7
Nuclear	MW	0	0	0	0	0	0	0
Wind power and other	MW	0	0	13.5	0	111.8	12.3	137.6
Total	MW	4514.4	6013.5	20730	18480.6	14321.2	32923.5	96983.2

Data sources:《China Electric Power Yearbook2005》

Table A-19 Installed capacity of North China Power Grid in 2003

Installed capacity	unit	Beijing	Tianjin	Hebei	Shanxi	Inner Mongolia	Shandong	Total
Thermal Power	MW	3347.5	6008.5	17698.7	15035.8	11421.7	30494.4	84006.6
Hydropower	MW	1058.1	5	764.3	795.7	592.1	50.8	3266
Nuclear	MW	0	0	0	0	0	0	0
Wind power and other	MW	0	0	13.5	0	76.6	0	90.1
Total	MW	4405.6	6013.5	18476.5	15831.5	12090.4	30545.2	87362.7

Data sources:《China Electric Power Yearbook2004》

Table A-20 The new installed capacity from 2003-2005 in the North China Power Grid

	Installed capacity in 2003	Installed capacity in 2004	Installed capacity in 2005	Addition capacity from 2003 to 2005	Addition share(%)
	A	B	C	D=C-A	
Thermal Power	84006.6	93594.9	111068.7	27062.1	99.28%
Hydropower	3266	3250.7	3216.2	-49.8	-0.18%
Nuclear	0	0	0	0	0.00%
Wind power	90.1	137.6	335.5	245.4	0.90%
Total（MW）	87362.7	96983.2	114620.4	27257.7	100.00%
Share of 2004 installed capacity	0.762191547	84.61%	100.00%		

Build Margin emission factor

$EF_{BM,y}=EF_{Thermal}\times CAP_{Thermal}/CAP_{Total}=0.9465\times 99.28\%=0.9397\ tCO_2/MW\bullet h$

where:

CAP_{Total} is the total capacity addition,

$CAP_{Thermal}$ is the fossil fuel fired capacity addition.

Step 3. Calculation of the Baseline Emissions Factor（EFy）

According to the baseline methodology (ACM0002), the baseline emission factor EF_y is calculated as the weighted average of the Operating Margin emission factor ($EF_{OM,y}$) and the Build Margin emission factor ($EF_{BM,y}$), as shown in table A-21。

Table A-21 Baseline Emission factor (EFy) of the North China Power Grid

Calculation of the Key factors:
Operating Margin emission factor (EFOM,y)（tCO2/MW•h）：1.1208
Build Margin emission factor (EFBM,y)（tCO2/MW•h）：0.9465×99.28%=0.9397
Baseline Emission factor (EFy) （tCO2/MW•h）：1.07969×0.75+0.91878×0.25=1.0755

Note: the latest version of ACM0002 (version 6) provides the following default weights for wind and solar projects: Operating Margin, WOM = 0.75; Build Margin, WBM = 0.25.

IRR calculation of the proposed project.

Tables B1 show the Parameters needed for calculation of IRR.

The below Formulas are used in the IRR calculation process. They are based on «Method and Parameter of economic analysis for construction project » published by National Development and Reform Commission:

a) Cash inflow= sales revenue+ fixed assets residue+ recovered liquid capital
b) Sales revenue= annual output× tariff (excl. VAT)
c) Fixed assets residual value= original fixed assets value × rate of assets residual value
d) Recovered liquid capital= liquid capital input at beginning of project operation
e) Cash outflow= capital construction investment + liquid capital+ operating cost + sales tax and extra charges + income tax

   Where:
   Capital construction investment = Static total investment
   Liquid capital = Liquid capital input of current year;
   Operating cost= annual salary per capita ×employee population × (1+ rate of welfarism) + the sum of original value of buildings and equipment × (rate of maintenance + rate of insurance premium) + (fixed amount of material cost+ fixed amount of other costs) × installed capacity;
   Sales tax and extra charges=sales revenue × rate of VAT × (rate of city construction tax + rate of additional education fee);
   Income tax= 〔sales revenue- sales tax and extra charges - operating cost - original value of houses and buildings × (1- expected rate of residual value) ÷ expected depreciable life - machinery × (1- expected rate of residual value) ÷ expected depreciable life - other assets ÷ amortizing period〕 × rate of income tax;

f) Net cash flow = cash inflow - cash outflow

g) The FIRR of the proposed project is calculated with the following formula:

$$\sum_{1}^{n} \frac{annual\ net\ cash\ flow_n}{(1+\ FIRR)^n} = 0$$

   where:
   n is the project life time(including construction period and operation period);
   $annual\ net\ cash\ flow_n$ is the net cash flow in NO. n year.
   FIRR is the financial internal rate of return, a financial indicator of the proposed project.

h) Net cash flow with CERs income = net cash flow without CERs income + 〔CERs income excl. VAT - CERs income excl. VAT × VAT rate ×(rate of city construction tax + rate of additional education fee))×（1 - rate of income tax)
i) The FIRR of the proposed project with CERs income is calculated with the following formula:

$$\sum_{1}^{n} \frac{annual\ net\ cash\ flow_n^{'}}{(1+\ FIRR^{'})^n} = 0$$

   where:
   n is the project life time;

$annual\ net\ cash\ flow_n^{'}$ is the net cash flow with CERs income in NO. n year.

$FIRR^{'}$ is the financial internal rate of return of the proposed project with CERs income.

Table B-1 Main Parameters needed for calculation of key financial indicators

No	Item	Unit	Figure
1	Type of wind turbines	***	33
2	Number of wind turbines		1500
4	Installed capacity	MW	49.5
5	Annual operation hours	Hour	2425.6
6	Annual output	10000kW.h	12007
6	Electricity tariff (excluding VAT)	yuan/kW.h	0.4700
7	Static total investment	10000Yuan	43843
7.1	Static total investment	10000Yuan	43843
7.2	Fixed assets construction static investment	10000Yuan	0
7.3	Fixed assets equipmentstatic investment	10000Yuan	0
8	Liquid capital	10000Yuan	149
9	Construction period	year	1
10	Operation time	year	20
11	Depreciable life of fixed assets		
11.1	Depreciable life of constructions	year	20
11.2	Depreciable life of equipments	year	15
12	Rate of residual value of fixed assets	%	5
13	Amortization period of other assets	year	0
14	Rate of fixed assets maintenance	%	1.5
15	Rate of insurance premium of fixed assets	%	0.35
16	Employee population		20
17	Annual salary per capita	10000Yuan	3
18	Rate of welfarism	%	41
19	Material cost	yuan/kW	5
20	Other costs	yuan/kW	30
21	Rate of VAT	%	8.5
22	Rate of city construction tax	%	0
23	Rate of additional education fee	%	1
24	Rate of income tax	%	15
25	**CERs**	Ton	129134
26	**CERs Unit price**	ERU/Ton	10.2
27	Exchange rate	ERU:RMB	10.2298
28	**CERs income (incl. VAT)**	10000 Yuan	1347

29	**CERs income (excl. VAT)**	10000 Yuan	1242

Date source are from the feasibility study report of the proposed project

Cash Flow Table (total investment)

Unit：10000 Yuan RMB

No.	Item	Total	Construction Period		Operation Period							
			1	2	3	4	5	6	7	8	9	10
	（10000kW.h）Annual output		1	2	3	4	5	6	7	8	9	10
	Tariff (Yuan/kWh, excl. VAT)	240140	0	12007	12007	12007	12007	12007	12007	12007	12007	12007
	Rate of fixed assets maintenance (%)	***	0	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47
	Rate of income tax (%)	***	0	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
1	Cash inflow	***	0	15	15	15	15	15	15	15	15	15
1.1	Sales revenue	115207	0	5643	5643	5643	5643	5643	5643	5643	5643	5643
1.2	Fixed assets residual value	112866	0	5643	5643	5643	5643	5643	5643	5643	5643	5643
1.3	Recovered liquid capital	2192	0	0	0	0	0	0	0	0	0	0
2	Cash outflow	149	0	0	0	0	0	0	0	0	0	0
2.1	Construction investment	76353	43843	1596	1447	1447	1447	1447	1447	1447	1447	1447
2.2	Liquid capital	43843	43843									
2.3	Operating cost	149		149								
2.4	Sales tax & extra charges	23571		1069	1069	1069	1069	1069	1069	1069	1069	1069
2.5	Income tax	96	0	5	5	5	5	5	5	5	5	5
3	Net cash flow (1-2)	8694		373	373	373	373	373	373	373	373	373
4	Accumulative total of net cash flow	38854	-43843	4047	4196	4196	4196	4196	4196	4196	4196	4196
5	Net cash flow with CERs income	59948	-43843	5102	5251	5251	5251	5251	5251	5251	5251	5251

Item	Operation Period										
	11	12	13	14	15	16	17	18	19	20	21
（10000kW.h）Annual output	12007	12007	12007	12007	12007	12007	12007	12007	12007	12007	12007
Tariff (Yuan/kWh, excl. VAT)	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47
Rate of fixed assets maintenance (%)	1.5	2	2	2	2	2	2	2	2	2	2
Rate of income tax (%)	15	15	15	15	15	15	15	15	15	15	15
Cash inflow	5643	5643	5643	5643	5643	5643	5643	5643	5643	5643	7984
Sales revenue	5643	5643	5643	5643	5643	5643	5643	5643	5643	5643	5643
Fixed assets residual value	0	0	0	0	0	0	0	0	0	0	2192
Recovered liquid capital	0	0	0	0	0	0	0	0	0	0	149
Cash outflow	1447	1633	1633	1633	1633	1633	1946	1946	1946	1946	1946
Construction investment											
Liquid capital											
Operating cost	1069	1288	1288	1288	1288	1288	1288	1288	1288	1288	1288
Sales tax & extra charges	5	5	5	5	5	5	5	5	5	5	5
Income tax	373	340	340	340	340	340	653	653	653	653	653
Net cash flow (1-2)	4196	4010	4010	4010	4010	4010	3698	3698	3698	3698	6039
Accumulative total of net cash flow	-2027	1983	5993	10003	14014	18024	21722	25419	29117	32815	38854
Net cash flow with CERs income	5251	5065	5065	5065	5065	5065	4752	4752	4752	4752	7094

FIRR without CERs income	**6.99%**
FIRR with CERs income	**10.12%**

Annex 4

Please refer to B7.2 in the PDD.

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