

HEBEI KANGBAO SANXIATIAN WIND FARM PROJECT



Document Prepared By Hebei Construction Investment New Energy Co., Ltd
Kangbao Sanxiatian Wind Energy Branch Company

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Table of Contents

Part I- Registered Project Design Document under the CDM page 1~53

- A. General description of project activity
- B. Application of a baseline and monitoring methodology
- C. Duration of the project activity/ crediting period
- D. Environmental impacts
- E. Stakeholders' comments

Annexes

- Annex 1: Contact information on participants in the project activity
- Annex 2: Information regarding public funding
- Annex 3: Baseline information
- Annex 4: Monitoring information

Part II- Further clarifications on requirements as per VCS 2007.1..... page 54~55

- 1.12 Demonstration to confirm that the project was not implemented to create GHG emissions primarily for the purpose of its subsequent removal or destruction.
- 1.13 Demonstration that the project has not created another form of environmental credit
- 1.14 Project rejected under other GHG programs Project start date
- 8.1 Proof of Title
- 8.2 Projects that reduce GHG emissions from activities that participate in an emissions trading program



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

CONTENTS

- A. General description of project activity.
- B. Application of a baseline and monitoring methodology
- C. Duration of the project activity / crediting period.
- D. Environmental impacts
- E. Stakeholders' comments

Annexes

- Annex 1: Contact information on participants in the project activity.
- Annex 2: Information regarding public funding
- Annex 3: Baseline information
- Annex 4: Monitoring plan

**SECTION A. General description of project activity****A.1. Title of the project activity:**

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Hebei Kangbao Sanxiatian Wind Farm Project

Version number of the document: 02

Date: 18/12/2009

A.2. Description of the project activity:

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The purpose of **Hebei Kangbao Sanxiatian Wind Farm Project** (hereinafter referred to as the proposed project) is to utilize wind resources for electricity generation through the construction of a wind farm with a total capacity of 49.5MW and a 110kV substation in Kangbao County, Zhangjiakou City, Hebei Province, P. R. China. The proposed project is invested and developed by Hebei Construction Investment New Energy Co., Ltd.

The electricity generated from the project will be sold to North China Power Grid (NCPG).

The purpose of the proposed project is to generate renewable power and deliver it to North China Power Grid. For the proposed project,

- (a) Prior to the start of implementation of the project activity, there is no power generation unit at the site of the proposed project, and the electricity was supplied by the North China Power Grid which was dominated by fossil fuel-fired power plants.
- (b) The project scenario is the implementation of the proposed project, the installation and operation of 33 sets of wind turbines with a total capacity of 49.5MW which will supply an average annual generation of 118,354.5MWh to North China Power Grid and replace the same amount of electricity generated by fossil fuel-fired power plants connected to North China Power Grid. According to ACM0002 applied, the proposed project is a renewable electricity generating activity.
- (c) The baseline scenario of the proposed project is the electricity supply of equal amount as the proposed project from the North China Power Grid. The baseline scenario of the proposed project is the same against the scenario prior to the start of the implementation of the project activity.

The proposed project is planned to install and operate 33 sets wind turbines with capacity of 1.5 MW each, which amount to a total capacity of 49.5 MW. The proposed project will achieve greenhouse gas (GHG) emission reductions through the displacement of mainly fossil-fuel dominated grid connected power generation. The estimated annual net electricity generation supplied to the grid is 118,354.5 MWh and the annual full-load operation time amount to 2,391 h per year. The estimated emission reduction is 124,846 tCO₂e annually.

The proposed project makes contribution to the sustainable development as follows:

1. GHG emission reduction

The project will help reduce the greenhouse gas GHG emissions versus the high-growth, coal-dominated business-as-usual scenario in the NCPG by reducing the electricity generation from the fossil-fuel fired power plants.

2. Employment opportunities



The conducting of the proposed project will create employment opportunities during the construction phase and operational period.

3. Economic Improvement

The construction of the wind farm will promote local economy by contributing to local government with more tax revenues through selling power generation.

A.3. Project participants:

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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)
People's Republic of China (host)	Hebei Construction Investment New Energy Co., Ltd.	Yes
(*) In accordance with the CDM modalities and procedures, at the time of making the CDM PDD public at the stage of validation, a Party involved may or may not have provided its approval. At the time of requesting registration, the approval by the Party(ies) involved is required.		

Further contact information of project participants is provided in Annex 1.

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

A.4.1.1. Host Party(ies):

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People's Republic of China

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

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Hebei Province

A.4.1.3. City/Town/Community etc:

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Kangbao County, Zhangjiakou City

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

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The proposed project is in Kangbao County, Zhangjiakou City, Hebei Province, P. R. China. The project has central geographical coordinates with east longitude of 114°29'47.3" and north latitude of 41°53'57.6". The figure A1 and A2 shows the geographical location of the proposed project.

Figure A1. The proposed project on the map of P. R. China



Figure A2. The proposed project on the map of Kangbao County, Hebei Province, P. R. China



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

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Category: Renewable electricity in grid connected applications

Sectoral Scope: 1 Energy industries

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

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The proposed project is to utilize wind resources for electricity generation in Kangbao County, Hebei Province, P. R. China. The proposed project is a grid-connected renewable energy to electricity project. The proposed project will achieve obvious greenhouse gas (GHG) emission reductions through the displacement of mainly fossil-fuel dominated grid connected power generation in North China Power Grid.

Prior to the start of implementation of the project activity, there is no power generation unit at the site of the proposed project. The scenario is North China Power Grid providing the same electricity service as the proposed project. North China Power Grid is dominated by the fossil-fuel fired power plants.

The project scenario is the implementation of the proposed project and replaces the same amount of electricity generated by North China Power Grid, which is dominated by the fossil-fuel fired power plants.

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

The proposed project involves the installation of 33 sets of wind turbines with 1.5 MW capacity each, which amounts to a total installed capacity of 49.5MW. The selected wind turbines recommended in FSR are produced by GE Electric, with models of GE1.5sle. The expected effective operating hours amount to 2,391 per year and the plant load factor is 0.273, which was determined by a third party, Hebei Electric Power Design and Research Institute, who is the conductor of FSR and is also a professional wind power engineering designing entity. It is consistent with the requirement of EB48, Annex 11 “Guidelines for the Reporting and Validation of Plant Load Factors”. The estimated net annual power supplied to the grid is 118,354.5 MWh.

The main technical specifications of the wind turbine are provided in the following table.

Parameter		Data
Model		GE1.5sle
Quantity		33
Height of hub		80 m
Wind Turbine	Diameter	77m
	Number of blades	3
	Rated wind speed	14 m/s
	Cut-in wind speed	3.5 m/s
	Cut-off wind speed	25 m/s
Generator	Rated Power	1500 kW
	Rated voltage	690V
	Life time	20 years
Main Transformer	Model	SZ11-50000/110kV
	Rated voltage	35/110kV



The proposed project will set up a main transformer in a 110 kV substation at the project site. The wind power generated will be switched through 110 kV substation at the project site, and then connected to the 110 kV Kangbao substation, then transmitted to the North China Power Grid finally.

Electricity supplied by the proposed project will be monitored through the bi-directional electricity meters. Both electricity supplied to the grid by the project activity and the electricity imported from the grid to the project site will be monitored by the meters. The gateway meter(s) will be installed at the project site. The to-grid and from-grid electricity will be cross-checked with the electricity receipts.

The proposed project does not involve any technology transfer.

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

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A crediting period of 7 years (01/06/2010 – 31/05/2017) is selected for the project activity. An estimation of emissions reductions expected over the crediting period is provided in the table below.

Years	Annual estimation of emission reductions in tonnes of CO ₂ e
01/06/2010 – 31/05/2011	124,846
01/06/2011 – 31/05/2012	124,846
01/06/2012 – 31/05/2013	124,846
01/06/2013 – 31/05/2014	124,846
01/06/2014 – 31/05/2015	124,846
01/06/2015 – 31/05/2016	124,846
01/06/2016 – 31/05/2017	124,846
Total estimated reductions (tonnes of CO₂e)	873,922
Total number of the first crediting years	7
Annual average over the crediting period of estimated reductions (tonnes of CO₂e)	124,846

A.4.5. Public funding of the project activity:

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There is no public funding from Parties included in Annex I is involved in this project.

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

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The approved methodology applied in the proposed project activity is ACM0002 (version 10) – “Consolidated methodology for grid-connected electricity generation from renewable sources”.

Reference:

<http://cdm.unfccc.int/UserManagement/FileStorage/NF9EDA0V5K382HW0JR14GS7XYQUMCP>

“Tool for the Demonstration and Assessment of Additionality (version 05.2)”

Reference: <http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v5.2.pdf>

“Tool to calculate the emission factor for an electricity system (version 02)”

Reference:

<http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v2.pdf>

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

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The proposed project is a grid-connected renewable power generation project activity that installs a new power plant at a site where no renewable power was operated prior to the implementation of the project activity (greenfield plant). It meets all applicability conditions of methodology ACM0002 (version 10) which is listed as follows:

- 1) **The project activity is the installation, capacity addition, retrofit or replacement of a power plant/unit of one of the following types: hydro power plant/unit (either with a run-of-river reservoir or an accumulation reservoir), wind power plant/unit, geothermal power plant/unit, solar power plant/unit, wave power plant/unit or tidal power plant/unit;**

The project activity is the installation of a new wind power plant.

- 2) **In the case of capacity additions, retrofits or replacements: the existing plant started commercial operation prior to the start of a minimum historical reference period of five years, used for the calculation of baseline emissions and defined in the baseline emission section, and no capacity expansion or retrofit of the plant has been undertaken between the start of this minimum historical reference period and the implementation of the project activity;**

The project doesn't belong to these types, so it doesn't need to consider this applicability condition.

- 3) **In case of hydro power plants, one of the following conditions must apply: The project activity is implemented in an existing reservoir, with no change in the volume of reservoir; or The project activity is implemented in an existing reservoir, where the volume of reservoir is increased and the power density of the project activity, as per definitions given in the Project Emissions section, is greater than 4 W/m²; The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the Project Emissions section, is greater than 4 W/m².**

The Project is not a hydro power plant, so it doesn't need to consider this applicability condition.



- 4) **The methodology is not applicable to the following: Project activities that involve switching from fossil fuels to renewable energy sources at the site of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site; Biomass fired power plants; Hydro power plants that result in new reservoirs or in the increase in existing reservoirs where the power density of the power plant is less than 4W/m².**

The Project is a new grid-connected wind power plant, therefore: The Project doesn't involve switching from fossil fuels to renewable energy sources at the site of the project activity; The Project isn't a biomass fired power plant; The Project isn't a hydro power plant. So it doesn't need to consider this applicability condition.

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

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	Source	Gas	Included?	Justification / Explanation
Baseline	CO ₂ emissions from electricity generation in fossil fuel-fired power plants that is displaced due to the project activity.	CO ₂	Yes	Main emission sources
		CH ₄	No	Minor emission source.
		N ₂ O	No	Minor emission source.
Project Activity	The wind power plant	CO ₂	No	According to ACM0002, the proposed project generates electricity by renewable energy, thus No GHG emissions emitted.
		CH ₄	No	According to ACM0002, the proposed project generates electricity by renewable energy, thus No GHG emissions emitted.
		N ₂ O	No	According to ACM0002, the proposed project generates electricity by renewable energy, thus No GHG emissions emitted.

The spatial extent of the project boundary includes the project power plant and all power plants connected physically to the electricity system that the proposed CDM project power plant is connected to, i.e. North China Power Grid. The project site includes the power plant, turbines themselves and auxiliary electric equipments that are used to support the turbines operation. The proposed project is connected to the North China Power Grid. Therefore, the North China Power Grid including all power plants connected is selected as the project boundary.

The NCPG is the project electricity system, which is defined by the spatial extent of the power plants that can be dispatched without significant transmission constraints. In determining this project electricity system, such causes below are taken into account.

According to the “Tool to calculate the emission factor for an electricity system” (version 02), the boundary definitions published by the Chinese DNA¹ is used, the NCPG consists of Beijing, Tianjin,

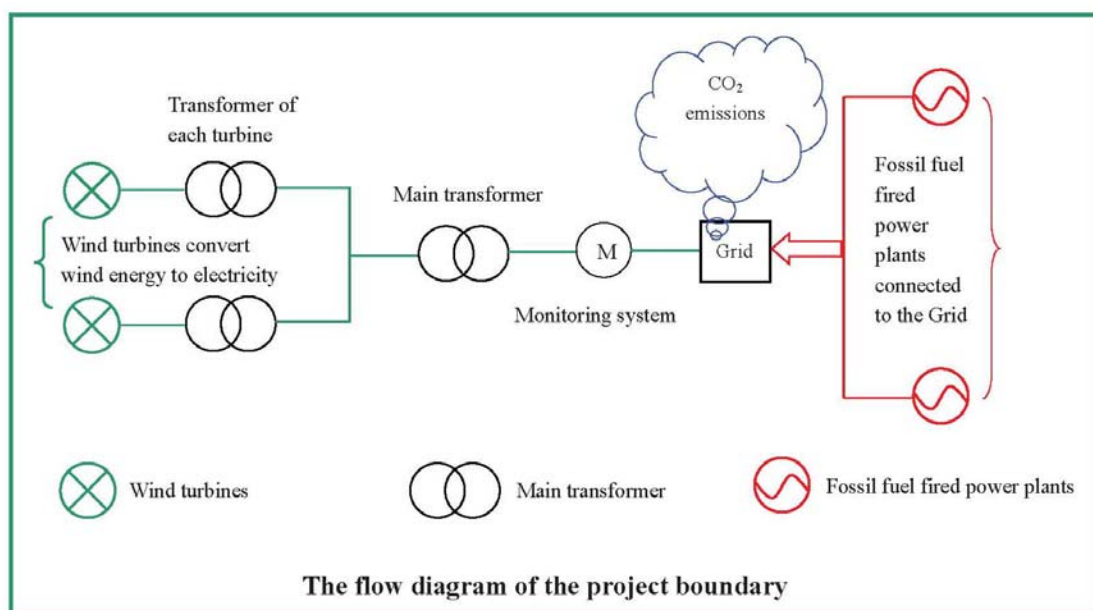
¹ Source: 2008 Baseline Emission Factors for Regional Power Grids in China

<http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/2008/200887164119674.pdf>

Hebei, Shanxi, Shandong and Inner Mongolia Power Grids. Therefore, the proposed project regards the North China Power Grid as the project boundary.

In April 2002, China implemented the policy of “separate power plants from grids and compete in price for grid connection”. The power sector reform started in 2002, and the six big power grids structured from then. Hence the grid data from Year 2004, 2005 and 2006 of the North China Power Grid applied in the PDD, which is after the power sector reform in China.

The flow diagram of the project boundary is illustrated as follow:



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

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According to ACM0002 (version 10), if the project activity is the installation of a new grid-connected renewable power plant/unit, the baseline is the following:

Electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the “Tool to calculate the emission factor for an electricity system” (version 02).

Therefore, supply of equivalent annual power output by the North China Power Grid to which the proposed project is connected is the baseline scenario for the proposed project activity.

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):

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The additionality of the proposed project is demonstrated and assessed by the approved “Tool for the Demonstration and Assessment of Additionality” (Version 05.2). Following steps include:

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

Define realistic and credible alternatives to the project activity(s) that can be (part of) the baseline scenario through the following sub-steps:

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

Identify realistic and credible alternative(s) available to the project participants or similar project developers that provide outputs or services comparable with the proposed CDM project activity. These alternatives are to include:

- 1) The proposed project not undertaken as CDM project;
- 2) Construction of a fossil fuel power plant with equivalent amount of annual electricity output;
- 3) Construction of a power plant using other source of renewable energy with equivalent amount of annual electricity output; and
- 4) Supply of equivalent annual power output by the Grid to which the proposed project is connected.

The alternative 3) is to construct renewable power plants whose annual power supply is equivalent to the projects. Solar PV, geothermal, biomass and hydro are the possible grid-connected renewable energy options that could be applied in the North China Power Grid besides wind energy. Limited by the status of technological advancement and high investment costs, solar PV², geothermal³ and biomass⁴ options are far from being economically attractive. Only hydropower projects have the investment return rate that can compete over that of wind power projects in China. However, the city of Kangbao where the proposed project is located in is characterized as a city which is short of water resources⁵. Thus, there won't be exploitable hydro resources on the project site. Hence, Scenario 3 is not a feasible alternative.

Scenario 1, Scenario 2 and Scenario 4 are considered to be feasible alternatives after the Sub-step 1a.

Sub-step 1b. Consistency with mandatory laws and regulations:

There is large difference between fossil fuel-fired power and wind farm in their annual operating hours and the stability of their operation. However, the average annual utilization hours (5,612 hours Reference: P626 *China Electric Power Yearbook 2007*) of the fossil fuel plants are larger than the average annual utilization of the project. Thus, the comparable installed capacity of the fossil fuel-fired plants with equivalent annual power supply as the project will be lower than 21 MW, while fossil fuel-fired plants with a capacity of 135 MW or less are prohibited from development in large grid such as provincial grid⁶

² Source: Page 50, *China Solar PV Report 2007*, China Environment Science Press. The cost of solar PV is 0.5 USD/kWh, which is around 3.7 RMB/kWh. The cost of solar PV is far higher than that of wind power, and thus not a attractive renewable energy technology for China at this moment

³ Source: Page 6 of *Overview of Chinese Renewable Energy Development*, NDRC/GEF/World Bank China Renewable Energy Development Project, 05/2004. Geothermal technology is still in demonstration stage in China.

⁴ Source: Biomass generation needs policy supply due to the high investment cost.
http://news.xinhuanet.com/energy/2009-07/10/content_11674750.htm

⁵ Source: FSR Page 65.

⁶ Notice on Strictly Prohibiting the Installation of Fuel-fired Generation with the Capacity of 135MW or below



according to current regulations in China. Consequently, Alternative 2) is not a realistic and credible alternative.

The alternative 1) and 4) are in line with the existing Chinese laws and regulations.

Step 2. Investment analysis

The purpose of this step is to determine whether the proposed project activity is economically or financially less attractive than other alternatives without an additional funding that may be derived from the CDM project activities. The investment analysis was conducted in the following steps:

Sub-step 2a. Determine appropriate analysis method

The three analysis methods suggested by *Tool for the demonstration and assessment of additionality* (version 05.2) are simple cost analysis (Option I), investment comparison analysis (Option II) and benchmark analysis (Option III). Since the proposed project will earn revenues from not only the CDM but also the electricity output, the simple cost analysis method is not applicable. Investment comparative analysis method is only applicable to the case that alternative baseline scenario is similar to the proposed projects, so that comparative analysis can be conducted. The alternative baseline scenario of the proposed project is to supply electricity from the North China Power Grid rather than a new investment project. Therefore, Option II is not an appropriate method either. The proposed project will use benchmark analysis method based on Project IRR.

Sub-step 2b. Apply post-tax benchmark analysis (Option III)

With reference to the *Interim Rules on Economic Assessment of Electric Engineering Retrofit Projects*, issued by the State Power Corporation in 2002, the financial benchmark return adopted as a guideline for investments in the electric power industry in China is 8% for the post-tax Project IRR of total investment and only if the total investment Project IRR of the project is higher than or equivalent to this benchmark, the proposed project is financially feasible. Thus, 8% is adopted as the post-tax benchmark of the proposed project.

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

Based on the above-mentioned benchmark analysis, the calculation and comparative analysis of financial indicators for the proposed project are carried out in sub-step 2c.

(1) Basic parameters for calculation of financial indicators

Based on the Feasibility Study Report of the proposed project, Basic parameters for calculation of financial indicators are as follows:

NO.	Parameters	Value	Unit	Data source	Remarks
1	Installed capacity	49.5	MW	FSR	33*1.5MW
2	Annual power supplied to NCPG	118,354.5	MWh/y	FSR	Calculated by the Professional Wind Resource Evaluation Software WAsP8.3 using 34 years' (from 1973 to 2006) wind resource data from nearby weather stations and related technical parameters of the wind turbines



3	Project lifetime	22	years	FSR	Including the construction period of 2 years
4	Bus-bar Tariff	0.5400	RMB / KWh (including VAT)	FSR & Tariff Letter ⁷	
5	Total Static Investment⁸	628.68	Million RMB	FSR	
6	Debt interest	7.83	%	FSR	
7	Debt-equity ratio	80/20		FSR	
8	Annual O&M Cost⁹	2.77(1 st -2 nd year) 5.83(3 rd -8 th year) 8.90(9 th -14 th year) 11.96(15 th -20 th year)	Million RMB	FSR	O&M costs contain the maintenance expense, insurance, material cost, employee payroll and welfare fund, and miscellaneous cost.
9	Residue value rate	5	%	FSR	
10	Tax of city construction¹⁰	5	%	FSR	The provisional regulation of city construction tax of PRC, state enact [1985] No. 19
11	Education surtax rate¹¹	4	%	FSR	No. 48 decree enacted by the State Council of PRC The provisional regulation of education surtax of Hebei Province
12	Income Tax¹²	25	%	FSR	The enforcement regulation of business income tax law of PRC, State Council Decree No. 521
13	VAT of	8.5	%	FSR	Financial Tax [2001] No.198

⁷ According to the Approval of the Tariff for the Proposed Project issued by the Hebei Provincial Price Bureau, the tariff of the proposed project was 0.5400 RMB/kWh (including VAT). The document has been submitted to DOE for validation.

⁸ The WTG used in the proposed project is manufactured by GE. And the WTG price is almost 7,600RMB/kW (closed to estimated valued in FSR) according to signed WTG contract, which played an important role of the static investment. The main contracts could almost reach the sub-item value estimated in the FSR, which have been provided to DOE for validation. As a result, the total static investment in the FSR is reasonable.

⁹ Annual O&M costs contain the maintenance expense, employee payroll and welfare fund, and miscellaneous costs. Based on the FSR, the maintenance tax is 0 for the first two years, because it is in the quality guarantee period in the first two years. The maintenance rate is 0.5% from 3rd to 8th year, 1% from 9th to 14th year, and 1.5% from 15th to 20th year during the operational period. As a result, the annual O&M cost were not the same for the different period during the operation.

¹⁰ Source: An official document *The provisional regulation of city construction tax of PRC* (<http://www.gxxhpc.com/Article.asp?id=762>)

¹¹ Source: Decree No. 395 of the State Council of the People's Republic (http://www.gov.cn/zwggk/2005-09/27/content_70440.htm ; <http://www.hebei.gov.cn/article/20031012/499554.htm>

¹² Source: *The Enforcement Regulation of Business Income Tax Law of PRC*, State Council Decree No.521 (http://www.gov.cn/zwggk/2007-12/11/content_830645.htm)



	electricity sale ¹³				Notification issued by China Tax Bureau
14	Crediting period	7×3	years		
15	CERs price	10 Euro	Per CERs		

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

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

Table 1 shows the Project IRR of the proposed project, with and without CDM-related income. Without CDM-related income, the Project IRR is lower than the benchmark and the proposed project is not financially acceptable. With it, the Project IRR is better than the benchmark and therefore, the proposed project is financially acceptable.

Table 1. Financial indicators of the Proposed Project

	Project IRR (post-tax benchmark = 8%)
Without CDM-related income	5.35%
With CDM-related income	8.66%

Sub-step 2d. Sensitivity analysis (only applicable to options II and III):

The purpose of the sensitivity analysis is to assess the impact of uncertainties in the input values of the financial model on the calculated IRR. Based on the analysis in the FSR, for a wind farm project without CDM funding, the critical factors that influences the Project IRR are mainly as follows:

- 1) Total static investment;
- 2) Annual O&M cost;
- 3) Annual power supply;
- 4) Tariff (Incl VAT)

They are fluctuated within the range from -10% to +10% in the FSR and the selection is also in accordance with the Guidance from “Tool for the demonstration and assessment of additionality” (Version 05.2). Their impacts on Project IRR of the proposed project were presented in Table 2 and Figure 2.

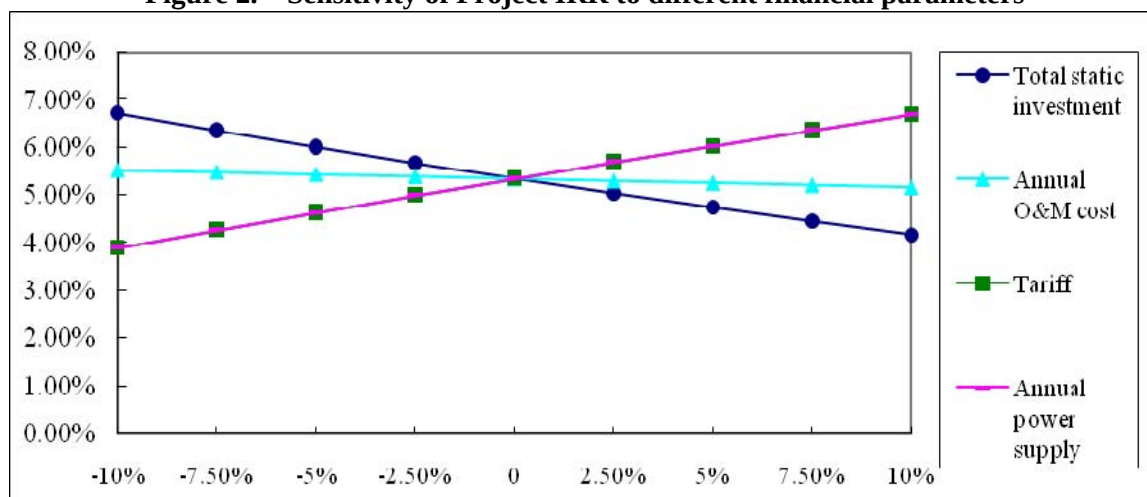
Table 2. Sensitivity of Project IRR to different financial parameters

Parameter	Range								
	-10%	-7.50%	-5%	-2.50%	0%	2.50%	5%	7.50%	10%
Total static investment	6.72%	6.36%	6.01%	5.67%	5.35%	5.04%	4.74%	4.45%	4.17%
Annual O&M cost	5.53%	5.49%	5.44%	5.40%	5.35%	5.30%	5.26%	5.21%	5.16%
Annual power	3.90%	4.27%	4.64%	5.00%	5.35%	5.70%	6.04%	6.37%	6.70%

¹³ Source: *The Provisional Regulation of VAT of PRC* validated from 1st Jan. 1994 Issued by State Council, (<http://www.taxchina.com/ssfg/1993-12/03/cms72624article.shtml>)

supply									
Tariff	3.90%	4.27%	4.64%	5.00%	5.35%	5.70%	6.04%	6.37%	6.70%

Figure 2. Sensitivity of Project IRR to different financial parameters



As shown in Table 2 and Figure 2, the Project IRR of the proposed project varies to different extents, when the above four financial indicators fluctuated within the reasonable range from -10% to +10% and the Project IRR does not exceed the benchmark of 8%.

The total static investment needs to decrease by 18% when the project IRR meets the benchmark of 8%. However, considering the majority part of total static investment, the wind turbine purchase contract and the construction contracts have been signed, and the values of the contracts are about 546 million RMB, which is about 87% of the total static investment. Moreover, the proposed project is still in the construction period, the total static investment has not been fully spent. As a result, the total investment of the proposed project is unlikely to be decreased by over 18% to exceed benchmark.

The annual O&M cost needs to decrease by 160% when the project IRR meets the benchmark of 8%. O&M cost consists of five basic parameters. They are material cost, insurance, employee payroll and welfare fund, maintenance expense and miscellaneous cost. Any change of the five basic parameters will result in the change of the annual O&M cost change. Both Producer Price Index (PPI) and employee payrolls increase fast^{14&15}. The Annual O&M Cost is unlikely to decrease by 160%. Hence, the IRR does not exceed the benchmark of 8%.

The tariff needs to increase by 20% when the project IRR meets the benchmark of 8%. According to the approved tariff of the proposed project, which was issued by the Hebei Provincial Price Bureau, 0.54 RMB/kWh (Include VAT) will be applied to the proposed project. Furthermore, the tariffs issued by NDRC Fa Gai Jia Ge [2007] No.1260 on 9th June 2007, Fa Gai Jia Ge [2007] No.3303 on 3rd December

¹⁴ Source: A news *PPI Increase by 4.6% in November, New High in 2007*, (<http://www.zjol.com.cn/05biz/system/2007/12/12/009048527.shtml>)

¹⁵ Source: A news, *In 2007, Rising Rate of The Average Wage of On-duty Staff and Workers in Urban Areas is The Highest in Past 6 Years*, (<http://finance.people.com.cn/GB/1037/7072896.html>)



2007, Fa Gai Jia Ge [2008] No.1876 on 23rd July 2008, and Fa Gai Jia Ge [2009] No.1906 on 20th July 2009 show that the tariff of the wind power projects with the same region is fixed at 0.54 RMB/kWh (Incl. VAT). Therefore, it is unlikely that the tariff of the proposed project could increase by 20%.

The annual power supply needs to increase by 20% when the Project IRR meets the benchmark of 8%. For the proposed project, the power generation is calculated based on the monitored data of the local wind resources over 30 years. The annual generation represents a long-term average power supply throughout the lifetime of wind farm, where the yearly-variations have already been taken into account. Therefore, the power generation of the proposed project is unlikely to increase by 20% to exceed benchmark of 8%.

In conclusion of the sensitive analysis, as the financial indicators vary within reasonable range, the proposed project remains financially unattractive without CDM support and the proposed project is additional. Hence, the Scenario 1) is not a realistic alternative.

Step 3. Barrier analysis

The barrier analysis is not employed for the Project.

Step 4. Common practice analysis

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

In line with the EB guidance on the additionality tool, the common practice analysis is carried out on similar projects in the same region and taking place in a comparable environment with regards to regulatory framework, investment climate, access to technology, and access to financing, etc.

In China, the regulatory framework and investment climate for wind farm projects are only similar and comparable in the same Province/ Autonomous Region. Wind farm project proposals are approved by the provincial DRC, and the projects' EIAs by the provincial Environmental Protection Bureau. The common practice analysis of the proposed project activity, therefore, covers projects in the Hebei province.

In April 2002, China implemented the policy "Separate power plants from network and compete in price to enter network"¹⁶. The objective of this power sector reform is to establish a more commercialized power market in China. Power project investment has to be under a more commercialized condition and considers project investment return more seriously. Since market condition for wind power project development changes much since April 2002, this common practice analysis starts from April 2002.

According to the methodology ACM0002, projects with installed capacity of or below 15 MW belong to small scale projects. Since the installed capacity of the proposed project is 49.5MW. Hence, this common practice analysis compares projects larger than 15 MW.

With reference to *Statistic of installed capacity of China's Wind Farms in 2007*¹⁷, there are two similar wind farms (capacity over 15 MW) as proposed project put into commission since April 2002 in Hebei Province without CDM support.

¹⁶ China implemented the policy "Separate power plants from network and compete in price to enter network"

¹⁷ Reference: <http://www.cwea.org.cn/upload/20080324.pdf> Chinese Wind Energy Association



Wind Farm	Installed capacity	Operation	Note
Chengde Hongsong Wind Farm Project	51.3 MW	Dec 2005	Facing financial barriers, applying for VER financing, validated by DNV, follow the criteria of VCS (version 01)
Shangyi Damanjing Wind Farm Project	34.5MW	Sep 2005	Facing financial barriers, applying for VER financing, validated by DNV, follow the criteria of VCS (version 01)

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

As discussed in Sub-step 4a, there are only one similar activity named Chengde Hongsong Wind Farm Project, is observed and commonly carried out without CDM support in Hebei Province. But Chengde Hongsong wind farm has been developed as a VER project following the Voluntary Carbon Standard due to low financial attractiveness, and thus has secured carbon revenue to improve its financial performance. Therefore, there is essential distinction between the project above and the proposed project.

As stated above, it is concluded that the proposed project is not common practice within the region.

Therefore, the proposed project is additional.

Prior consideration of the CDM

Time	Project action	CDM action
04/2008	Environmental Impact Assessment (EIA) developed	
15/05/2008	EIA approved by Hebei Provincial Environment Protection Bureau	
09/2008	Feasibility Study Report (FSR) developed ¹⁸	
01/12/2008	FSR approved by Hebei Provincial Development and Reform Committee	
20/01/2009		Board decision on the CDM development was made
19/02/2009	Tower of WTG Purchase contract signed	
26/03/2009		CDM Consultancy Agreement signed
10/04/2009		Submitted the notification of the commencement of the project activity and the intention to seek CDM status to DNRC
01/05/2009	Construction started	

¹⁸ It is a typo in the PDD for GSP.



06/05/2009	Construction Contract signed	
15/05/2009	Turbines Purchasing Agreement signed	
02/06/2009		Submitted to China DNA for LoA
23/06/2009		PDD uploaded on the website of UNFCCC
07/2009		The China LoA obtained

Based on the FSR finished in September 2008 and approved tariff of Hebei Province, the project developer, found the Project IRR is much lower than the benchmark of 8%. The proposed project is thus financially unattractive to investors. Then the project owner, Hebei Construction Investment New Energy Co., Ltd., decided to seek additional financial support from CDM to make the proposed project feasible on the Board meeting and made investment decision therefore. The CDM consulting contract was signed with Easy Carbon consultancy in 26th March 2009 and started the CDM application process.

So the proposed project started on 19th February 2009. The development procedure shows that CDM was serious considered before the proposed project started.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

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The key methodological steps are as follows:

1. Calculating the Baseline Emission (BE_y)
2. Calculating the Project Emission (PE_y)
3. Calculating the Leakage Emission (LE_y)
4. Calculating the Emission Reduction (ER_y)

1. Calculating the Baseline emissions

The baseline emissions (BE_y) is the product of the baseline emissions factor ($EF_{grid,CM,y}$ in tCO_2e/MWh) calculated, times the electricity supplied by the project activity to the grid (EG_y in MWh), as follows:

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

1.1 Calculation of the baseline emissions factor

Following ACM0002, the baseline emission factor (EF_y) is calculated as a combined margin ($EF_{grid,CM}$), consisting of the combination of operating margin ($EF_{grid,OM}$) and build margin ($EF_{grid,BM}$) factors according to the following seven steps defined in the “Tool to calculate the emission factor for an electricity system” (version 02). Data for the calculations are based on official national statistics books: China Energy Statistical Yearbook and China Electric Power Yearbook.

Step 1. Identify the relevant electricity system

The DNA of the host country has published a delineation of the project electricity system and connected electricity systems, this delineation is used. Following the DNA delineation, the project electricity system is the North China Power Grid (NCPG), which consists of Beijing, Tianjin, Hebei, Shanxi, Shandong and Inner Mongolia Power Grids. The proposed project is located in Hebei Province and covered by the NCPG. Therefore, NCPG is chosen as the relevant electric power system.



The connected electricity systems are Northeast Power Grid (NEPG) which consists of Liaoning, Jilin and Heilongjiang Power Grids, and Central China Power Grid (CCPG) which consists of Chongqing Municipal Power Grid and Henan, Hubei, Hunan Jiangxi and Sichuan Power Grids.

The electricity imports from NEPG and CCPG to NCPG have not changed significantly from 2004 to 2006. Therefore, the spatial extent is limited to NCPG for the purpose of determining the build margin emission factor.

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

The proposed project does not include off-grid power plants in the project electricity system, only grid power plants are included in the calculation apply to “Tool to calculate the emission factor for an electricity system”.

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

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

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

According to ACM0002, the Simple OM method is applicable to the project if the low-cost resources constitute less than 50% of total grid generation on average in the five most recent years or based on long-term averages for hydroelectric production.

The share of low-cost/must-run generation in NCPG is 0.745% in 2006, 0.749% in 2005, 0.708% in 2004, 0.862% in 2003, and 0.889% in 2002¹⁹. The Simple OM method, therefore, is selected to calculate the Operating Margin emission factor of the proposed project.

The Simple OM can be calculated using either of the two following data vintages for years(s) y:

- (Ex-ante option): If the ex ante option is chosen, the emission factor is determined once at the validation stage, thus no monitoring and recalculation of the emissions factor during the crediting period is required. For grid power plants, use a 3-year generation-weighted average, based on the most recent data available at the time of submission of the CDM-PDD to the DOE for validation, without requirement to monitor and recalculate the emissions factor during the crediting period, or
- (Ex-post option): If the ex post option is chosen, the emission factor is determined for the year in which the project activity displaces grid electricity, requiring the emission factor to be updated annually during monitoring.

Here ex-ante vintage is chosen, and the $EF_{grid,OM}$ is fixed during the first crediting period.

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

¹⁹ China Electric Power Yearbook 2003(P585) 2004(P709) 2005(P485) 2006(P568)2007(P638)

(a) Simple OM

The Simple OM emission factor is calculated as the generation-weighted average CO₂ emissions per unit net electricity generation (tCO₂e/MWh) of all generating power plants serving the system, not including low-cost / must-run power plants / units.

The simple OM may be calculated:

- Option A: Based on the net electricity generation and a CO₂ emission factor of each power unit, or
- Option B: Based on the total net electricity generation of all power plants serving the system and the fuel types and total fuel consumption of the project electricity system.

For the proposed project activity, the required data for the exercise of Option A is not available and those of Option B can be obtained from official sources, and also nuclear and renewable power generation are considered as low-cost / must-run power sources. Besides, off-grid power plants are not included in the calculation. Therefore, Option B is chosen to calculate the operating margin emission factor:

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

Option B – Calculation based on total fuel consumption and electricity generation of the system

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

$$EF_{grid,OMsimple,y} = \frac{\sum_i FC_{i,y} \times NCV_{i,y} \times EF_{CO_2,i,y}}{EG_y} \quad (2)$$

Where:

$EF_{grid,OMsimple,y}$	=	Simple operating margin CO ₂ emission factor in year y (tCO ₂ e/MWh)
$FC_{i,y}$	=	Amount of fossil fuel type i consumed in the project electricity system in year y (mass or volume unit)
$NCV_{i,y}$	=	Net calorific value (energy content) of fossil fuel type i in year y (GJ / mass or volume unit)
$EF_{CO_2,i,y}$	=	CO ₂ emission factor of fossil fuel type i in year y (tCO ₂ e/GJ)
$EG_{PJ,y}$	=	Net electricity generated and delivered to the grid by all power sources serving the system, not including low-cost / must-run power plants / units, in year y (MWh)
i	=	All fossil fuel types combusted in power sources in the project electricity system in year y
y	=	The relevant year as per the data vintage chosen in Step 3

Regarding parameter selection, local values of $NCV_{i,y}$ and $EF_{CO_2,i,y}$ should be used where available. If no such values are available, IPCC world-wide default values are preferable. The Net Calorific Value ($NCV_{i,y}$) of each type of fossil fuel used in the calculation comes from China Energy Statistic Yearbook 2007. Emission factors ($EF_{CO_2,i,y}$) of each type of fossil fuel come from IPCC 2006 default values.

On the basis of the data available, the three-year average operating margin emission factor is calculated by the DNA as a full-generation-weighted average of the emission factors:

$$EF_{grid,OM,simple} = 1.1169 \text{ tCO}_2\text{e/MWh}$$

Step 5. Identify the group of power units to be included in the build margin

The sample group of power units m used to calculate the build margin consists of either:

- (a) The set of five power units that have been built most recently, or
- (b) The set of power capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently.

Project participants should use the set of power units that comprises the larger annual generation.

In terms of vintage of data, project participants can choose between option 1 ex-ante, and option 2 ex-post data vintages. The project proponents have chosen to use the ex-ante option, and $EF_{grid,BM,y}$ is fixed for the duration of the first crediting period.

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

Step 6. Calculate the build margin emission factor

The build margin emission factor is the generation-weighted average emission factor ($\text{tCO}_2\text{e/MWh}$) of all power units m during the most recent year y for which power generation data is available, calculated as follows:

$$EF_{grid,BM,y} = \frac{\sum_m EG_{m,y} \times EF_{EL,m,y}}{\sum_m EG_{m,y}} \quad (3)$$

Where:

$EF_{grid,BM,y}$	=	Build margin CO_2 emission factor in year y ($\text{tCO}_2\text{e/MWh}$)
$EG_{m,y}$	=	Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh)
$EF_{EL,m,y}$	=	CO_2 emission factor of power unit m in year y ($\text{tCO}_2\text{e/MWh}$)
m	=	Power units included in the build margin
y	=	Most recent historical year for which power generation data is available

Currently, it is very difficult to get the capacity margin data of power plants in China, since these data as well as net quantity of electricity generated and delivered to the grid and fuel consumption data in power



unit m are regarded as commercial secrets or only for internal usage. Then the following deviation²⁰ approved by the EB was adopted to calculate the Build Margin emission factor.

According to the guidance from the CDM Executive Board for a deviation of the baseline methodology of AM0005, which had combined into the baseline methodology of ACM0002, the following deviation was adopted to calculate the Build Margin emission factor.

- 1) Use the efficiency level of the best technologies commercially available in the provincial/regional or national grid of China, as a conservative proxy, for fuel i consumption estimation to estimate the $EF_{grid,BM,y}$.
- 2) Use capacity additions during last several years for estimating the $EF_{grid,BM,y}$, i.e. the capacity addition over last several years, whichever results in a capacity addition that is closest to 20% of total installed capacity. For the proposed project, the data from Year 2004 to 2006 is used to calculate $EF_{grid,BM,y}$.
- 3) Use installed capacity to replace annual power generation to estimate weights.

The BM emission factor in this PDD is calculated as following sub-steps.

Sub-step 1. Calculation of weights of CO₂ emissions of solid, liquid and gaseous fossil fuels in total emissions for power generation

$$\lambda_{Coal,y} = \frac{\sum_{i \in COAL,j} FC_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,y}}{\sum_{i,j} FC_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,y}} \quad (4)$$

$$\lambda_{Oil,y} = \frac{\sum_{i \in OIL,j} FC_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,y}}{\sum_{i,j} FC_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,y}} \quad (5)$$

$$\lambda_{Gas,y} = \frac{\sum_{i \in GAS,j} FC_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,y}}{\sum_{i,j} FC_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,y}} \quad (6)$$

Where:

$FC_{i,j,y}$ = Amount of fossil fuel type i consumed in province j in year y
(mass or volume unit)

$NCV_{i,y}$ = Net calorific value (energy content) of fossil fuel type i in year y
(GJ/t or GJ/m³)

$EF_{CO_2,i,y}$ = CO₂ emission factor of fossil fuel type i in year y (tCO₂e/GJ)

Coal, *Oil* and *Gas* refer to the group of solid, liquid, and gaseous fossil fuels, respectively.

Sub-step 2: Calculation of Emission Factor of Relevant Thermal Power

²⁰ Source: http://cdm.unfccc.int/UserManagement/FileStorage/AM_CLAR_QEJWJEF3CFBP1OZAK6V5YXPQK



$$EF_{Thermal,y} = \lambda_{Coal,y} \times EF_{Coal,Adv,y} + \lambda_{Oil,y} \times EF_{Oil,Adv,y} + \lambda_{Gas,y} \times EF_{Gas,Adv,y} \quad (7)$$

Where:

$EF_{Coal,Adv}$, $EF_{Oil,Adv}$ and $EF_{Gas,Adv}$ refer to the emission factors representing best technologies commercially available for coal, oil and gas fired power plants, respectively.

Sub-step 3: Calculation of BM of the 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 $EF_{grid,BM,y}$ of NCPG.

$$EF_{grid,BM,y} = \frac{CAP_{Thermal,y}}{CAP_{Total,y}} \times EF_{Thermal,y} \quad (8)$$

Where:

CAP_{Total} = The total newly added electricity generation capacity (MW)

$CAP_{Thermal}$ = The newly added electricity generation capacity of thermal power (MW)

Following the four steps above, the build margin emission factor $EF_{grid,BM,y}$ of the NCPG is calculated to be: 0.8687 tCO₂e/MWh (see Annex 3 for more details).

Step 7. Calculate the combined margin emission factor

The baseline emissions factor (EF_{CM}) is calculated as the weighted average of the Operating Margin emission factor and Build Margin emission factors following ACM0002. For wind projects, the default weights are as follows: $w_{OM} = 0.75$ and $w_{BM} = 0.25$:

$$EF_{grid,CM,y} = w_{OM} \times EF_{grid,OM,y} + w_{BM} \times EF_{grid,BM,y} \quad (9)$$

Where:

$EF_{grid,BM,y}$ = Build margin CO₂ emission factor in year y (tCO₂e/MWh)

$EF_{grid,OM,y}$ = Operating margin CO₂ emission factor in year y (tCO₂e/MWh)

w_{OM} = Weighting of operating margin emissions factor (%)

w_{BM} = Weighting of build margin emissions factor (%)

On the basis of these weights for the first crediting period, the combined margin emission factor is calculated, and fixed ex-ante:

$$EF_{grid,CM,y} = 1.05485 \text{ tCO}_2\text{e/MWh}$$

Baseline emissions (BE_y) now can be calculated as the combined margin CO₂ emission factor ($EF_{grid,CM,y}$) multiplied by the annual net generation of the Proposed Project ($EG_{PJ,y}$).

$$BE_y = EG_{PJ,y} \times EF_{grid,CM,y}$$

Where:



- BE_y = Baseline emissions in year y (tCO_2 /yr)
 $EG_{PJ,y}$ = Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y (MWh/yr)
 $EF_{grid,CM,y}$ = Combined margin CO_2 emission factor for the project electricity system in year y calculated using the latest version of the “Tool to calculate the emission factor for an electricity system”.

Calculation of $EG_{PJ,y}$

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

$$EG_{PJ,y} = EG_{facility,y}$$

where:

- $EG_{PJ,y}$ = Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y (MWh/yr)
 $EG_{facility,y}$ = Quantity of net electricity generation supplied by the project plant/unit to the grid in year y (MWh/yr)

2 Calculating the Project Emission (PE_y)

According to ACM0002 (version 10), project emission of the proposed wind farm project is zero.

$$PE_y = 0$$

3 Calculating the Leakage Emission (LE_y)

According to ACM0002 (version 10), no leakage is considered for the proposed wind farm project.

4 Calculating the Emission Reduction (ER_y)

The annual emission reductions ER_y for the project activity are calculated as the baseline emissions minus the project emissions and minus the leakage emissions. Being the project of a zero-emission activity the final GHG emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y \quad (10)$$

Where:

ER_y = Emission reductions in year y (tCO_2e /year)

BE_y = Baseline emissions in year y (tCO_2e /year)

PE_y = Project emissions in year y (tCO_2e year)

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

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Data / Parameter:	$FC_{i,m,y}$
Data unit:	tonnes or m^3
Description:	Amount of fossil fuel type i consumed by power plant / unit m in year y
Source of data used:	China Energy Statistical Yearbook (2005~2007)
Value applied:	See Annex 3 for details
Justification of the choice of data or description of	Official statistical data



measurement methods and procedures actually applied :	
Any comment:	Applied for calculating OM and BM

Data / Parameter:	$NCV_{i,y}$
Data unit:	kJ/kg or kJ/m ³
Description:	Net calorific value (energy content) of fossil fuel type <i>i</i> in year <i>y</i>
Source of data used:	China Energy Statistical Yearbook (2007)
Value applied:	See Annex 3 for details
Justification of the choice of data or description of measurement methods and procedures actually applied :	Official statistical data
Any comment:	Applied for calculating OM and BM

Data / Parameter:	$EF_{CO_2,i,y}$
Data unit:	tCO ₂ e/GJ
Description:	CO ₂ emission factor of fossil fuel type <i>i</i> in year <i>y</i>
Source of data used:	2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value applied:	See Annex 3 for details
Justification of the choice of data or description of measurement methods and procedures actually applied :	IPCC default value
Any comment:	Applied for calculating OM and BM

Data / Parameter:	Installed Capacity
Data unit:	MW
Description:	The Installed Capacity of the power plants in the grid in the year <i>y</i>
Source of data used:	China Electric Power Yearbook (2005,2006,2007)
Value applied:	See Annex 3 for details
Justification of the choice of data or description of measurement methods and procedures actually applied :	Official statistical data
Any comment:	Applied for calculating BM

Data / Parameter:	GEN_y
Data unit:	MWh
Description:	The electricity generation of the power plants in the grid in the year <i>y</i>
Source of data used:	China Electric Power Yearbook



Value applied:	See Annex 3 for details
Justification of the choice of data or description of measurement methods and procedures actually applied :	Official statistical data
Any comment:	Applied for calculating BM

Data / Parameter:	Efficiency of the best technology commercially
Data unit:	%
Description:	Best commercial available efficiency of coal, gas, oil fuel power plant
Source of data used:	Chinese DNA's Guideline of emission factors of Chinese grids
Value applied:	Best efficiency for coal plant is 37.28% Best efficiency for oil plant is 48.81% Best efficiency for gas plant is 48.81%
Justification of the choice of data or description of measurement methods and procedures actually applied :	Official statistic value
Any comment:	Applied for calculating BM

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

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Based on the Feasible Study Report, the net power generation of this proposed project will be 118,354.5 MWh annually. The emission reduction ER_y by the project activity in a given year y is calculated as follows

$$BE_y = EG_{PJ,y} \times EF_{grid,CM,y} = 124,846 \text{ tCO}_2\text{e}$$

$$ER_y = BE_y - PE_y = 124,846 - 0 = 124,846 \text{ tCO}_2\text{e}$$

The proposed project activity is expected to achieve 873,922 tCO₂e of net emission reductions during the first 7-year crediting period.

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

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Year	Estimation of project activity emissions (tonnes of CO ₂ e)	Estimation of baseline emissions (tonnes of CO ₂ e)	Estimation of leakage (tonnes of CO ₂ e)	Estimation of overall emission reductions (tonnes of CO ₂ e)
01/06/2010 – 31/05/2011	0	124,846	0	124,846
01/06/2011 – 31/05/2012	0	124,846	0	124,846
01/06/2012 – 31/05/2013	0	124,846	0	124,846



01/06/2013 – 31/05/2014	0	124,846	0	124,846
01/06/2014 – 31/05/2015	0	124,846	0	124,846
01/06/2015 – 31/05/2016	0	124,846	0	124,846
01/06/2016 – 31/05/2017	0	124,846	0	124,846
Total (tonnes of CO₂e)	0	873,922	0	873,922

B.7. Application of the monitoring methodology and description of the monitoring plan:
B.7.1. Data and parameters monitored:

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Data / Parameter:	$EG_{export,y}$
Data unit:	MWh
Description:	Electricity supplied by the project activity to the grid in year y.
Source of data to be used:	Project activity site.
Value of data applied for the purpose of calculating expected emission reductions in section B.5.	118,354.5
Description of measurement methods and procedures to be applied:	Continuously measurement and monthly recording The data will be continuously measured and monthly recorded. Data will be archived for 2 years following the end of the last crediting period.
Monitoring frequency	Continuously measurement and monthly recording
QA/QC procedures to be applied:	The metering equipments at the project site will be calibrated once a year according to the management standard DL/T228-4000. Power supplied to the grid will be double checked according to electricity sales receipts.
Any comment:	

Data / Parameter:	$EG_{import,y}$
Data unit:	MWh
Description:	Electricity imported from the grid by the proposed project during year y
Source of data to be used:	Project activity site.
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:	Continuously measurement and monthly recording The data will be continuously measured and monthly recorded. Data will be archived for 2 years following the end of the crediting period.
Monitoring frequency	Continuously measurement and monthly recording
QA/QC procedures to be applied:	The metering equipments at the project site will be calibrated once a year according to the management standard DL/T228-4000. Power imported from the grid will be double checked according to electricity sales receipts.
Any comment:	

Data / Parameter:	$EG_{facility,y}$
Data unit:	MWh/yr
Description:	Quantity of net electricity generation supplied to the Grid by the project activity in year y.
Source of data to be used:	Calculation by $EG_{export,y}$ minus $EG_{import,y}$
Value of data applied for the purpose of calculating expected emission reductions in section B.5.	In this PDD, the net electricity delivered to the Grid 118,354.5 MWh is applied.
Description of measurement methods and procedures to be applied:	The net electricity supplied to the Grid by the proposed project will be calculated through electricity supplied by the project to the grid ($EG_{export,y}$) minus electricity purchased from the Grid ($EG_{import,y}$).
Monitoring frequency	Continuously measurement and monthly recording
QA/QC procedures to be applied:	Power supplied to the grid will be checked by internal verification procedure and electricity sales receipts.
Any comment:	

B.7.2. Description of the monitoring plan:

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The proposed project adopts the approved consolidated monitoring methodology ACM0002 “Consolidated monitoring methodology for grid-connected electricity generation from renewable sources” (version 10) to determine the emission reductions from the net electricity generation from the wind farm. This plan describes in more detail the process.

1. Monitoring Object

The monitoring is to justify the realistic amount of emission reduction from the CDM project. The monitoring plan will provide credible, accurate, transparent and conservative monitoring data and ensure the real, measurable, long-term GHG emission reduction from this project.

2. Management Structure

Hebei Construction Investment New Energy Co., Ltd, the owner of the proposed project, will use this document as guideline in monitoring of the project emission reduction performance and will adhere to the



guidelines set out in this monitoring plan to ensure that the monitoring is credible, transparent and conservative.

The responsibilities of the project staff are as follow:

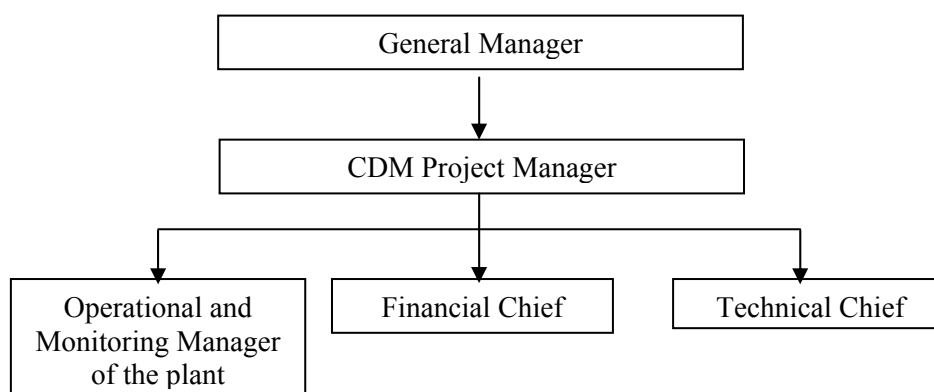
General Manager: To be responsible for supervising the whole monitoring procedure.

CDM Project Manager: To be responsible for data management and compiling monitoring report.

Operational and monitoring manager: To be responsible for collecting data and do internal audit.

Financial chief: To be responsible for collection of sales receipts.

Technical chief: To be responsible for preparing operational reports of the project activity, recording the daily operation of the wind farm, including operating periods, equipment defects, etc.

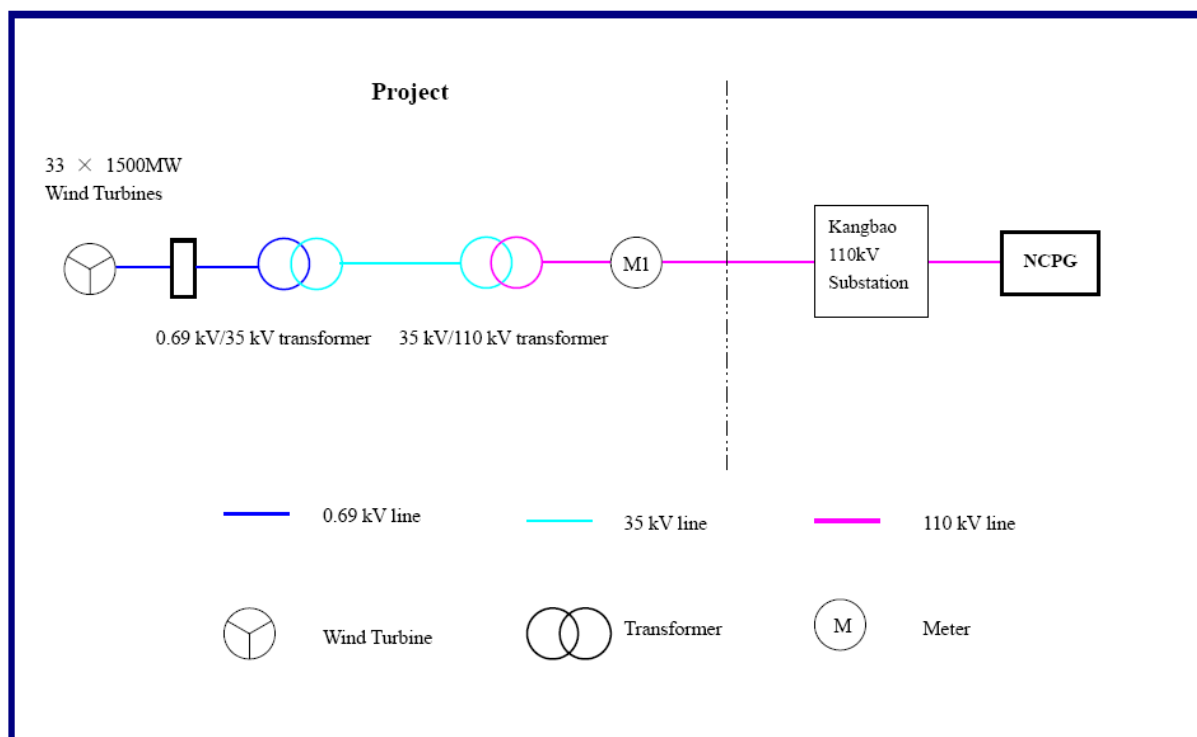


3. Monitoring Equipments

Electricity supplied by the proposed project will be monitored through the bi-directional electricity meter. Electricity supplied to the grid by the project activity and the electricity imported from the grid to the project site will be monitored by the meters. The gateway meter(s) (hereafter referred as the meter M1) will be installed at the project site. The to-grid and from-grid electricity will be cross-checked with the electricity receipts. The precision of the meter M1 is 0.2S.

The receipts of the electricity supplied to the grid by this proposed project and the electricity imported from the grid will be issued based on the power purchase agreement (PPA) signed between the project entity and the power grid company and the readings from the gateway meter (M1). The net generation is calculated as exports minus imports.

A diagram shows how parameters are monitored is presented as follows:



The metering equipment are calibrated and checked for accuracy so that the metering equipment shall have sufficient accuracy within the agreed limits. The metering equipments are calibrated and checked annually by qualified third party for accuracy. The records will be supplied to the wind farm operator, and maintained by the operator.

If any error is detected, the party owning the meter shall repair, recalibrate or replace the meter giving the other party sufficient notice to allow a representative to attend during any corrective activity.

4. Monitoring procedure

The electricity supplied to the grid and the electricity imported from the grid will base on the meter installed at project site. The receipts of the electricity supplied to the power grid by this proposed project and the electricity imported from the power grid will be issued based on the power purchase agreement (PPA) signed between the project entity and the power grid company and the readings from the metering equipment.

The net generation is calculated as exports minus imports. The electricity exchanged between the proposed project and NCPG via the Kangbao 110kV substation is cross-checked by the project owner and the grid company, the metered values of electricity exported and imported will confirmed by the two sides.

5. Quality Assurance and Quality Control

The workers are trained to be competent and the metering equipments are calibrated and sealed as per the industry practices at regular intervals, with the purpose to provide credible, accurate, transparent and conservative monitoring data and ensure the real, measurable, long-term GHG emission reduction from this project.



Monthly net on-grid electricity supplied data will be approved and signed off by the Manager before it is accepted and stored. This audit will check compliance with monitoring procedures in this monitoring plan. This internal audit will also identify potential improvements to procedures to improve monitoring and reporting in future years. The monitoring officers will also attend a training session organized by the CDM consultant. The purpose of training is to assure those staffs are competent to conduct the monitoring plan, thus to make the monitored data accurate.

Emergency Procedure:

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

In case metering equipment is damaged: The project entity and the grid company will jointly calculate a conservative estimate of power supplied to the grid. A statement will be prepared indicating

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

The project entity will furthermore document all efforts taken to restore normal monitoring procedures.

6. Data Management System

The CDM manual sets out the procedures for tracking information from the primary source to the end-data calculations in paper document format. 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 auditors' reference of relevant literature relating to the proposed project activity, the project material and monitoring results will be made available.

At the end of each month, the monitoring data will be filed in a spreadsheet and stored electronically, and the paper-based printout should be also archived. Furthermore, the project owner collects the sales receipts for the electricity supplied to the grid as a cross-check, and compiled the monitoring report including the monitoring data and relevant evidence at the end of each crediting year.

All the data will be kept for two years following the end of the last crediting period.

7. Monitoring Report

The monitoring report is prepared by the CDM project manager alone or with designated third party. The project developer and/or the designated third party have to make sure that the format and content of the monitoring report are consistent with the monitoring methodology in the registered PDD.

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 and monitoring methodology: 18/12/2009

Name of person/entity determining the baseline:

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Above persons are not Project Participants.

**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:**

>>

19/02/2009 (Tower of WTG Purchase contract signed date, which is considered as the earliest date of the proposed project)

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

>>

20 years operational lifetime + 2 years construction period

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:**

>>

01/06/2010 (or the date of registration date whichever is later)

C.2.1.2. Length of the first crediting period:

>>

7 years

C.2.2. Fixed crediting period:**C.2.2.1. Starting date:**

>>

Not applicable

C.2.2.2. Length:

>>

Not applicable

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

>>

The environmental impact assessment for this project was carried out by Hebei Institute of Geographical Sciences in April 2008. The results of the EIA were positive and approved by Hebei Provincial Environmental Protection Bureau on 15th May 2008. A summary of conclusion of the report is illustrated as below:

Ambient air

The impact on ambient air quality of the proposed project is mainly from dust during construction stage. The excavation work is the primary emission source, however, it is a ground source and the particle size is quite large so that dust will deposit quickly on the ground. Immediately replant the areas where construction has completed, and by sprinkling water frequently and timely clearing can reduce the dust pollution. When the project is in operational period, there will be no air pollutions. In conclusion, the proposed project will not pose any threat on the quality of ambient air.

Impact from noise

There is some noise caused by operation of equipments. However, the location arrangement of wind turbines is serious considered to avoid adverse influence to the residents. The noise level is in accordance with the National Standard (Grade II of the *Noise Standard for City Environment GB12348-90*: below daytime 55 dB (A), night-time 45 dB (A). Hence, the noise will not impact the work and daily life of local residents.

Electromagnetic impact

The electromagnetic pollution generated from operation of the wind blades has limited effect within about 200m around, whereas no wireless communication facilities exist within 300m nearby, so the electronic magnetic pollution to the surrounding environment is insignificant.

Impact from Solid waste

There is mainly some waste of stone, bricks or domestic waste in the construction stage and basically no solid waste in the operational period. Solid waste will be collected and handled properly. Hence, it will not result any environmental impact.

Impact from Wastewater

There is mainly domestic wastewater with fairly small quantities in construction stage, and primary treatment methods will be first applied, small-scale septic tanks should be built on the site, through which the wastewater can finally meet the standard of discharge after treatment. Therefore, the impact of wastewater is limited and mitigated.

Impact on ecological environment

The proposed project will both permanently and temporarily occupy some land (mostly farmland), the temporarily occupied land will be ecologically restored for original use. Such restoration measures will include land re-surfacing, re-vegetation, and etc. As for the permanently occupied land, ecological compensation measures will be applied to the adjacent area to offset the impact on ecosystem.

No migrating birds have been found in the project field till now. Therefore, the project is not located on the passage of migrating birds, and the project construction will not influence the migration of birds.



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 Project use clean renewable energy to generate electricity whose environmental impact comply with relevant environmental laws and regulations in the host country. The environmental impacts of the proposed project are not considered significant.

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

>>

In Nov 2008, staff from the project owner carried out a survey of the local residents around the project location. The staff introduced the background of the proposed project and then sent out 50 copies of questionnaire in a random way, 50 pieces of reply were received. Among the interviewees, 18 of them have educational level of middle school or below middle school, 7 of high school, 4 of technical secondary school and 21 of collage.

An invitation notice for stakeholder comments was later issued by the project developer, several representatives of local stakeholders, including governmental officials of local county and local residents, etc attended the meeting on 15th Nov 2008 to discuss the questionnaires collected and further introduce the project. No negative opinion on construction of the project is heard and environmental considerations expressed by stakeholders are discussed on the meeting.

The questions regarding the proposed project were mainly as follows:

Do you know the proposed project?
The attitude to the proposed project (simple choice)?
The necessity of the proposed project (multiple choices)?
What are the positive impacts on your life of the proposed project (multiple choices)?
What are the negative impacts on your life of the proposed project (multiple choices)?
What measures do you think can reduce the above effects?
Do you know the Clean Development Mechanism?

E.2. Summary of the comments received:

>>

The summary of questionnaire survey is listed as the following:

- 24 (48%) of them know the proposed project very well, 21(42%) have gained some understanding of it, 5 (10%)of them don't know the project;
- All (100%) of them support the project;
- 29 of them think it will increase the power supply, 31 of them think it will offer job opportunities for local people, 38 of them think it will increase local taxation, and one of them thinks the proposed project belongs to the renewable resource, it will reduce fossil fuel consumption;
- 22 of them think the proposed project will help to use electricity or increase the power supply,28of them think it will make income growth, 29 of them think it will offer job opportunities for local people, 22 of the think it will advance the living standard, and 3 of them think it will avoid pollutant emissions and has obvious environmental benefit;
- 32 of them think the proposed project doesn't have negative impacts, 1of them think it will make noise, 14 of them think it will appropriate land, no one thinks it will effect the living environment



of birds, destroy the local ecological environment and traffic facilities, 2 of them think it will reduce the farmland production, and one of them thinks it may destroy vegetation;

- Regarding the negative impacts of the propose project, they think it should make revegetation, use advance technology to reduce noise and optimization design to reduce the land appropriation;
- 22 (44%) of them know Clean Development Mechanism, and the others (56%) do not know;
- Regarding the suggestion of the propose project, 13 of them think it is a good project, they hope it can put into construction early.

The summary of local stakeholders meeting:

The local community possesses basically positive comments on the effects of the proposed project. The interviewees considered that local social, economic and environmental development would be beneficial from the proposed project. The response was overall supportive to the project implementation.

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

>>

During the survey local residents support the propose project as they showed in the questionnaires. Some people express their concerns about the negative impacts of the project, but they don't think it is serious. About the environment impacts of the project, the requirements in the EIA report will be strictly conducted by the project owner and be supervised by the municipal environmental protection bureau. Therefore, the proposed project can be carried out as planned.

**Annex 1****CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY**

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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

There is no public funding for Hebei Kangbao Sanxiatian Wind Farm Project.

**Annex 3****BASELINE INFORMATION**

All the tables related to the calculation of baseline emission reduction are presented below:

Calculation of Operating Margin (OM)

Table A1. Simple OM Emission Factor of North China Power Grid in 2004

Fuel types	Unit	Beijing	Tianjin	Hebei	Shanxi	Inner Mongolia	Shandong	Subtotal	Emission Factor (tc/TJ)	Average low Caloric value (MJ/t, km ³)	CO ₂ emission (tCO ₂ e) K=G*H*I*J*44/12/100 (unit of mass)
		A	B	C	D	E	F	G=A+B+C+D+E+F	H	I	K=G*H*I*44/12/10 (unit of volume)
Raw coal	10000ton	823.09	1,410	6,299.8	5,213.2	4,932.2	8,550	27,228.29	25.8	20,908	538,547,477
Cleaned coal	10000 ton						40	40.00	25.8	26,344	996,857
Other washed coal	10000 ton	6.48		101.04	354.17		284.22	745.91	25.8	8,363	5,901,191
Coke	10000 ton					0.22		0.22	29.2	28,435	6,698
Coke oven gas	108m ³	0.55		0.54	5.32	0.4	8.73	15.54	12.1	16,726	1,153,187
Other coal gas	108m ³	17.74		24.25	8.2	16.47	1.41	68.07	12.1	5,227	1,578,574
Crude oil	10000 ton							0.00	20	41,816	0
Gasoline	10000 ton							0.00	18.9	43,070	0



Diesel	10000 ton	0.39	0.84	4.66				5.89	20.2	42,652	186,070
Fuel oil	10000 ton	14.66		0.16				14.82	21.1	41,816	479,451
LPG	10000 ton							0.00	17.2	50,179	0
Refinery gas	10000 ton		0.55	1.42				1.97	15.7	46,055	52,229
Natural gas	10 ⁸ m3		0.37		0.19			0.56	15.3	38,931	122,306
Other oil product	10000 ton							0.00	20	38,369	0
Other coking product	10000 ton							0.00	25.8	28,435	0
Other fuel	10000 tce	9.41		34.64	109.73	4.48		158.26	0	0	0
										Subtotal	549,024,041

Source: China Energy Statistical Yearbook 2005

Table A2. Thermal Power Generation of North China Power Grid in 2004

Province	Power Generation (MWh)	Ratio of Self Power Consumption of Plant (%)	Power Supply(MWh)
Beijing	18,579,000	7.94	17,103,827
Tianjin	33,952,000	6.35	31,796,048
Hebei	124,970,000	6.5	116,846,950
Shanxi	104,926,000	7.7	96,846,698
Inner Mongolia	80,427,000	7.17	74,660,384
Shandong	163,918,000	7.32	151,919,202
Total			489,173,110

Source: China Electric Yearbook 2005

Table A3. Emission Factor of North China Power Grid in 2004



	Parameter	Unit	Value	Source
A	Net Import from Northeast China Power Grid to North China Power Grid	MWh	4,514,550	China Electric Power Yearbook 2005
B	Total Emissions of Northeast China Power Grid	tCO ₂ e	199,708,287	Calculation based on data from China Electric Power Yearbook and China Energy Statistical Yearbook
C	Total Power Supply of Northeast China Power Grid	MWh	170,132,885	China Electric Power Yearbook 2005
D	Average Emission Factor of Northeast China Power Grid	tCO ₂ e /MWh	1.17384	D=B/C
E	Total Power Supply of North China Power Grid	MWh	493,687,660	E=Total Power Generation of North China Power Grid + A
F	Total Emissions of North China Power Grid	tCO ₂ e	554,323,400	
G	Emission Factor of North China Power Grid	tCO ₂ e /MWh	1.12282	G=F/E

Table A4. Simple OM Emission Factor of North China Power Grid in 2005

Fuel types	Unit	Beijing	Tianjin	Hebei	Shanxi	Inner Mongolia	Shandong	Subtotal	Emission Factor (tC/TJ)	Average low Caloric value (MJ/t, km ³)	CO ₂ emission (tCO ₂ e) K=G*H*I*44/12/100 (unit of mass)
		A	B	C	D	E	F	G=A+B+C+D+E+F	H	I	K=G*H*I*44/12/100 (unit of volume)
Raw coal	10000ton	897.75	1,675.2	6,726.5	6,176	6,277.23	10,405.	32,158.5	25.8	20,908	636,062,536



					.45		4	3			
Cleaned coal	10000 ton						42.18	42.18	25.8	26,344	1,051,186
Other washed coal	10000 ton	6.57		167.45	373.65		108.69	656.36	25.8	8,363	5,192,725
Coke	10000 ton					0.21	0.11	0.32	29.2	28,435	9,742
Coke oven gas	108m3	0.64	0.75	0.62	21.08	0.39		23.48	12.1	16,726	1,742,396
Other coal gas	108m3	16.09	7.86	38.83	9.88	18.37		91.03	12.1	5,227	2,111,027
Crude oil	10000 ton					0.73		0.73	20	41,816	22,385
Gasoline	10000 ton			0.01				0.01	18.9	43,070	298
Diesel	10000 ton	0.48		3.54		0.12		4.14	20.2	42,652	130,786
Fuel oil	10000 ton	12.25		0.23		0.06		12.54	21.1	41,816	405,690
LPG	10000 ton							0	17.2	50,179	0
Refinery gas	10000 ton			9.02				9.02	15.7	46,055	239,141
Natural gas	10 ⁸ m3	0.28	0.08		2.76			3.12	15.3	38,931	681,417
Other oil product	10000 ton							0	20	38,369	0
Other coking product	10000 ton							0	25.8	28435	0
Other fuel	10000 tce	8.58		32.35	69.31	7.27	118.9	236.41	0	0	0
										Subtotal	647,649,331

Source: China Energy Statistical Yearbook 2006

TableA5. Thermal Power Generation of North China Power Grid in 2005



Province	Power Generation (MWh)	Ratio of Self Power Consumption of Plant (%)	Power Supply(MWh)
Beijing	20,880,000	7.73	19,265,976
Tianjin	36,993,000	6.63	34,540,364
Hebei	134,348,000	6.57	125,521,336
Shanxi	128,785,000	7.42	119,229,153
Inner Mongolia	92,345,000	7.01	85,871,616
Shandong	189,880,000	7.14	176,322,568
Total			560,751,013

Source: China Electric Yearbook 2006

Table A6. Emission Factor of North China Power Grid in 2005

	Parameter	Unit	Value	Source
A	Net Import from Northeast China Power Grid to North China Power Grid (MWh)	MWh	3,929,000	China Power Industry Statistics 2005
B	Total Emissions of Northeast China Power Grid	tCO ₂ e	207,254,040	Calculation based on data from China Electric Power Yearbook and China Energy Statistical Yearbook
C	Total Power Supply of Northeast China Power Grid	MWh	179,031,569	China Electric Power Yearbook 2006
D	Average Emission Factor of Northeast China Power Grid	tCO ₂ e /MWh	1.15764	D=B/C
E	Total Power Supply of North China Power Grid	MWh	564,680,013	E=Total Power Generation of North China Power Grid + A



F	Total Emissions of North China Power Grid	tCO ₂ e	652,197,698	
G	Emission Factor of North China Power Grid	tCO ₂ e /MWh	1.15499	G=F/E

China Energy Statistical Yearbook 2006

Table A7. Simple OM Emission Factor of North China Power Grid in 2006

Fuel types	Unit	Beijing	Tianjin	Hebei	Shanxi	Inner Mongolia	Shandong	Subtotal	Emission Factor (tC/TJ)	Average low Caloric value (MJ/t, km ³)	CO ₂ emission (tCO ₂ e) K=G*H*T*44/12/100 (unit of mass)
		A	B	C	D	E	F	G=A+B+C+D+E+F	H	I	K=G*H*T*44/12/100 (unit of volume)
Raw coal	10000ton	796.63	1,639.2	6,867.99	6,968.88	8,404.05	10,930.66	35,607.41	25.8	20,908	704,277,823
Cleaned coal	10000 ton						39.77	39.77	25.8	26,344	991,125
Other washed coal	10000 ton	6.36		214.13	371.14	61.77	544.6	1198	25.8	8,363	9,477,855
Coke	10000 ton	7.97					27.77	35.74	26.6	20,908	728,820
Coke oven gas	108m ³						3.23	3.23	29.2	28,435	98,335
Other coal gas	108m ³	0.38	0.63	5.8	22.32	0.64	5.79	35.56	12.1	16,726	2,638,825
Crude oil	10000 ton	20.66	6.58	69.72	13.79	22.76	7.22	140.73	12.1	5,227	3,263,593
Gasoline	10000					0.74		0.74	20	41,816	22,692



	ton										
Diesel	10000 ton			0.01				0.01	18.9	43,070	298
Fuel oil	10000 ton	0.21		3.01		0.07	6.32	9.61	20.2	42,652	303,589
LPG	10000 ton	6.38		0.08			4.1	10.56	21.1	41,816	341,633
Refinery gas	10000 ton						0.01	0.01	17.2	50,179	316
Natural gas	10 ⁸ m3			2.43			2.32	4.75	15.7	46,055	125,934
Other oil product	10000 ton	3.41	0.73		0.53			4.67	15.3	38,931	1,019,942
Other coking product	10000 ton						0.28	0.28	20	38,369	7,878
Other fuel	10000 tce							0	25.8	28,435	0
										Subtotal	723,298,659

Source: China Energy Statistical Yearbook 2007

Table A8. Thermal Power Generation of North China Power Grid in 2006

Province	Power Generation (MWh)	Ratio of Self Power Consumption of Plant (%)	Power Supply(MWh)
Beijing	20,705,000	7.51	19,150,055
Tianjin	35,924,000	6.86	33,459,614
Hebei	143,888,000	6.63	134,348,226
Shanxi	150,250,000	7.45	139,056,375
Inner Mongolia	139,593,000	7.58	129,011,851
Shandong	230,922,000	7.12	214,480,354
Total			669,506,473



Source: China Electric Yearbook 2007

Table A9. Emission Factor of North China Power Grid in 2006

	Parameter	Unit	Value	Source
A	Net Import from Northeast China Power Grid to North China Power Grid	MWh	2,618,060	China Power Industry Statistics 2006
B	Total Emissions of Northeast China Power Grid	tCO ₂ e	229,226,818	Calculation based on data from China Electric Power Yearbook and China Energy Statistical Yearbook
C	Total Power Supply of Northeast China Power Grid	MWh	196,444,400	China Electric Power Yearbook 2007
D	Average Emission Factor of Northeast China Power Grid	tCO ₂ e /MWh	1.16688	D=B/C
E	Net Import from Central China Power Grid to North China Power Grid	MWh	497,060	China Power Industry Statistics 2006
F	Total Emissions of Central China Power Grid	tCO ₂ e	408,776,270	Calculation based on data from China Electric Power Yearbook and China Energy Statistical Yearbook
G	Total Power Supply of Central China Power Grid	MWh	529,958,480	China Electric Power Yearbook 2007
H	Average Emission Factor of Central China Power Grid	tCO ₂ e /MWh	0.87599	H=F/G



I	Total Power Supply of North China Power Grid	MWh	672,621,593	E=Total Power Generation of North China Power Grid + A + E
J	Total Emissions of North China Power Grid	tCO ₂ e	726,789,038	
K	Emission Factor of North China Power Grid	tCO ₂ e /MWh	1.08053	K=J/I

Table A10. Operating Margin Emission Factor of North China Power Grid

		Year 2004	Year 2005	Year 2006	Total
A	Emissions (tCO ₂ e /year)	554,323,387	652,197,697	726,737,018	1,933,258,102
B	Power Supply (MWh)	493,687,660	564,680,013	672,621,593	1,730,989,266
C	CO ₂ Emission Factor (tCO ₂ e/MWh)	C = A/B			1.1169

Calculation of Build Margin (BM):

Step 1. Calculation of weights of CO₂ emissions of solid, liquid and gas fuel in total emissions for power generation

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

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

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

Where:

$FC_{i,j,y}$: Amount of fossil fuel type i consumed in province j in year y (mass or volume unit);

$EF_{CO_2,i,y}$: CO_2 emission factor of fossil fuel type i in year y (tCO_2 / GJ);

COAL, OIL and GAS respectively refers to the group of solid, liquid, and gas fuels.

Based on China Energy Statistical Yearbook 2007, the calculation of the weights of solid, liquid, and gas fuels in North China Power Grid are:

$$\lambda_{Coal} = 98.93\%, \quad \lambda_{Oil} = 0.09\%, \quad \lambda_{Gas} = 0.98\%$$

Step 2: Calculation of Emission Factor of Relevant Thermal Power

$$EF_{Thermal} = \lambda_{Coal} \times EF_{Coal,Adv} + \lambda_{Oil} \times EF_{Oil,Adv} + \lambda_{Gas} \times EF_{Gas,Adv}$$

Where: $EF_{Coal,Adv}$, $EF_{Oil,Adv}$ and $EF_{Gas,Adv}$ respectively refers to the emission factor representing best technology commercially available for fuel of coal, oil or gas fired power plants. For specific workings, see the following:

Table A11. Emission factor representing best technology commercially available for fuel of coal, oil or gas fired power plants

	Variable	Efficiency of Power Supply	Emission Coefficient of Fuel (tc/TJ)	Emission Factor (tCO ₂ e/MWh)



		A	B	D=3.6/A/1000*B*44/12
Coal-fired Power Plant	$EF_{Coal,Adv}$	37.28%	25.8	0.9135
Gas-fired Power Plant	$EF_{Gas,Adv}$	48.81%	15.3	0.4138
Oil-fired Power Plant	$EF_{Oil,Adv}$	48.81%	21.1	0.5706

$$EF_{Thermal} = \lambda_{Coal} \times EF_{Coal,Adv} + \lambda_{Oil} \times EF_{Oil,Adv} + \lambda_{Gas} \times EF_{Gas,Adv} = 0.9083 \text{ (tCO}_2\text{/MWh)}$$

Step 3: Calculation of BM of the Grid

$$EF_{grid,BM,y} = \frac{CAP_{Thermal,y}}{CAP_{Total,y}} \times EF_{Thermal,y}$$

Where: CAP_{Total} is the total of new capacity additions, and $CAP_{Thermal}$ is the new capacity addition of thermal power.

Table A12. Installed Capacity of North China Power Grid in 2006

Installed Capacity	Unit	Beijing	Tianjin	Hebei	Shanxi	Inner Mongolia	Shandong	Total
Thermal Power	MW	3,984	6,512	26,087	26,661	28,899	49,395	141,538
Hydropower	MW	1053	5	785	790	818	553	4004
Nuclear Power	MW	0	0	0	0	0	0	0
Wind Power and Others	MW	24	24	218	0	565	106	937
Total		5,061	6,541	27,090	27,451	30,282	50,054	146,479

Source: China Power Yearbook 2007

**Table A13. Installed Capacity of North China Power Grid in 2005**

Installed Capacity	Unit	Beijing	Tianjin	Hebei	Shanxi	Inner Mongolia	Shandong	Total
Thermal Power	MW	3,833.5	6,149.9	22,333.2	22,246.8	19,173.3	37,332	111,068.7
Hydropower	MW	1025	5	784.5	783	567.9	50.8	3216.2
Nuclear Power	MW	0	0	0	0	0	0	0
Wind Power and Others	MW	24	24	48	0	208	30.6	335.5
Total	MW	4,882.5	6,178.9	23,165.7	23,029.8	19,950.2	37,413.4	114,620.5

Source: China Power Yearbook 2006

Table A14. Installed Capacity of North China Power Grid in 2004

Installed Capacity	Unit	Beijing	Tianjin	Hebei	Shanxi	Inner Mongolia	Shandong	Total
Thermal Power	MW	3,458.5	6,008.5	19,932.7	17,693.3	13,641.5	32,860.4	93,594.9
Hydropower	MW	1,055.9	5	783.8	787.3	567.9	50.8	3,250.7
Nuclear Power	MW	0	0	0	0	0	0	0
Wind Power and Others	MW	0	0	13.5	0	111.7	12.3	137.5
Total	MW	4,514.4	6,013.5	20,730	18,480.6	14,321.2	32,923.5	96,983.2

Source: China Power Yearbook 2005

Table A15. Calculation of BM of North China Power Grid (MW)



	Installation in year 2004	Installation in year 2005	Installation in year 2006	New Additions from 2000 to 2006	Ratio in New Additions
	A	B	C	D=C-B	
Thermal Power (MW)	93,594.9	111,068.7	141,538.0	30,469.3	95.64%
Hydro Power (MW)	3,250.7	3,216.2	4,004.0	787.8	2.47%
Nuclear Power (MW)	0.0	0.0	0.0	0.0	0.00%
Wind Power and Others (MW)	137.5	334.6	937.0	602.4	1.89%
Total (MW)	96,983.1	114,619.5	146,479.0	31,859.5	100.00%
Percentage compared with installation of 2006	66.21%	78.25%	100.00%		

$$EF_{\text{grid,BM,y}} = 0.9083 \times 95.64\% = 0.8687 \text{ tCO}_2/\text{MWh}$$

Table A16. Baseline Emission Factor of North China Power Grid

	Parameter	Unit	Amount
A	Operating Margin Emission Factor	tCO ₂ /MWh	1.1169
B	Build Margin Emission Factor	tCO ₂ /MWh	0.8687
C	Combined Emission Factor (C=0.75*A+0.25*B)	tCO ₂ /MWh	1.05485

Table A17. Electricity Generation Baseline Emissions

	Parameter	Unit	Amount	Source or Equation
A	Project installed capacity	MW	49.5	Feasibility Study
B	Annual electricity supplied	MWh	118,354.5	Feasibility Study
C	Baseline Emissions Factor	tCO ₂ e/MWh	1.05485	Table A16
D	Electricity generation baseline emissions	tCO ₂ e/year	124,846	D= B * C



Annex 4

MONITORING PLAN

Please refer to B 7.2. in the PDD.

PART II- FURTHER CLARIFICATIONS ON REQUIREMENTS AS PER VCS 2007.1

The Project was registered as a CDM project on 26/11/2010 (reference number: 3312). As per *Further Guidance for Projects that are Registered in Two GHG Programs* published on 19/03/2008:

“Projects registered under other VCS Program approved GHG Programs (such as the CDM) are eligible to create Voluntary Carbon Units (VCUs) for the emissions reductions or removals not registered under that GHG Program.

For example, when a project has been validated under the CDM, a further validation shall be completed of clauses 1.12, 1.13, 1.14, 8.1 and 8.2 of the VCS Project Description template²¹. This validation can be completed when the Project Proponent undergoes a VCS Program verification of achieved emissions reductions or removals.”

Therefore only clauses 1.12, 1.13, 1.14, 8.1 and 8.2 of the VCS Project Description template are filled as below.

1.12 Demonstration to confirm that the project was not implemented to create GHG emissions primarily for the purpose of its subsequent removal or destruction.

As described in the registered CDM-PDD (version 02), “the Project is a grid-connected renewable power generation project activity that installs a new power plant at a site where no renewable power plant was operated prior to the implementation of the project activity.” As a wind power project, the Project generates ERs by avoiding CO₂ emissions from the same amount of electricity generation from North China Grid, which is mainly composed of traditional thermal power plants. Therefore, the Project was not implemented to create GHG emissions primarily for the purpose of its subsequent removal or destruction.

1.13 Demonstration that the project has not created another form of environmental credit (for example renewable energy certificates).

The Project was registered as a CDM project on 26/11/2010. As per CDM rules, emission reduction credits generated by the Project prior to 26/11/2010 cannot be claimed as CERs. The Project Owner expects to claim these emission reduction credits as VCUs and will not apply for other environmental credits.

1.14 Project rejected under other GHG programs (if applicable):

Prior to the application for issuance of VCUs, only CDM development was implemented for the Project. The Project was registered as a CDM project on 26/11/2010. And the Project has not been rejected by other GHG programs.

8.1 Proof of Title:

²¹ For further details, refer to: <http://v-c-s.org/docs/VCS%20PD.doc>

Letter of Approval ²² issued by China's DNA for the Project can be the proof of title of the Project Owner. As described in Letter of Approval, Hebei Construction Investment New Energy Co., Ltd. is authorized as China's participant to voluntarily participate in and carry out the Project.

The Project Owner has also obtained all relevant permits for to the Project including Business License, FSR Approval and Power Purchase Agreement. Moreover, the ownership of the Project Owner has been described in the registered CDM-PDD (version 02), which has been validated by Bureau Veritas Certification. The validation report ²³ has already been issued by Bureau Veritas Certification.

8.2 Projects that reduce GHG emissions from activities that participate in an emissions trading program (if applicable):

The Project does not reduce GHG emissions from activities that are included in an emissions trading program or take place in a jurisdiction or sector in which binding limits are established on GHG emissions. So this clause is not applicable.

²² Letter of Approval issued by China's DNA for the Project can be found at:
http://cdm.unfccc.int/filestorage/K/8/W/K8WFBJQV6EXI0YHOLRDP7GUMA4CS1T/Approval.pdf?t=cER8MTMwMzI2NjkwMC42OA==|ozXSBjna9fOj__xEpS_TdVUsIg=

²³ <http://cdm.unfccc.int/filestorage/U/H/6/UH6S8KR49VOAN35GEMCDWXFYLBTP0/Validation%20Report.pdf?t=SWI8MTMwMzI2NjU3MS4zMQ==|bmj11c8sdVW4bKAwUmprne46rL0=>