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

CONTENTS

Annexes

SECTION A. General description of project activity

A.1. Title of the project activity:

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CECIC Zhangbei Gaojialiang Wind farm Project
PDD version 1.1
Completed on 05/04/2009

PDD revision history

PDD version	Time	Note
Version 1.0	08/11/2008	For CDM approval meeting of Chinese DNA and GSP
Version 1.1	05/04/2009	Response to CARs and CLs

A.2. Description of the project activity:

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CECIC Zhangbei Gaojialiang Wind farm Project (hereinafter referred to as the proposed project) is located in Zhangbei County, Hebei Province, and is developed by CECIC Wind Power (Zhangbei) Yunwei Co. Ltd. As per the FSR, the estimated net supplied power is calculated from the turbine availability, grid availability and the wind speed. The calculations for the proposed project are carried out using professional WASP software (www.wasp.dk) designed for wind energy. The output is maximised through selection of the most suitable turbines, optimal turbine distribution in the wind farm, and considering the specific turbine characteristics, and the grid connection. So the proposed project is to install and operate 66 wind turbines of 750kW and net supplied power of 94,050 MWh per year will be exported to the North China Power Grid (NCPG) on the basis of a Power Purchase Agreement (PPA).

As the baseline scenario, which is the same as the scenario existing prior to the implementation of the project activity, comparable capacity or electricity generation addition provided by the NCPG, is dominated by the thermal power generation, the operation of the proposed project will lead to emission reductions of CO_2, which is estimated to be approximately 99,204 tonnes of CO_2e per year. The proposed project will therefore help local government to promote the economy development and improve the air quality.

The proposed project promotes local sustainable development through the following aspects:

- reducing CO_2, SO_2 and NOx emissions;
- creating local employment opportunity during the assembly and installation of wind turbines, and for operation of the proposed project;
- reducing other particulate pollutants resulting from the fossil fuel fired power plants compared with a business-as-usual scenario.

A.3. Project participants:

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Name of Party involved	Private and/or public entity(ies) project participants (as applicable)	Party involved wishes to be considered as project participant (Yes/No)
P.R. China (host)	CECIC Wind Power (Zhangbei)	No

	Yunwei Co., Ltd	
United Kingdom of Great Britain and Northern Ireland	Carbon Resource Management Ltd.	No

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

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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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Zhangjiakou City/ Zhangbei Town

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 project is located in the northwest of Zhangbei County, which is in Hebei Province in the People’s Republic of China. It is located longitude 114^{o}27’3.89” to 114^{o}31’23.38” East and latitude 41^{o}9’22.52” to 41^{o}13’35.76” North. The altitude of the site ranges from 1477m to 1521m above mean sea level. Figure 1 shows the location of the project.

Figure 1 Map showing the location of the Project

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

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Category: Renewable electricity in grid connected applications
Sector scope (1): Energy industries

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

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Baseline scenario is the additional provision of comparable capacity or electricity generation by the NCPG. While for project scenario, 66 wind turbines with the capacity of 750kW each is planed to be installed on the project site, so the total installed capacity is 49.5 MW. The technology, also used in previous wind farms by the developer, is considered good practice in China. According to the analysis in the feasibility study report, the load factor of the project would be about 21.7% and the expected net annual generation of electricity exported to NCPG will be 94,050MWh. The expected lifetime of the selected wind turbine would be 20 years. The main parameters of the wind turbine are shown in table 1.

Table 1. Key Technology to be employed at the Project Wind Farm

Key Technology Parameter	
Manufacturer	Zhejiang Windey Wind Generating Engineering Co. Ltd.
Model	WD49/750kW
Rotor diameter (m)	50
Cut-in wind speed (m/s)	3.5
Rated wind speed (m/s)	14

Cut-out wind speed (m/s)	25
Hub height of the wind turbines (m)	65
Capacity (kW)	750
Total Capacity(MW)	49.5
Number of turbines	66
Rated Voltage	690

The wind farm will be connected with one 110kV substation, and then connected with 220kV Zhangbei substation via 110kV transmission line. Each wind turbine will have a transformer from 690V to 35kV, and connects with the 110kV substation. The net electricity supplied by the proposed project activity to the grid will be monitored through the main meter installed in Zhangbei 220kV substation, recording exports to the grid (supply) and imports from the grid (consumption). There will be also electric meters in the substation of the wind farm as backups.

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

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The project participants chose renewable crediting period. The ex-ante estimated average annual emission reductions over the first seven-year crediting period of the project are as follows:

Table 2. Estimated amount of emission reductions over the chosen crediting period

Period*	Annual estimation of emission reductions in tonnes of CO_2e
2009	99,204
2010	99,204
2011	99,204
2012	99,204
2013	99,204
2014	99,204
2015	99,204
Total estimated reductions (tonnes CO_2e)	694,428
Total number of crediting years	7 years
Annual average over the crediting period of estimated reductions (tonnes of CO_2e)	99,204

*Note: * using 12-monthly periods from the start of the crediting period*

The baseline emissions factor has been fixed in the first 7-year crediting period. The amount of CERs actually generated by the project will vary based on the metered power supply of the project.

A.4.5. Public funding of the project activity:

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There is no pubic funding from Annex 1 Parties for 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 methodology applied in the proposed project is the approved baseline and monitoring methodology ACM0002 (version 09) –"Consolidated methodology for grid-connected electricity generation from renewable sources".

Approved methodology ACM0002 prescribes the use of the latest version of the "Tool for the demonstration and assessment of additionality (version 05.2)" and the "Tool to calculate the emission factor for an electricity system" (version 01.1).

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

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The approved methodology ACM0002 is applicable to the proposed project activity, because:

- The proposed project involves electricity capacity addition from wind sources; and
- The project is connected to the grid; and
- The proposed project does not involve switching from fossil fuels to renewable energy at the site of the project activity; and
- The geographic and system boundaries for the North China Power Grid (NCPG) can be clearly identified and information on the characteristics of the grid is available.

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

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Emission sources:

For the baseline determination only CO_2 emissions from electricity generation by fossil fuel fired power plant that is displaced due to the project activity are taken into account.

According to the approved methodology, the emission sources and GHGs in the project boundary are listed in Table 3.

Table 3. Emission sources and GHG included in the project boundary

	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 source
		CH_4	No	Minor emission source.
		N_2O	No	Minor emission source.
Project Activity	None	CO_2	No	According to the methodology, wind power project is renewable energy project and the project has no backup power, so the project emission is zero.
		CH_4		
		N_2O		

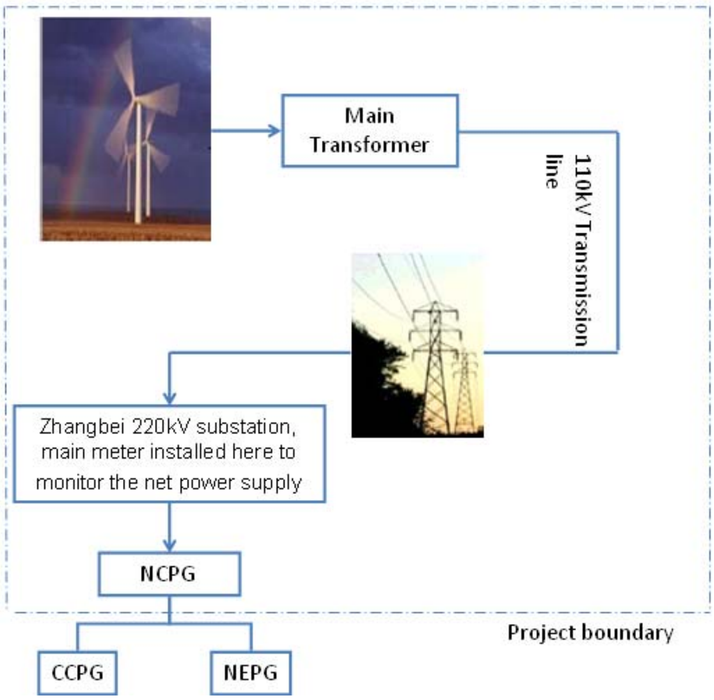
Spatial boundary:

The spatial extent of the proposed project boundary includes the proposed project (including wind fans, main transformer, transmission line and substation) and all power plants connected physically to the NCPG.

According to the delineation of grid boundaries as provided by the DNA of China, the NCPG, including Beijing, Tianjin, Hebei, Shanxi, Inner Mongolia and Shandong[1], is the project electricity system, which is defined by the spatial extent of the power plants that can be dispatched without significant transmission constrains. The electricity transmission between different provinces in the NCPG is very large so it is unreasonable for the proposed project to regard the Provincial Power Grid as the project boundary.

The connected electricity systems are the Northeast Power Grid (NEPG), consisting of Jilin, Liaoning and Heilongjiang provincial grids, and the Central China Power Grid (CCPG), consisting of Jiangxi, Henan, Hubei, Hunan, Chongqing and Sichuan provincial grids.

The project boundary is shown in the figure below:



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

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Because the project activity is the installation of a new grid-connected renewable power plant/unit, and is not a modification/retrofit of an existing plant/unit, the baseline scenario, according to the methodology, is the following:

[1] Chinese DNA designates it at http://cdm.ccchina.gov.cn/web/NewsInfo.asp?NewsId=3239 .

"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".

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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CDM consideration

Following successful registration of a previous windfarm developed by the company[2], this phase of the wind farm was assumed to become a CDM project activity from the inception.

Time schedule of the implementation of the project

Time	Milestone
2008.6	The feasibility study report has been compiled.
2008.7.3	Developer held a board meeting and decided to develop the proposed project as CDM project.
2008.9.28	Emission Reduction Purchase Agreement signed with CRM
2008.10.29	The feasibility study report was approved by Hebei Development Reformation Committee.
2008.11.8	The first version of PDD completed
2008.11.21	Submit to DNA to apply the host LoA
2008.11.27	Start of the Global Stakeholder Consultation period
2008.11.30	Launch of construction
2009.1	Equipment contract signed between the developer and the provider

According to the analysis in the FSR, this proposed project is not financially attractive because the IRR of this project was lower than the benchmark, so the CDM income was suggested in the FSR to improve the IRR above benchmark. The developer decided to develop the proposed project as a CDM project on 3rd July 2008 and confirmed Carbon Resource Management Ltd as the CER buyer on 28th September 2008. After the FSR was approved on 29th Oct 2008, the launch of construction took place on 30th November 2008. According to the glossary of CDM terms, the start date of project activity should be the earliest date at which either the implementation or construction or real action of a project activity begins. As the construction start date, the date 30 November 2008, is the earliest one among those dates, the date is considered as the start date of this proposed project. The incentive from the CDM, therefore, had been fully taken into account prior to the starting date of the project activity, aiming to obtain the additional funding to secure the project financially.

The methodology requires the use of the latest version of the "Tool for the demonstration and assessment of additionality" to demonstrate and assess the additionality of the proposed project. The Tool consists of 4 steps as described below.

Additionality

[2] Project1855 was registered on 27 Oct 2008 respectively.

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

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

Sub-step1a. Define alternatives to the project activity:

The demonstration about the alternative that provides outputs or services comparable with the proposed CDM project activity is as follows:

a) The proposed project activity undertaken without being registered as a CDM project activity.

- Alternative a) is in compliance with all applicable legal and regulatory requirements. But according to the detailed analysis in step 2, this scenario is less attractive with low IRR and is not realistic without CDM financing.

b) A fossil fuel-fired power plant with the comparable capacity or electricity generation.

- Taking into account the required capacity for the same annual generation, according to the current laws and regulations, it is not a realistic alternative (please refer to the analysis in sub-step 1b).

c) Other renewable energy with comparable capacity or electricity generation.

- Generation from hydro power is about 15% of the total electricity generation in China; renewable energy generation from resources other than hydro power are not common practice in China, and only hydro power projects are likely to achieve investment returns comparable to wind power projects.[3] However, due to the regional climate and the lack of water resources in project area, there is no commercially exploitable hydro resource which can provide similar electricity generation to the proposed project activity.[4] Therefore, this alternative is not realistic.

d) Continuation of the current situation: 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.

- Scenario d) is a realistic and feasible alternative which can provide outputs or services comparable with the proposed project and comply with applicable laws and regulations. Added capacity is dominated by thermal (coal-fired) power plants as determined in B.6.
- To meet the increasing electricity demand, the power grid company can increase the generation from operating units as well as from new built (thermal) power plants connected to the grid. Indeed, this is the current route followed by the industry to meet demand, as reflected in the baseline calculations data presented: more than 99% of recently added capacity is thermal power.

Therefore, continuation of the current situation, with the electricity generated by the operation of grid-connected power plants and by the addition of new generation sources on NCPG can be taken as a realistic alternative for the project activity and comply with the applicable laws and regulations.

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

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[3] The new renewable energy is being blocked by high cost, see http://www.chinaenergy.gov.cn/news.php?id=15688 and http://scitech.people.com.cn/GB/5347113.html.

[4] There is no hydro energy resource available in the project site: http://www.shuidianzhan.net/snzy/267.html.

According to Chinese regulations, coal-fired power plants of less than 135MW are prohibited from being built in areas covered by the large grids such as provincial grids[5]. Therefore, a fossil fuel fired power plant with the same capacity as the proposed project activity, or with a capacity with comparable electricity generation[6], as described in alternative b in sub-step 1a, conflicts with Chinese regulations and practice. Alternative b, therefore, is not a realistic alternative.

The other alternatives described in sub-step 1a are all in compliance with applicable legal and regulatory requirements. However, only comparable capacity or electricity generation addition provided by North China Power Grid (alternative d) is a realistic alternative consistent with current laws and regulations. Indeed, it is very common in the power grid to increase the generation output of some operating units to satisfy the load demand.

Step 2 of the Additionality Tool will show that alternative (a) is not financially or economically attractive, and is not the baseline. Therefore, alternative (d) *comparable capacity or electricity generation addition provided by North China Power Grid* can be taken as a realistic alternative for the project activity and comply with the applicable laws and regulations.

Step 2. Investment analysis

The purpose of this step is to determine whether the proposed project activity is not (1) the most economically or financially attractive; or (2) economically or financially feasible, without the revenue from the sale of certified emission reductions (CERs). To conduct the investment analysis, use the following sub-steps:

Sub-step 2a. Determine appropriate analysis method

This step determines whether to apply the simple cost analysis, investment comparison analysis or benchmark analysis (sub-step 2b):

Following the EB guidance on the assessment of investment analysis[7], if the alternative to the project activity is the supply of electricity from the grid, this is not considered an investment and a benchmark approach is considered appropriate. As the baseline alternative involves the continuation of current practices, supply of electricity from the grid, a benchmark analysis is used to identify whether the project is economically attractive (Option III). The use of a benchmark analysis is also in line with Chinese practice and is followed in the FSR. Therefore, the benchmark analysis (Option III) is adopted.

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

According to the *Interim Rules on Economic Assessment of Electrical Engineering Retrofit Projects* issued by former State Power Corporation of China in 2002, the benchmark of total investment financial

[5] Notice on Strictly Prohibiting the Installation of Fuel fired Generators with the Capacity of 135MW or below issued by the General Office of the State Council, Decree No. 2002-6.

[6] According to the *China Electric Power Yearbook, Page 626 (2007 Edition), China Electric Power Press*, the average annual utilisation rate of thermal power units in China in 2006 was 5612 hours. A 16.8MW unit with average utilization rate could generate the same electricity as the proposed wind farm.

[7] Paragraph 15, ‘Guidance on the Assessment of Investment Analysis’ (version 02), EB 41 Annex 45.

internal rate of return (IRR) of electric power industry is 8%, and only if the total investment IRR of the project is higher than or equivalent to this benchmark, the proposed project is financially feasible. This benchmark is widely used in the assessment and approval of Chinese electricity sector projects, both new and retrofit projects. The approved FSR of the proposed project also adopted these Interim Rules and used 8% as the benchmark. The benchmark of 8% IRR, therefore, is used in this analysis for the proposed project activity.

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

The investment estimation in the Feasibility Study Report is based on national regulation, material and equipment price levels and was carried out by an independent accredited design institute. The relevant data from the FSR is listed in table 4, with more detail in the calculation spreadsheet:

Table 4. Relevant indicators for financial assessment

Item	Value	Data Source
Net supplied power to the grid	94,050MWh	FSR
Static investment	437.86 million Yuan RMB	FSR
On-grid tariff (Including VAT)	0.54 Yuan RMB/kWh	FSR
Expected operational lifetime	20 years	FSR
Value added tax rate	8.5%	FSR
Income tax rate	25％	FSR

Table 5 shows the IRR of the project without and with CER revenue. It can be seen that IRR without CER revenue is below the benchmark 8% and with revenue from CDM at the assumed price level, the proposed project would be more financially attractive.

Table 5. Total investment analysis of the proposed project

IRR	
without CDM	**with CDM revenue**
5.47％	**8.13％**

The revenue from the sale of CERs is expected to have a significant impact on the IRR. Although some uncertainties still exist, investors would gain reasonable financial return to reduce the risk. And the internal return rates, 8.13% for total investments, would appear more financially attractive for prospective investors.

Sub-step 2d. Sensitivity analysis

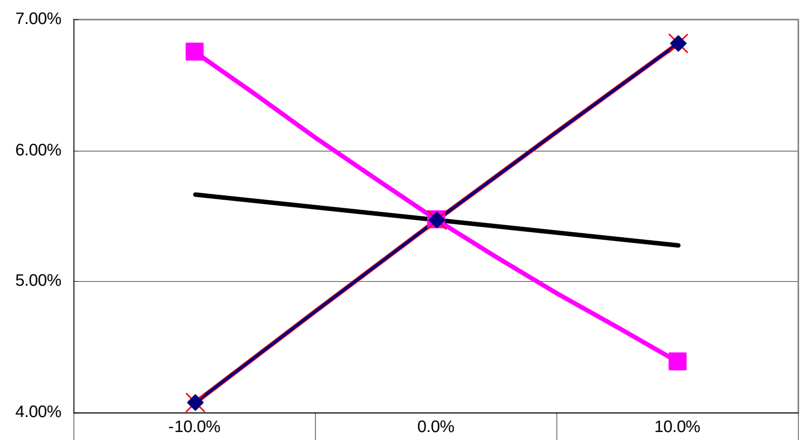
A sensitivity analysis is used to show whether the conclusion regarding the financial attractiveness is robust to reasonable variations in the critical assumptions. The investment analysis provides a valid argument in favour of additionality as this sensitivity analysis consistently supports (for a realistic range of assumptions) the conclusion that the project activity is unlikely to be economically or financially attractive.

According to EB Guidance, only variables that constitute more than 20% of either total project costs or total project revenues should be subjected to reasonable variation. The most important parameters

impacting the project IRR are:

(1) Static total investments
(2) Annual O&M cost
(3) Tariff
(4) Annual supplied electricity.

In line with EB guidance, the range of variations in the sensitivity analysis is between -10% and +10%, which is also in line with normal practice in China. Greater variations are unlikely, as discussed below, and it is not considered that the benchmark can be reached without CDM registration. The outcomes of IRR sensitivities are presented in the following figure.



	-10.0%	0.0%	10.0%
Static investment	6.75%	5.47%	4.39%
Annual O&M cost	5.66%	5.47%	5.28%
On-grid tariff	4.08%	5.47%	6.82%
Annual power supply	4.08%	5.47%	6.82%

Figure 2 IRR sensitivity analysis for the proposed project

Figure2 shows that, when these financial indicators above fluctuated within the range of -10% to +10%, the IRR of the project will not reach the benchmark 8%. The impact of variations in the tariff, supplied power and static total investment on IRR are most significant. The impact of annual operational cost on IRR is not significant.

Investment

For a wind farm project, the cost of turbines, engineering construction and related accessories comprise the main budget of the static investment. As prices of turbines and other related equipment have been increasing in recent years, a decrease of the static investment is unlikely and there's a much greater likelihood of the static investment to go up.[8] The investment costs per kW for wind farms in China is above 8,000 Yuan/kW[9], therefore it was not realistic for the developer to assume that investment costs

[8] http://energy.people.com.cn/GB/5720709.html. In the last 2 years, the demands for the turbines and its accessories exceeded the supply. Moreover the price of the raw material such as steel and cooper is increasing, which results in the price of wind turbines and equipments increasing, as demonstrated in *The Development of Wind Power*, published by People's Daily.
[9] http://www.istis.sh.cn/list/list.aspx?id=2888.

could decrease by more than the 10% analyzed above.[10].

Tariff

The expected on-grid tariff used for the financial analysis in this PDD and in the approved FSR refers to the formal approved tariff of the nearby wind farm, the most recent available at the time of writing the FSR. As now the Chinese government is trying to lower the on-grid tariff of the wind farm project[11], so it was almost certain at the time of making the decision to go ahead with the project that the finally agreed tariff will be the same or lower than the recently approved 0.54 RMB/kWh. Therefore, it is very unlikely to increase the tariff nearly 20% higher in order to reach the benchmark 8%. Within a reasonable range for the tariff, the proposed project will not reach the benchmark.

Generation

The expected power generation of the proposed project is calculated by an independent qualified design institute with the highest grade (Grade A) in the electricity report in the FSR on the basis of historical wind resource assessment records, experience of the developer in this area with the same turbines, and the manufacturer's reference data of the turbines, using a scientific approach applied internationally. The volume of annual generation therefore represents the long-term average power supply during the lifetime of the wind farm, taking into account yearly variations in power generation.

As per the FSR, the estimated net supplied power is calculated from the turbine availability, grid availability and the wind speed. The calculations for the proposed project are carried out using professional WASP software (www.wasp.dk) designed for wind energy. The output is maximised through selection of the most suitable turbines, optimal turbine distribution in the wind farm, and considering the specific turbine characteristics, and the grid connection. The output calculations account for issues such as air density corrections, turbine efficiency, planned maintenance, contaminated rotors, and auxiliary power use, etc. The method of anticipating power generation is also approved by the government and is widely used in China for wind energy.

Therefore, it is not credible to assume that generation from the proposed project would increase by nearly 20% or more over the lifetime of the project in order the reach the benchmark 8%.

Conclusion

The financial analysis shows that the project is not the most financially attractive alternative, and the sensitivity analysis shows that it is unlikely to be financially attractive compared to the benchmark under any reasonable variations in the assumptions. However, the revenue from the CERs will greatly improve the financial feasibility of the proposed project, and it will also improve the ability to hedge risks. In conclusion, the proposed project is not financially feasible without the revenue of CERs and thus is additional.

Step 4. Common practice analysis

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

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[10] The specific investment costs with static investment 10% below the value in the FSR is 7,961 RMB/kW.

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

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. 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. Taking note of that the proposed project is a large scale project, small scale projects of less than 15MW are excluded.

Using the statistics of installed capacity of wind power in China, by Professor Shi Pengfei[12], wind farm projects in the same region (Hebei) and of similar scale (large scale) are listed below.

Table 6 Similar wind farm projects located in Hebei Province

Name	**Commissioning Date**	**Capacity (MW)**	**Notes**
Shangyi Damanjing	Jul 2005	34.5	Facing financial barriers, receiving carbon funding
Chengde Hongsong	Dec 2005	50.1	Facing financial barriers, receiving carbon funding
Zhangbei Manjing	Apr 2006	45	Registered CDM project (0233)
Shangyi Manjing East	Sep 2006	49.5	Registered CDM project (0842)
Zhangbei Mijiagou	Jan 2007	49.5	Registered CDM project (0845)
Kangbao Wolongtushan	Jan 2007	30	Registered CDM project (0878)
Chengde Songshan	Feb 2007	49.5	Registered CDM project (0877)

Source: http://www.cwea.org.cn/download/display_info.asp?cid=2&sid=16&id=19; http://cdm.unfccc.int/Projects/registered.html.

Among the listed project above, most of the projects are CDM projects, but according to the guidance from EB, the common practice analysis should exclude all CDM projects. Therefore, only two projects, Shangyi Damanjing and Chengde Hongsong, should be included in this common practice analysis as the similar projects.

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

Both Shangyi Damanjing and Chengde Hongsong wind farms faced financial barriers and have successfully applied for carbon funding to overcome these financial barriers. [13] It can be concluded therefore, that similar wind farms in Hebei province face financial barriers and are not feasible in Hebei province without carbon income. Therefore, the wind power projects similar with the proposed project without carbon income are not the common practice in Hebei Province.

[12] http://www.cwea.org.cn/download/display_info.asp?cid=&sid=&id=19 : Cumulative wind installation in China till 2006,

[13] Tariff letter by Hebei Price Bureau and VCU Verification and Certification Report issued by DOE.

→ If Sub-steps 4a and 4b are satisfied, i.e. similar activities cannot be observed or similar activities are observed, but essential distinctions between the project activity and similar activities can reasonably be explained, then the proposed project activity is additional.

In conclusion, all the steps above are satisfied, the proposed CDM project is not the baseline scenario, and the project activity is additional.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

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1. Baseline Emission Calculation

According to the methodology**,** the baseline emissions include only CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity, calculated as follows:

$$BE_y = (EG_y - EG_{baseline})EF_{grid,CM,y} \qquad (1)$$

Where:
BE_y = Baseline emissions in year y (tCO_2/yr).
EG_y = Electricity supplied by the project activity to the grid (MWh).
$EG_{baseline}$ = Baseline electricity supplied to the grid in the case of modified or retrofit facilities (MWh). For new power plants this value is taken as zero. The proposed project is a new power plant, so this value is 0.
$EF_{grid,CM,y}$ = Combined margin CO_2 emission factor for grid connected power generation in year y calculated using the latest version of the "Tool to calculate the emission factor for an electricity system".

The baseline emission factor (EF_y) is calculated as a combined margin ($EF_{grid,CM,y}$), consisting of the combination of operating margin ($EF_{grid,OM,y}$) and build margin ($EF_{grid,BMy,}$) factors according to the following six steps defined in the "Tool to calculate the emission factor for an electricity system". 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 electric power system

The power generated from the proposed project activity will be supplied to the grid. As the DNA has published a delineation of the project electricity system and connected electricity systems, these delineations are used.

Following the DNA delineation, the project electricity system is the North China Power Grid (NCPG), consisting of six provincial grids: Beijing, Tianjin, Hebei, Shanxi, Inner Mongolia and Shandong.

The connected electricity system is the Northeast Power Grid (NEPG), consisting of three provincial grids: Jilin, Liaoning and Heilongjiang, and Central China Power Grid (CCPG), consisting of Jiangxi, Henan, Hubei, Hunan, Chongqing and Sichuan. There is electricity transferring from the connected electricity systems to the project electricity system, so the CO_2 emission factor for net electricity imports ($EF_{grid,import,y}$) from the connected electricity system should be determined using one of the following options for the purpose of determining the operating margin emission factor:

(a) 0 tCO_2/MWh, or
(b) The weighted average operating margin (OM) emission rate of the exporting grid; or
(c) The simple operating margin emission rate of the exporting grid; or
(d) The simple adjusted operating margin emission rate of the exporting grid.

The option (c) is selected to calculated the CO_2 emission factor(s) for net electricity imports ($EF_{grid,import,y}$) according to the delineation.

The electricity imports from the Northeast Power Grid to the North China Power Grid has not changed significantly from 2003 to 2006 (see Annex 3), and the electricity from Central China Power Grid to North China Power Grid just started from 2006 and the imported electricity is negligible compared to the power generated from NCPG (see Annex 3). So for the purpose of determining the build margin emission factor, the spatial extent is limited to the project electricity system according to the tool.

Step 2. Select an operating margin (OM) method

According to the tool, four various methods are provided for calculating the operating margin emission factor ($EF_{grid,OM,y}$), including:

a) Simple OM;
b) Simple Adjusted OM;
c) Dispatch data analysis OM;
d) Average OM

According to the tool, the Simple OM method (a) is applicable to the project if the low-cost resources constitute less than 50% of total grid generation in: 1) average of the five most recent years, or 2) based on long-term averages for hydroelectricity production

Since generation from all sources (including hydro power) other than thermal plants were less than 1% of total generation in the North China Power Grid in each of the last 5 years (see Annex 3), the Simple OM method is applicable to the proposed project.

The Simple OM emissions factor can be calculated using either ex-ante or ex-post data vintages. The project proponents have chosen to use the ex-ante option, and $EF_{grid,OM,y}$ is fixed for the duration of the first crediting period.

- Ex ante option: 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.

Step 3. Calculate the operating margin emission factor according to the selected method

The Simple Operating Margin emission factor $EF_{grid,OM,y}$ is defined as the generation-weighted average emissions per unit net electricity generation (tCO_2/MWh) of all generating sources serving the system, not including low-operating cost and must-run power plants. Three options can be selected to calculate the simple OM:

- Based on data on fuel consumption and net electricity generation of each power plant / unit (Option

A); or

- Based on data on net electricity generation, the average efficiency of each power unit and the fuel type(s) used in each power unit (Option B); or
- Based on data 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 (option C).

As data for options A and B are not available, and because only nuclear and renewable power generation are considered as low-cost / must-run power sources and the quantity of electricity supplied to the grid by these sources is known, the published DNA data uses option C for the calculation of the operating margin emission factor.

For Option C, 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:

$$EF_{grid,OMsimple,y} = \frac{\sum_i FC_{i,y} \times NCV_{i,y} \times EF_{co_2,i,y}}{EG_y} \qquad (2)$$

Where

$EF_{grid,OMsimple,y}$ is the simple operating margin CO_2 emission factor in year y (tCO_2/MWh)

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

$NCV_{i,y}$ is the net calorific value (energy content) of fossil fuel type i in year y (GJ/mass or volume unit)

$EF_{CO2,i,y}$ is the CO_2 emission factor of fossil fuel type i in year y (tCO_2/GJ)

EG_y is the 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 is all fossil fuel types combusted in power sources in the project electricity system in year y

y, when using the ex-ante option, is the three most recent years for which data is available at the time of submission of the CDM-PDD to the DOE for validation

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[14]:

$EF_{grid,OMsimlpe,y}$ = 1.1169 tCO_2/MWh

Step 4. Identify the cohort 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 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.[15] This option is chosen as it comprises larger annual generation than the five units built most recently. Following the deviation[16], the latest statistical data available (from the China Power Yearbook) is used by the DNA to determine the most recent year from which the added

[14] http://cdm.ccchina.gov.cn/web/NewsInfo.asp?NewsId=3239

[15] If 20% falls on part capacity of a unit, that unit is fully included in the calculation.

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

generation capacity is equal to or just exceeds 20% of the latest statistic year 2006. The added generation capacity is the sample group of power units *m* used to calculate the build margin.

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. For the second crediting period, the build margin emission factor should be updated based on the most recent information available on units already built at the time of submission of the request for renewal of the crediting period to the DOE. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used. This option does not require monitoring the emission factor during the crediting period.

Step 5. Calculate the build margin emission factor

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

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

$EF_{grid,BM,y}$ is the Build margin CO2 emission factor in year *y* (t CO_2/MWh);
$EG_{m,y}$ is the net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh);
$EF_{EL,m,y}$ is the CO2 emission factor of power unit *m* in year y (tCO_2/MWh);
m is the power units included in the build margin;
y is the most recent historical year for which power generation data is available.

The CO_2 emission factor of each power unit *m* ($EF_{EL,m,y}$) should be determined as per the guidance in step 3 (a) for the simple OM. However, due to the limited availability of publicly available data, the DNA uses the accepted deviation mentioned in Step 4 to calculate $EF_{BM,y}$, as follows:

- Use of capacity additions for estimating the build margin emission factor for grid electricity.
- Use of weights estimated using installed capacity in place of annual electricity generation.
- Using the latest statistical data available from China Energy Statistical Yearbook 2007 to calculate the different CO_2 emission percentage (λ_i) of solid, liquid and gas fuel in the total emission from thermal generation in the North China Power Grid in 2006.
- Based the emission percentage (λ_i) of different kind fossil fuels and the corresponding emission factor (EF_i) according to the best technology commercially available in the China, the weighted emission factor of thermal power ($EF_{thermal}$) is calculated.

- Using the latest statistical data available (from the China Electric Power Yearbook) determine the year from which the added generation capacity is equal to or just exceeds 20% of the capacity of the latest statistic year 2006. Regarding the added generation capacity above 20%, calculate the Build Margin through multiply the weighted emission factor of thermal power ($EF_{thermal}$) by the capacity percentage of the thermal power among the about 20% new capacity of 2006.

It is calculated that the $EF_{grid,BM,y}$ of North China Power Grid is 0.8687 tCO_2/MWh[17] (see Annex 3 for more details).

Step 6. Calculation of the combined margin emission factor

The combined margin emission factor is calculated as follows:

$$EF_{grid,CM,y} = w_{OM} \bullet EF_{grid,OM,y} + w_{BM} \bullet EF_{grid,BM,y} \qquad (4)$$

Where
$EF_{grid,BM,y}$ is the build margin CO_2 emission factor in year y (tCO_2/MWh)
$EF_{grid,OM,y}$ is the operating margin CO_2 emission factor in year y (tCO_2/MWh)
w_{OM} is the weighting of operating margin emissions factor (%)
w_{BM} is the weighting of build margin emissions factor (%).

The default weights are used, i.e. for the wind farm projects in the first crediting period and the subsequent crediting period, $w_{OM} = 0.75$ and $w_{BM} = 0.25$.

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

$EF_{grid,CM,y} = 1.0548$ tCO_2/MWh

Using Operating Margin and Build Margin emission factors that are fixed for the duration of the first crediting period, the baseline emissions factor is also fixed for the first crediting period. These parameters will be recalculated at any renewal of the crediting period using the same steps 1-6 in the tool and the latest data available at that time.

Table 7 Values obtained when calculating the baseline emission factor using ACM0002

Variable	Value
Operating Margin Emissions Factor ($EF_{grid,OM,y}$)in tCO_2/MWh)	1.1169
Build Margin Emissions Factor ($EF_{grid, BM,y}$ in tCO_2/MWh)	0.8687
Baseline Emissions Factor ($EF_{grid,CM,y}$ in tCO_2/MWh)	1.0548

Baseline emissions (BE_y) now can be calculated as the combined margin CO_2 emission factor ($EF_{grid,CM,y}$)multiplied by the annual net generation of the Proposed Project (EG_y).

2. Project emission

[17] http://cdm.ccchina.gov.cn/web/NewsInfo.asp?NewsId=3239

According to the methodology, the proposed project is a windfarm, belongs to renewable energy activity, and no backup power, so PE_y of the proposed project is zero.

3. Leakage

According to the methodology, no leakage is considered for the proposed project.

4. Calculate Emission Reduction

The emission reduction ER_y by the project activity during a given year y is the difference between baseline emission (BE_y), project emissions (PE_y) and emission due to leakage (LE_y), as follows:

$$ER_y = BE_y - PE_y - LE_y \qquad (5)$$

Where the baseline emissions (BE_y in tCO_2) are the product of the baseline emissions factor (EF_y in tCO_2/MWh) times the electricity supplied by the project activity to the grid (EG_y in MWh). The calculation formula is as follows:

$$BE_y = EG_y \times EF_{grid,CM,y} = (EG_{togrid,y} - EG_{consumption,y}) \times EF_{grid,CM,y} \qquad (6)$$

With:
$EG_{to\ grid,y}$ is the quantity of annual electricity delivered to the grid by the proposed project(MWh);
$EG_{consumption,y}$ is the quantity of annual electricity purchased from the grid by the proposed project(MWh).

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

Data / Parameter:	$FC_{i,y}$
Data unit:	Mass or volume
Description:	the amount of the fossil fuel *i* consumed in the project electricity system in year *y*
Source of data used:	China Energy Statistical Yearbook
Value applied:	See Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	The available data were published by the Chinese DNA, and officially accepted by the Chinese DNA in their emission factor calculations.
Any comment:	

Data / Parameter:	$EG_{grid,y}$ and $EG_{m,y}$
Data unit:	MWh
Description:	Electricity supplied to power grid by included sources in year y
Source of data used:	China Electric Power Yearbook
Value applied:	See Annex 3
Justification of the	The available data were published by the Chinese DNA, and officially accepted

choice of data or description of measurement methods and procedures actually applied :	by the Chinese DNA in their emission factor calculations.
Any comment:	

Data / Parameter:	$NCV_{i,y}$
Data unit:	GJ/mass or volume unit
Description:	Net caloric value of fossil fuel type i consumed in the project electricity system in year y
Source of data used:	China Energy Statistic Yearbook
Value applied:	See Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	The available data were published by the Chinese DNA, and officially accepted by the Chinese DNA in their emission factor calculations.
Any comment:	

Data / Parameter:	$EF_{CO2,i,y}$ *and* $EF_{CO2,m,y}$
Data unit:	tCO_2/GJ
Description:	CO_2 emission factor of fossil fuel type i in year y
Source of data used:	Taken from DNA of China, see http://cdm.ccchina.gov.cn/web/NewsInfo.asp?NewsId=2876 . Original data used are the IPCC default values from the 2006 IPCC Guidelines for National Greenhouse gas Inventories, Volume 2, Energy.
Value applied:	See Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Based on official national statistics
Any comment:	

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:	http://cdm.ccchina.gov.cn/web/NewsInfo.asp?NewsId=2876
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	The available data were published by the Chinese DNA, and officially accepted by the Chinese DNA in their emission factor calculations.

measurement methods and procedures actually applied :	
Any comment:	

Data / Parameter:	Installed Capacity
Data unit:	MW
Description:	Installed capacity of the NCPG in year *y*
Source of data used:	China Electric Power Yearbook(2005,2006,2007)
Value applied:	See Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	The available data were published by the Chinese DNA, and officially accepted by the Chinese DNA in their emission factor calculations.
Any comment:	

Data / Parameter:	Import Electricity
Data unit:	MWh
Description:	Net import electricity from NEPG to the NCPG
Source of data used:	China Electric Power Yearbook
Value applied:	See Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	The available data were published by the Chinese DNA, and officially accepted by the Chinese DNA in their emission factor calculations.
Any comment:	

Data / Parameter:	Import Electricity
Data unit:	MWh
Description:	Net import electricity from CCPG to the NCPG
Source of data used:	China Electric Power Yearbook
Value applied:	See Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	The available data were published by the Chinese DNA, and officially accepted by the Chinese DNA in their emission factor calculations.
Any comment:	

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

>>

Based on the Feasible Study Report, the proposed project will generate 94,050MWh electricity to the NCPG annually. The emission reduction ER_y by the project activity during a giving year y is calculated as follows:

$$BE_y = EG_y \times EF_{grid,CM,y} = 94{,}050\text{MWh} \times 1.0548\ tCO_2/\text{MWh} = 99{,}204\ tCO_2$$

$$ER_y = BE_y - PE_y - LE_y = 99{,}204 - 0 - 0 = 99{,}204\ tCO_2$$

The emission reduction ER_y by the project activity during a giving year y is 99,204 tCO_2 and the total emission reduction in the first crediting period is 694,428 tCO_2.

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

>>

Table 8. Emission reduction of the proposed project in the first crediting period

Period*	Estimation of the project activity emissions (tCO2e)	Estimation of the baseline emissions (tCO2e)	Estimation of leakage (tCO2e)	Estimation of overall emission reductions (tCO2e)
2009	0	99,204	0	99,204
2010	0	99,204	0	99,204
2011	0	99,204	0	99,204
2012	0	99,204	0	99,204
2013	0	99,204	0	99,204
2014	0	99,204	0	99,204
2015	0	99,204	0	99,204
Total (tCO2e)	0	694,428	0	694,428

*Note: * using 12-monthly periods from the start of the crediting period*

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

>>

All data collected as part of the monitoring are archived electronically and kept at least for 2 years after the end of the last crediting period. 100% of the data are monitored as indicated in the table below. All measurements are conducted with calibrated measurement equipment according to relevant industry standards.

B.7.1 Data and parameters monitored:

Data / Parameter:	**Electricity exportation (EG_{export})**
Data unit:	MWh
Description:	Quantity of annual electricity exported to the grid by the proposed project
Source of data to be used:	Monitored from the meter installed at the Zhangbei 220kV substation (main meter) and the electricity meters installed in the wind farms.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	94,050 MWh when fully operating
Description of	Hourly measurement and monthly recording.

measurement methods and procedures to be applied:	The electricity exported to the grid by the proposed project will be monitored through metering equipment at the Zhangbei 220kV substation and the meters installed in the wind farms continuously. Details are shown in the Annex 4. Monthly power exported to the NCPG will be approved and signed off by CDM manager before it is accepted and stored.
QA/QC procedures to be applied:	Monthly power exported to the NCPG is cross-checked against sales receipts. The metering equipments are calibrated and checked for accuracy by a qualified third party according to industry standards. The metering equipment shall have sufficient accuracy so that any error resulting from such equipment shall not exceed 0.5% of full-scale rating.
Any comment:	Details information shown in the attached monitoring plan

Data / Parameter:	**Electricity importation (*EG_{import}*)**
Data unit:	MWh
Description:	Quantity of annual electricity imported from the grid by the proposed project
Source of data to be used:	Monitored from electricity meters
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:	The power imported from the grid will be monitored through metering equipment at the Zhangbei 220kV substation. Monthly power imported from NCPG will be approved and signed off by CDM manager before it is accepted and stored.
QA/QC procedures to be applied:	Monthly power imported from NCPG is cross-checked against receipts. The metering equipments are calibrated and checked for accuracy by a qualified third party according to industry standards. The metering equipment shall have sufficient accuracy so that any error resulting from such equipment shall not exceed 0.5% of full-scale rating.
Any comment:	Details information shown in the attached monitoring plan

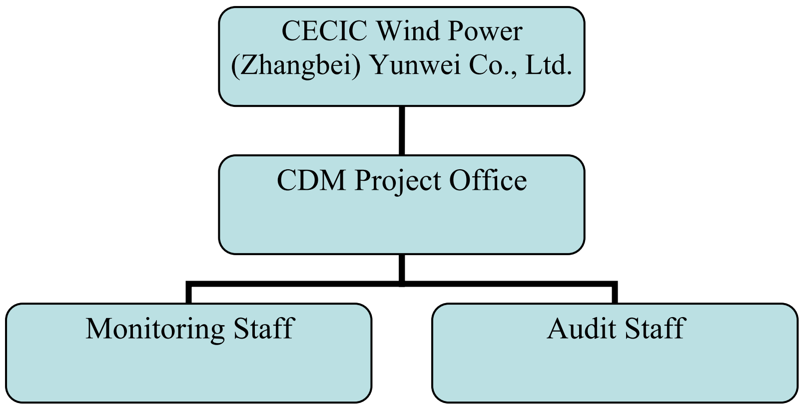
B.7.2 Description of the monitoring plan:

>>

Overall responsibility for monitoring and carrying out the monitoring following this monitoring plan lies with CECIC Wind Power (Zhangbei) Yunwei Co., Ltd. The company established a CDM project management office and assign dedicated people responsible for the monitoring and reporting of the generation and emission reductions of the project activity.

The operating and management structure is illustrated as followed:

The detailed information about the monitoring plan is presented in Annex 4.



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 the baseline study and monitoring methodology: 18/11/2008

- Mr. Zhu Hailei, Ms. Qian Yiwen, zhl@carbonresource.com, Carbon Resource Management China Representative Office, Suite 806, Hyundai Motor Tower, No. 38 Xiaoyun Road, Chaoyang District, Beijing, 100027, China, Tel: +86 10 8447 5246/8.
- Mr. Christiaan Vrolijk, cv@carbonresource.com, Carbon Resource Management Ltd, 49 St James's Street, London SW1A 1JT, UK, Tel: +44 20 7016 1426.
- *Carbon Resource Management is a project participant.*

SECTION C. Duration of the project activity / crediting period

C.1. Duration of the project activity:

C.1.1. Starting date of the project activity:

>>

30/11/2008 (construction launch date)

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

>>

20 years (from commissioning)

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:

>>

01/07/2009 (or the date of registration, whichever is later)

C.2.1.2. Length of the first crediting period:

>>
7y

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:

>>
In line with the requirements of local government, an Environmental Impact Assessment (EIA) for the proposed wind farm project was carried out. The EIA has been completed by Hebei Province Engineering Consulting Institute in November 2007 and it has been approved by the Environmental Protection Bureau of Hebei Province in April 2008. Here is a summary of the EIA.

1. The analysis of the environment impact in the construction period

- Dust: Since the local residential area is 500m away from the wind farm site, the impact of construction dust to the local region is limited. Several measures will be implemented to reduce the impact of dust on local residents and the construction staff, including watering and covering.
- Noise: Construction machines, transportation vehicles and construction work will generate noise. However, the noise levels are within acceptable levels at the nearest habitation, which is 500m away from the project site. Furthermore, using machinery and equipments with low noise levels, and arranging the construction times during day time, reduces the impact to the environment significantly.
- Solid waste: The solid wastes from the construction include waste soil and stone and construction wastes, as well as a little office waste. All these wastes are collected and disposed of properly.
- Waste water: The waste water generated includes washing water from machines and wastewater from the project office. The water will be treated and be used again on the construction site or as fertilizer. So waste water has little impact to the environment.
- Ecosystem: After construction, the land temporally occupied by the project will be recovered by grass, so as to recreate the original ecosystem. So the project has little impact to the ecosystem.

2. **The analysis of the environment impact in operation period**

- Noise: The operating level of these turbines range from 96dB to 104dB. At a range of 300 meters from the turbines the noise has been greatly weakened, and drops down below the national standard

of 45dB. Furthermore, the residential areas are 500m away from the wind farm, so the noise does not influence the residential districts nearest to the site.

- Dust: After revegetation upon completion of the construction work, no dust will be generated by the wind turbines and the growth of the local plant will not be impacted.
- Waste: Solid waste and waste water will be produced by operation staff during operation period. The emitted waste quantity is very small and will cause no interference with the environment after proper treatment or collection.

3. Conclusion

Wind power is green power and the impact caused by wind farm on the surrounding ecosystem, water, noise, and atmosphere is very little. Therefore, the proposed project is feasible from aspect of environment protection.

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 environmental impacts of the proposed project are not considered significant.The Environmental Protection Bureau of Hebei Province has approved the EIA.

SECTION E. Stakeholders' comments

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

>>

In June 2008, consultations were carried out in the Zhangbei County by CECIC Wind Power (Zhangbei) Yunwei Co. Ltd. The consultations resulted in a clear support from the local residents. The developer introduced the background of the proposed project by speaker and then made a questionnaire survey using a random sampling method. Respondents filled in a questionnaire with the following sections:

- Project introduction
- Respondent's basic information and education level
- Questions on:

1. Do they agree with the development and construction of the project?
2. Will the project have a negative impact on your environment of living, studying and working?
3. Will the project have a negative impact on the environment, such as noise, water and electromagnetism?
4. Will the project have a negative impact on the ecosystem?
5. Do you think the proposed project will have promotion in local economic development?
6. Do you have some suggestion about the project?

E.2. Summary of the comments received:

>>

The questionnaires were sent to 50 households and the survey had a 100% response rate. The result of the survey indicates support for the project.

- Education level of the respondents: Elementary school (10%), Junior high school (26 %), high school (42 %), University level and above (22%).
- Gender of the respondents: male (36 %) and female (64 %).
- 100% of respondents agreed with the development of the project.
- 100% of respondents believed that the project construction will not do harm to the environment.
- 100% believed that the project construction will do no harm to the ecosystem.
- 100% believed that the project construction will have no impact to the environment of living, studying and working.
- 100% believed that the project construction will have positive impact on local economic development.

Conclusions:

The survey shows that the proposed project has strong local support among the local people. They all believe the proposed project will promote the local economic development and agree the project construction.

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

>>

The local residents are all supportive of the proposed project and to date there has been no need to modify the project design according to the comments received.

The project owner has an overall environment-friendly plan to guarantee that the project has the minimum negative impact on the environment during the project construction and operation.

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 the proposed project.

Annex 3

BASELINE INFORMATION

Step 1. Identify the relevant electric power system

Following the DNA delineation, the project electricity system is the North China Power Grid (NCPG), consisting of six provincial grids: Beijing, Tianjin, Hebei, Shanxi, Inner Mongolia and Shandong.

The connected electricity systems are the Northeast Power Grid (NEPG), consisting of three provincial grids: Jilin, Liaoning and Heilongjiang, and Central China Power Grid (CCPG), consisting of six provincial grids: Jiangxi, Henan, Hubei, Hunan, Chongqing, Sichuan.

Step 2. Select an operating margin (OM) method

According to Tool to calculate the emission factor for an electricity system, 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 average hydroelectric production. The Simple OM method, therefore, is applicable to the proposed project as the share of low-cost/must-run generation does not exceed 1% in the most recent last 5 years, with the average being 0.8% as presented below.

The most recent year for which data is available in the yearbook is the year 2006. Table A1 presents the shares of generation from all sources including hydro power, other than thermal plants. The table shows that over the last five years generation from these sources has been consistently less than 1%.

Table A1 Power generation in the North China Power Grid from 2002 to 2006

Year	Low-cost/must-run generation (10^8 kWh)	Total Generation (10^8 kWh)	Share	Source* (edition/page)
2002	36.25	4,075.45	0.89%	2003/p585
2003	39.79	4,616.53	0.86%	2004/p709
2004	40.32	5,308.04	0.76%	2005/p474
2005	45.51	6,077.82	0.75%	2006/p568
2006	45.89	6,079.11	0.75%	2007/p638
Total	207.76	26,156.95		
Average	41.552	5231.39	0.80%	

*Note: * China Electric Power Yearbook*

Step 3. Calculate the operating margin emission factor according to the selected method

$EF_{CO2,i,y}$, the CO_2 emission factor of fossil fuel type i in year y ,is calculated as follows:

$EF_{CO2,i,y} = EF_{CO2,i,y} * 44/12$

Table A2 Emission Factors of Fuels

Fuel types	Carbon Emission Factor (tC/TJ)
Coal	25.8
Cleaned Coal	25.8
Other washed coal	25.8
Coke	29.2
Shaped Coal	26.6
Crude Oil	20.0
Gasoline	18.9
Diesel	20.2
Fuel Oil	21.1
Other Petro Product	20.0
Natural Gas	15.3
Coke Oven Gas	12.1
Other Coal Gas	12.1
LPG	17.2
Refinery Gas	15.7
Other Coking Products	25.8
Other Energy	0

Source: 1) 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2 Energy; 2) China Power Year Book (2007).

Fossil fuel consumption

Fuel consumption is taken from the latest China Energy Statistical Yearbook editions. The yearbooks present a range of more than 10 fuels for each province. Data is presented in Table A3 below. The share of emissions from coal consumption is also given in the table.

Table A3 Energy consumption and CO_2 emissions of NCPG in 2004-2006

2004

Fuel Type	Beijing	Tianjing	Hebei	Shanxi	Neimeng	Shandong	Fuel Consumption (Mt,Mm^3)	CO_2 Emission ($MtCO_2$)
Coal	8.9775	16.752	67.265	61.7645	62.7723	104.054	321.5853	636.0625
Cleaned coal						0.4218	0.4218	1.0512
Other washed coal	0.0657		1.6745	3.7365		1.0869	6.5636	5.1927
Coke					0.0021	0.0011	0.0032	0.0097
Coke oven gas	64	75	62	2108	39		2348	1.7424
Other coal gas	1609	786	3883		1837		9103	2.1110
Crude oil					0.0073		0.0073	0.0224
Gasoline			0.0001				0.0001	0.0003

Diesel	0.0048		0.0354		0.0012		0.0414	0.1308
Fuel oil	0.1225		0.0023		0.0006		0.1254	0.4057
LPG							0	0
Refinery gas			0.0902				0.0902	0.2391
Natural gas	28	8		276			312	0.6814
Other petro products							0	0
Other coke products							0	0
Other energy	0.0858		0.3235	0.6931	0.0727		2.3641	0
					CO_2 Emission			**549.0240 $MtCO_2$**

Source: China Energy Statistical Year Book (2005)

2005

Fuel Type	**Beijing**	**Tianjing**	**Hebei**	**Shanxi**	**Neimeng**	**Shandong**	**Fuel Consumption (Mt,Mm3)**	**CO_2 Emission ($MtCO_2$)**
Coal	8.9775	16.752	67.265	61.7645	62.7723	104.054	321.5853	636.0625
Cleaned coal						0.4218	0.4218	1.0512
Other washed coal	0.0657		1.6745	3.7365		1.0869	6.5636	5.1927
Coke					0.0021	0.0011	0.0032	0.0097
Coke oven gas	64	75	62	2108	39		2348	1.7424
Other coal gas	1609	786	3883		1837		9103	2.1110
Crude oil					0.0073		0.0073	0.0224
Gasoline			0.0001				0.0001	0.0003
Diesel	0.0048		0.0354		0.0012		0.0414	0.1308
Fuel oil	0.1225		0.0023		0.0006		0.1254	0.4057
LPG							0	0
Refinery gas			0.0902				0.0902	0.2391
Natural gas	28	8		276			312	0.6814
Other petro products							0	0
Other coke products							0	0
Other energy	0.0858		0.3235	0.6931	0.0727		2.3641	0
					CO_2 Emission			**647.6493**

MtCO2

Source: China Energy Statistical Year Book (2006)

2006

Fuel Type	Beijing	Tianjing	Hebei	Shanxi	Neimeng	Shandong	Fuel Consumption (Mt,Mm3)	CO_2 Emission ($MtCO_2$)
Coal	7.9663	16.392	68.6799	69.6888	84.0405	109.3066	356.0741	704.2778
Cleaned coal						0.3977	0.3977	0.9911
Other washed coal	0.0636		2.1413	3.7114	0.6177	5.446	11.98	9.4779
Shape coal	0.0797				0.2777		0.3574	0.7288
Coke						0.0323	0.0323	0.0983
Coke oven gas	38	63	580	2232	64	579	3556	2.6388
Other coal gas	2066	658	6972	1379	2276	722	14073	3.2636
Crude oil					0.0074		0.0074	0.0227
Gasoline			0.0001				0.0001	0.0003
Diesel	0.0021		0.0301		0.0007	0.0632	0.0961	0.3036
Fuel oil	0.0638		0.0008			0.041	0.1056	0.3416
LPG						0.0001	0.0001	0.0003
Refinery gas			0.0243			0.0232	0.0475	0.1259
Natural gas	341	73		53			467	1.0199
Other petro products						0.0028	0.0028	0.00788
Other coke products							0	0
Other energy	0.0683		0.4711	2.3076	0.1251	1.3229	4.295	0
CO_2 Emission $MtCO_2$								723.2987

Source: China Energy Statistical Year Book (2007)

Calculation of net generation from included sources

Gross generation for each province is presented in the yearbooks. The data is also broken down into three categories: thermal, hydro and other sources. For the OM calculations, only thermal generation is included. Gross generation and own consumption are used to calculate net generation from included sources. The calculations are presented in Table A4 below.

Table A4 Thermal generation, own consumption rate, and net supply in NCPG

Provincial Grid	2004			2005			2006		
	Generation	**Self use rate**	**On-grid generation**	**Generation**	**Self use rate**	**On-grid generation**	**Generation**	**Self use rate**	**On-grid generation**
	（MWh)	**（%）**	**（MWh)**	**（MWh)**	**（%）**	**（MWh)**	**（MWh)**	**（%）**	**（MWh)**
Beijing	18579000	7.94	17103827	20880000	7.73	19265976	20705000	7.51	19150055
Tianjing	33952000	6.35	31796048	36993000	6.63	34540364	35924000	6.86	33459614
Hebei	124970000	6.5	116846950	134348000	6.57	125521336	143888000	6.63	134348226
Shanxi	104926000	7.7	96846698	128785000	7.42	119229153	150250000	7.45	139056375
Neimeng	80427000	7.17	74660384	92345000	7.01	85871616	139593000	7.58	129011851
Shandong	163918000	7.32	151919202	189880000	7.14	176322568	230922000	7.12	214480354
Total			489173110			560751013			669506473

Source: China Power Year Book (2005, 2006, 2007)

Imports

The connected electricity systems are the Northeast Power Grid (NEPG), consisting of three provincial grids: Jilin, Liaoning and Heilongjiang and the Central China Power Grid (CCPG), consisting of six provincial grids: Jiangxi, Henan, Hubei, Hunan, Chongqing and Sichuan. According to the tool, there is electricity transferring from the connected electricity systems to the project electricity system, so the CO_2 emission factor for net electricity imports ($EF_{grid,import,y}$) from the connected electricity systems should be determined to use “The weighted average operating margin (OM) emission rate of the exporting grid”.

The average emission rate is calculated using the same steps as above for NCPG, namely fuel consumption and net generation as indicated in Table A5 – A8 below.

Fuel consumption in NEPG and CCPG is taken from the latest China Energy Statistical Yearbook editions. The yearbooks present a range of more than 10 fuels for each province.

Table A5 Fuel consumption and CO_2 emissions of NEPG in 2004-2006 (connected system)

2004

Fuel type	Liaoning	Jinlin	Heilongjiang	Fuel Consumption (Mt,Mm^3)	CO_2 Emission ($MtCO_2$)
Coal	41.442	23.109	30.848	95.399	188.6894
Cleaned coal	0.8475	0.0109	0.0488	0.9072	2.2609
Other washed coal	5.7767	0.1426	0.61	6.5293	5.1656
Coke				0	0
Coke oven gas	483	291		774	0.5744
Other coal gas	5733	419		6152	1.4267
Crude oil				0	0
Gasoline				0	0
Diesel	0.0204	0.0116	0.0024	0.0344	0.1087
Fuel oil	0.1281	0.0178	0.0286	0.1745	0.5645

LPG	0.0219			0.0219	0.0693
Refinery gas	0.0979		0.0114	0.1093	0.2898
Natural gas		3	253	256	0.5591
Other petro products				0	0
Other coke products				0	0
Other energy	0.2697	0.0507		0.3204	0
			CO_2 **Emission**		**199.7083 $MtCO_2$**

Source: China Energy Statistical Year Book (2005)

2005

Fuel type	**Liaoning**	**Jinlin**	**Heilongjiang**	**Fuel Consumption (Mt,Mm^3)**	**CO_2 Emission ($MtCO_2$)**
Coal	43.0541	24.4613	33.8321	101.3475	200.4549
Cleaned coal				0	0
Other washed coal	5.2474	0.1926	0.2416	5.6816	4.4949
Coke				0	0
Coke oven gas	103	357	68	528	0.3918
Other coal gas	1262	837		2099	0.4868
Crude oil	0.0116			0.0116	0.0356
Gasoline				0	0
Diesel	0.0118	0.0148	0.0057	0.0323	0.1020
Fuel oil	0.0932	0.0246	0.0155	0.1333	0.4312
LPG	0.0012			0.0012	0.0038
Refinery gas	0.0548		0.0132	0.068	0.1803
Natural gas		84	224	308	0.6727
Other petro products				0	0
Other coke products				0	0
Other energy	0.1618			0.1618	0
			CO_2 **Emission**		**207.2540 $MtCO_2$**

Source: China Energy Statistical Year Book (2006)

2006

Fuel type	**Liaoning**	**Jinlin**	**Heilongjiang**	**Fuel Consumption (Mt,Mm^3)**	**CO_2 Emission ($MtCO_2$)**
Coal	46.8199	27.3824	36.9829	111.1852	200.4548959
Cleaned coal	0.0003			0.0003	0.000748
Other washed coal	6.7474	0.1783	0.96	7.8857	6.2387

Coke	0.00332			0.00332	0.1011
Coke oven gas	268	16	144	428	0.3176
Other coal gas	5526	143		5669	1.3147
Crude oil	0.0049			0.0049	0.015
Gasoline				0	0
Diesel	0.0075	0.0039	0.003	0.0144	0.0455
Fuel oil	0.1173	0.0045	0.0144	0.1362	0.4406
LPG				0	0.003797547
Refinery gas	0.0855		0.0427	0.1282	0.3399
Natural gas		19	210	229	0.5001
Other petro products				0	0
Other coke products				0	0
Other energy	0.1216	0.176	0.8277	1.1253	0
			CO_2 Emission		**229.2268 $MtCO_2$**

Source: China Energy Statistical Year Book (2007)

Net generation is calculated from gross generation and self consumption data presented.

Table A6 Power generation, own consumption and net supply in NEPG (2004-2006)

Province	2004			2005			2006		
	Generation	**Self use rate**	**On-grid generation**	**Generation**	**Self use rate**	**On-grid generation**	**Generation**	**Self use rate**	**On-grid generation**
	（MWh)	**（%）**	**（MWh)**	**（MWh)**	**（%）**	**（MWh)**	**（MWh)**	**（%）**	**（MWh)**
Liaoning	84543000	7.21	78447450	89668000	7.03	83364340	101100000	6.62	94407180
Jinlin	33242000	7.68	30689014	43395000	6.59	40535270	45600000	6.78	42508320
Heilongjiang	53482000	7.84	49289011	59900000	7.96	55131960	64600000	7.85	59528900
Total			158425475			179031569			196444400

Source: China Power Year Book (2005 - 2007)

Table A7 Fuel consumption and CO_2 emissions of CCPG in 2006 (connected system)

Fuel type	Jiangxi	Henan	Hubei	Hunan	Chongqing	Sichuan	Fuel Consumption (Mt,Mm^3)	CO_2 Emission ($MtCO_2$)
Coal	19.2602	80.9801	31.7979	24.5448	11.843	32.8522	201.2782	398.1075
Cleaned coal					0.0579		0.0579	0.1443
Other washed coal	0.0451	1.0412		0.0859	0.7921		1.9643	1.5540
Shape coal					0.0001		0.0001	0.00002
Coke		0.1723		0.0032			0.1755	0.5343
Coke oven		52	107	424	38	1	622	0.4616

gas								
Other coal gas	1269	395		170	436	1	2271	0.5267
Crude oil		0.0049					0.0049	0.0150
Gasoline		0.0001					0.0001	0.00003
Diesel	0.0091	0.0223	0.0141	0.0178	0.0096		0.0729	0.2303
Fuel oil	0.0051	0.0126	0.0131	0.008	0.0057	0.0349	0.0794	0.2569
LPG							0	0.0003
Refinery gas	0.0086	0.081	0.01	0.0097			0.1093	0.2898
Natural gas			28		16	1863	1907	4.1649
Other petro products							0	0.00788
Other coke products						0.0001	0.0001	0.00003
Other energy	0.1745	0.3736	0.3155	0.1829	0.2935		1.34	0
					CO_2 Emission			**406.2861 $MtCO_2$**

Source: China Energy Statistical Year Book (2007)

Table A8 Power generation, own consumption and net supply in CCPG (2006)

Provincial grids	Generation	Self use rate	On-grid generation
	（MWh)	（%）	（MWh)
Jiangxi	34449000	6.17	32323497
Henan	151235000	7.06	140557809
Hubei	54841000	2.75	53332873
Hunan	46408000	4.95	44110804
Chongqing	23487000	8.45	21502349
Sichuan	44193000	4.51	42199896
Total			334027226

Source: China Power Year Book (2007)

Operating Margin Emission Factor calculations

The Operating Margin Emissions Factor is now calculated from the data presented above using the formula below, including adjustment for imports from NEPG and CCPG. The calculation is shown in Table A9.

$$EF_{grid,OMsimple,y} = \frac{\sum_i FC_{i,y} \times NCV_{i,y} \times EF_{co_2,i,y}}{EG_y}$$

Table A9 Operating margin emission factor calculation

	Unit	2004	2005	2006	3-year total/average
NCPG					

Emission	$MtCO_2$	549.02	647.65	723.3	1919.97
Generation	TWh	489.17	560.75	669.51	1719.43
Import from NEPG	TWh	4.51	3.93	2.618	11.06
EF NEPG	tCO_2/MWh	1.17384	1.15764	1.16688	
Emissions from imports	$MtCO_2$	5.30	4.55	3.05	12.90
Import from CCPG	TWh	-	-	0.497	0.50
EF CCPG	tCO_2/MWh	-	-	0.87599	
Emission from imports	$MtCO_2$	-	-	0.43536703	0.44
Total					
Emissions	$MtCO_2$	554.32	652.20	726.79	1933.31
Generation supply	TWh	493.68	564.68	672.63	1730.99
			Operating margin Emission Factor		**1.1169 tCO_2/MWh**

Based on above data, the simple OM emission factor of NCPG is calculated ex-ante using a 3-year generation-weighed average is 1.1169 tCO_2e/MWh.

Step 4. Identify the cohort 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 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. This option is chosen as it comprises larger annual generation than the five units built most recently. Following the deviation, the latest statistical data available (from the China Power Yearbook 2007) is used by the DNA to determine the most recent year from which the added generation capacity is equal to or just exceeds 20% of the latest statistic year 2006. The added generation capacity is the sample group of power units *m* used to calculate the build margin.

Step 5. Calculate the build margin emission factor

As described in step4, because of the limited availability of publicly available data, this proposed project uses a substitute method accepted by EB to calculate $EF_{BM,y}$

Sub-step 1: calculate the fuel share of thermal generation

Calculate the different CO_2 emission percentage of solid, liquid and gas fuel in the total emission of North China Power Grid in 2006 using new latest statistical data available from China Energy Statistical Year Book 2007.

Table A10 Calculation of CO_2 Emission of North China Power Grid in 2006

Fuel type	CO_2 Emission (tCO_2)	Share
Coal	715573958	98.932%
Oil	676091	0.093%
Gas	7048610	0.975%
Total	**723298659**	**100%**

Source: China Energy Statistical Year Book (2007).

λ_{Coal} = 98.932%;

λ_{Oil} = 0.093%;

λ_{Gas} = 0.975%.

Sub-step 2: Based on best efficiencies available, determine the emission factor of thermal power

Based the emission percentage (λ_i) of different kind fossil fuels and the corresponding emission factor (EF_i) according to the best technology commercially available in the China, the weighted emission factor of thermal power ($EF_{thermal}$) is calculated.

Table A11 Calculation of CO_2 Emission Factor of Coal, Oil and Gas Fuel Power Plant with the Best Commercial Efficiency in China

Power plant type	Parameter	Best efficiency	Carbon factor (tC/TJ)	CO_2 emission factor (tCO_2/MWh)
		A	B	C=3.6/A/1000*B*44/12
Coal	$EF_{Coal,Adv}$	37.28%	25.8	0.9135
Gas	$EF_{Gas,Adv}$	48.81%	15.3	0.4138
Oil	$EF_{Oil,Adv}$	48.81%	21.1	0.5706

Source: http://cdm.ccchina.gov.cn/web/NewsInfo.asp?NewsId=2876

So, emission factor of thermal plant is:

$$EF_{Thermal} = \lambda_{Coal} \times EF_{Coal,Adv} + \lambda_{Oil} \times EF_{Oil,Adv} + \lambda_{Gas} \times EF_{Gas,Adv} = 0.9083tCO_2/MWh$$

Sub-step3: Determine the Build Margin emissions factor from recent added generation capacity

Using the latest statistical data available (from the China Electric Power Yearbook) determine the year from which the added generation capacity is equal to or just exceeds 20% of the latest statistic year 2006.

Table A12 Identify the year from which the added generation capacity is equal to or just exceeds 20% of the latest statistic year 2006

Power plant type	Capacity 2004 A	Capacity 2005 B	Capacity 2006 C	Added Capacity 2005-2006 D=C-B	Share
Thermal（MW）	93594.9	111068.7	141538	30469.3	95.64%
Hydro（MW）	3250.7	3216.2	4004	787.8	2.47%
Nuclear（MW）	0	0	0	0	0.00%
Wind（MW）	137.5	335.5	937	601.5	1.89%
Total（MW）	96983.1	114620.4	146479	31858.6	100.00%
The ratio to C	66.21%	78.25%	100.00%		

Source: China Power Year Book (2005, 2006, 2007).

$EF_{BM} = (CAP_{Thermal} / CAP_{Total}) * EF_{Thermal}$

$CAP_{Thermal}$ is the thermal capacity among the new capacity from 2005 to 2006, and CAP_{Total} is the total capacity from 2005 to 2006.

EF_{BM}= 95.64% × 0.9083 = 0.8687 tCO_2/MWh

Step 6. Calculation of the combined margin emission factor

The combined margin emission factor is calculated as follows:

$EF_{grid,CM,y} = w_{OM} \bullet EF_{grid,OM,y} + w_{BM} \bullet EF_{grid,BM,y}$ = 0.75× 1.1169 + 0.25×0.8687 = 1.0548 tCO_2/MWh

Annex 4

MONITORING INFORMATION

1. Introduction

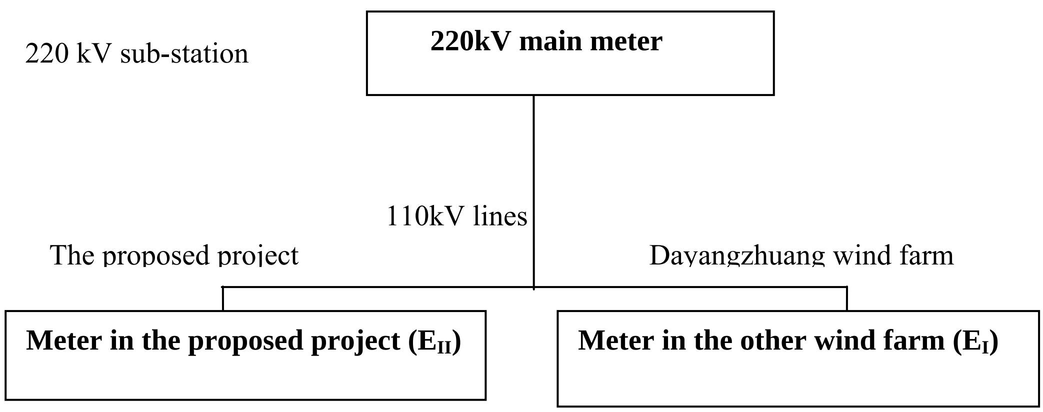
The proposed project adopts the methodology ACM0002 “Consolidated monitoring methodology for grid-connected electricity generation from renewable sources” (version 09) to determine the emission reductions from the net electricity generation from the wind farm. The project developer has compiled “The Monitoring and Management Manual for CECIC Zhangbei Gaojialiang Wind farm Project” to make sure the monitoring plan will be implemented in a right way. The aim of the monitoring plan is to make sure that the net electricity generation delivered to the grid is monitored completely, consistently, reliably and precisely. This plan describes in more detail the process.

2. Installation of meters

The net electricity generation of the proposed project will be monitored through the use of the metering equipments, recording exports to the grid (supply) and imports from the grid (consumption). Net generation supplied is calculated as exports minus imports. The metering equipments are calibrated and checked for accuracy by a qualified third party according to industry standard. The metering equipment shall have sufficient accuracy so that any error resulting from such equipment shall not exceed 0.5% of full-scale rating.

The electricity supplied to the gird and the electricity imported from the grid will base on the main meter installed in Zhangbei 220kV sub-station. Every month Zhangbei 220kV substation will report the electricity exchanged between the proposed project and NCPG via the Zhangbei 220kV substation. The main metering system equipment and the backup metering system equipment will be calibrated and maintained by NCPG.

The electricity supplied to NCPG by the proposed project will share one electric flow meter (the main meter) at 220kV level with another registered CDM wind farm (Ref: 1855) as the following figure shows, so the meter at 220kV level measures the total electricity exchanged between NCPG and the two wind farms.



In the monitoring, NCPG takes independent responsibility to operate the 220kV sub-station and read the main meter installed at the 220kV sub-station. The data gained from the main meter is the total power supply (EG_{total}). The data gained from the meter at 110 kV level installed in the proposed project is E_{II}. The data gained from the meter at 110 kV level installed in the other wind farm is E_I. So, the electricity delivered by the proposed project (EG_{export}) can be calculated as:

$$EG_{export} = EG_{total} \frac{E_{II}}{E_I + E_{II}}$$

The invoice of each wind farm will be issued separately to cross check the power exportation.
The electricity imported from the grid by the proposed project and the other wind farm will share the same main meter too. So the meter readings of the main meter recorded should be the sum of the two wind farms. To be conservative, the imported electricity measured by the main meter is considered as the electricity imported by the proposed project.

3. Monitored data

The main monitored data of the proposed project is the electricity delivered to the grid by the proposed project (EG_{export}) and the power imported from the grid (EG_{import}). The net generation is calculated as exports minus imports.

3.1 Monitoring generation for part of a month

The monitoring procedures will follow the generation and invoice months, not necessarily calendar months, for the proposed project activity.

If it is necessary to monitor part of a month, for example if the date of registration is not at the start of the generation month, the following procedure will be used:
- A special meter reading will take place on 0:00 of the starting date of the first crediting period.
- A special receipt will be issued based on this special reading for the use of cross-check.

4. Calibration

The metering equipments are calibrated and checked for accuracy according to local industry standards to make sure that any error resulting from such equipment will not exceed 0.5% of full-scale rating. The net generation output registered by the meters alone will suffice for the purpose of billing and emission reduction verification as long as the error in the meters is within the agreed limits.

Both meters shall be jointly inspected and sealed on behalf of the parties concerned and shall not be interfered with by either party except in the presence of the other party or its accredited representatives.

Calibration is carried out by the qualified third party with the records being supplied to the proposed Wind farm, and these records will be maintained by the proposed Wind farm and the third party appointed by DOE.

All the meters installed shall be tested by the NCPG within 10 days after: the detection of a difference larger than the allowable error in the readings of both meters; the repair of all or part of meter caused by the failure of one or more parts to operate in accordance with the specifications.

If any errors are 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.

Should any previous months reading of the main meter be inaccurate by more than the allowable error, or otherwise functioned improperly, the net generation output shall be determined by (a) first, by reading backup meter, unless a test by either party reveals it is inaccurate; (b) if the backup system is not with acceptable limits of accuracy or operation is performed improperly the proposed Wind farm and the NCPG shall jointly prepare an reasonable and conservative estimate of the correct reading, and provide sufficient evidence that this estimation is reasonable and conservative when DOE undertakes verification; and (c) if the NCPG and the proposed Wind farm fail to agree then the matter will be referred for arbitration according to agreed procedures.

5. Data collection and management system

- Zhangjiakou Electric Power Company reads main meter and reports the result to NCPG Company monthly.
- Zhangjiakou Electric Power Company supplies reading to the proposed wind farm monthly.
- The proposed wind farm records readings from the backup meter monthly.
- The proposed wind farm carries out an internal audit on the readings and calculations.
- The proposed wind farm calculates the emission reductions after each monitoring period.

Physical document such as paper-based maps, diagrams and environmental assessments 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 Wind farm project, the project material and monitoring results will be indexed. All paper-based information will be stored by the technology department of the proposed Wind farm and all the material will have a copy for backup.

And all data including calibration records is kept until 2 years after the end of the total crediting period of the CDM project.

6. Quality control

Monthly net generation data will be approved and signed off by CDM manager before it is accepted and stored.

This audit will check compliance with operational procedures in this monitoring plan.

This internal audit will also identify potential improvements to procedures to improve monitoring and reporting in future years. If such improvements are proposed these will be reported to the DOE and only operated after approval from the DOE.

7**. Reporting**

CECIC Wind Power (Zhangbei) Yunwei Co. Ltd, with the help of Carbon Resource Management Ltd, will complete the monitoring report and provide it to a DOE for verification

8. Training program

The project developer will train all related staff before the start of the crediting period. The training contains CDM knowledge, operational regulations, quality control (QC), data monitoring requirements and data management regulations, etc.