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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Zhangjiakou Chabei Wind Farm Project
Current version of the PDD: 1.2
Date of completion: 21/02/2011

PDD revision history

PDD version	Time	Note
Version 1.0	13/09/2010	Complete first version and submission to China DNA
Version 1.1	10/12/2010	Submission to DOE for GSP after internal QA (using ACM0002 v12.1.0)
Version 1.2	21/02/2011	Revised based on the draft validation report

A.2. Description of the project activity:

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Zhangjiakou Chabei Wind Farm Project (the proposed project activity) is located in Chabei District, Zhangjiakou City, Hebei Province, China. The proposed project activity is developed by CGN (Chabei) Wind Power Co., Ltd.. The proposed project activity is to install and operate 67 wind turbines with a capacity of 1,500kW each; the total installed capacity will be 100.5MW. The expected annual equivalent full load operating hour is 2,127h with Plant Load Factor (PLF) of 24.3%. Once fully operational, the proposed project activity is expected to deliver on 213,735MWh of electricity per year to the North China Power Grid (NCPG). The purpose of the proposed project activity is the generation of electricity from wind and the supply of this electricity to the NCPG.

The project scenario is the installation of 100.5MW of renewable energy power generation capacity, and the supply to NCPG of 213,735MWh of electricity generated from renewable energy.

The baseline scenario, which is the same as the scenario existing prior to the implementation of the proposed project activity, is the generation of electricity by grid-connected power plants.

As the NCPG is dominated by thermal power generation, the establishment of the proposed project activity will lead to greenhouse gas (GHG) emission reductions. Following the baseline methodology, the emission reductions are estimated to be approximately 203,090 tonnes of CO_2 equivalent (tCO_2e) per year once the proposed project activity is fully operational.

Sustainable development

The proposed project activity will help the local government to promote economic development and to improve the air quality. The project will assist China in stimulating and accelerating the commercialisation of grid-connected wind power technologies and markets which are an important objective of the Chinese government. The project will therefore help reduce GHG emissions versus the high-growth, coal-dominated business-as-usual scenario. The project will improve air quality and local livelihoods, promote sustainable renewable energy industry development.

The proposed project activity will contribute to sustainable development in the following ways:

- It will promote local economic development by creating local employment opportunities during

both the construction and operational phase of the proposed project activity.

- It will generate electricity from renewable sources.
- It will promote technology development, through the use of advanced technology.
- It will reduce GHG emissions in China compared to the baseline/business-as-usual scenario.
- It will reduce the emissions of other pollutants associated with the operation of fossil fuel-fired thermal power plant, including SO_2 and soot, as well as reducing thermal pollution from cooling water in the baseline/business-as-usual scenario.

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)	Party involved wishes to be considered as project participant (Yes/No)
P.R. China (host)	CGN (Chabei) Wind Power Co., Ltd.	No
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:

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

Figure 1 Hebei Province

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

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Chabei District, Zhangjiakou City

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

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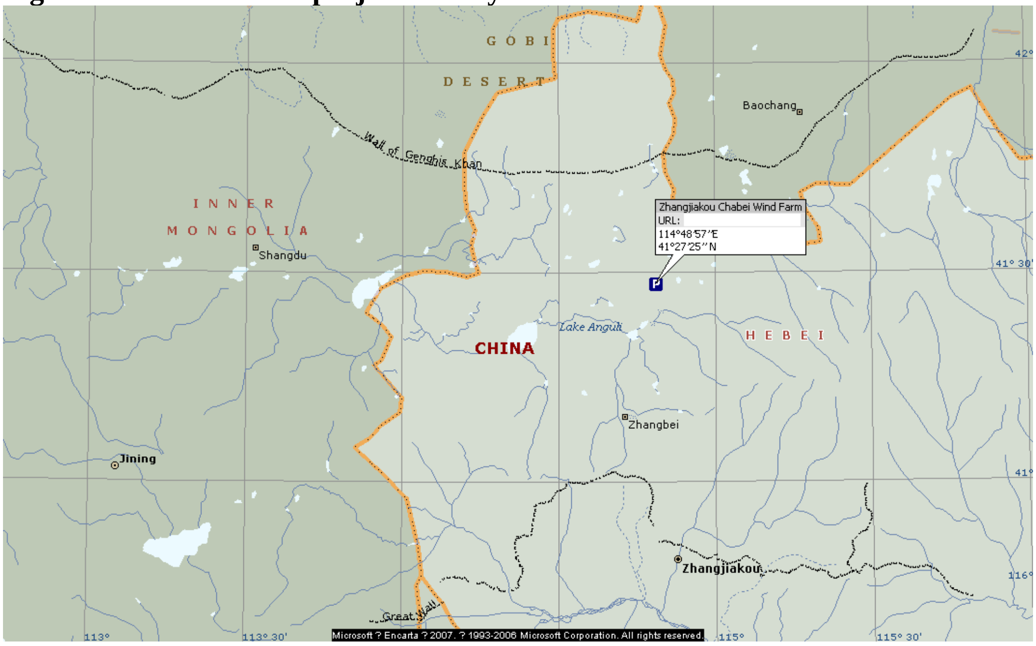
Longitude (centre)	114.8158°East
Latitude (centre)	41.4569° North
Altitude	1420m～1450m above sea level

Figure 2 Location of the project activity



The coordinates of the project boundary corners are summarized below.

Corner No.	Longitude	Latitude
1	114.8642°	41.5186°
2	114.8731°	41.5181°
3	114.8764°	41.4922°
4	114.7978°	41.4008°
5	114.7886°	41.4300°
6	114.7475°	41.4367°
7	114.8017°	41.4736°

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

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Sectoral scope : 01 Energy industries

Category: Grid-connected electricity generation from renewable sources

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

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The purpose of the Proposed Project Activity is the generation of electricity from wind and the supply of this electricity to the Grid. The project scenario is the installation of 67 wind turbines with a capacity of 1,500 kW each. The equipment is manufactured in China by Xinjiang Goldwind Science & Technology Co., Ltd.. Because of the high utilization efficiency of wind energy, Goldwind 1500 kW type has been becoming one of main wind turbine generators in China[1]. There is no direct technology transfer related to the project activity since all the technology employed is from domestic manufacturers. The technology specifications applied is shown in Table 1.

[1] http://www.cninfo.com.cn/finalpage/2010-03-04/57649308.PDF

Table 1 Technology specifications

Item	Specification	Data Source
Manufacturer	Xinjiang Goldwind Science & Technology Co., Ltd.	Manufacturer's Specifications
Model	77/1500kW	
Power Rating	1,500kW	
Rotor Diameter	77m	
Hub height (Centre)	65m	
Cut-in Wind Speed	3m/s	
Rating Wind Speed	12m/s	
Cut-out Wind Speed	25m/s	
Designed Life	20 years	
Load factor	24.3%	FSR

Each turbine will have a transformer from 690V to 35kV, and are connected with the newly-constructed 220kV substation on the wind farm. The onsite substation is connected to the grid substation via 220kV transmission line. All the electricity generated by the wind farm will be transferred to the NCPG via the grid substation.

The project scenario is the installation of 67 wind turbines with a total capacity of 100.5MW. The wind turbines are estimated to generate on average 213,735MWh of electricity annually once fully operational, with an average load factor of 24.3%. The expected load factor is determined by an independent qualified design institute in the Feasibility Study Report (FSR) using detailed onsite information and long-term local wind data, in accordance with EB guidance on plant load factors (EB48 Annex 11).

Prior to the implementation of the project activity, the electricity was generated by grid-connected power plants. Without the implementation of the project, this scenario would have continued and is considered the baseline scenario. As the grid is dominated by thermal power generation, the establishment of the proposed project activity will lead to greenhouse gas (GHG) emission reductions, estimated following the baseline methodology below.

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

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Applying the baseline methodology and estimated annual net electricity supply, the ex-ante estimated emission reductions over the chosen 7-year crediting period are presented below.

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

Years	Annual estimation of emission reductions in tonnes of CO_2e
2011.07.01-2011.12.31	101,545
2012.01.01-2012.12.31	203,090
2013.01.01-2013.12.31	203,090

2014.01.01-2014.12.31	203,090
2015.01.01-2015.12.31	203,090
2016.01.01-2016.12.31	203,090
2017.01.01-2017.12.31	203,090
2018.01.01-2018.06.30	101,545
Total estimated reductions (tonnes CO_2e)	1,421,630
Total number of crediting years	7
Annual average over the crediting period of estimated reductions (tonnes of CO_2e)	203,090

A.4.5. Public funding of the project activity:

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There is no public funding from Parties included in Annex I 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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Methodology

- Approved consolidated baseline and monitoring methodology ACM0002 "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" version 12.1.0 (EB58 Annex 7, valid from 17 Sep 2010 onwards)

The methodology refers to the following tools

- AM Tool 07 "Tool to calculate the emission factor for an electricity system" version 02.1.0 (EB60 Annex 8, valid from 16 Oct 2009 onwards);
- AM Tool 01 "Tool for the demonstration and assessment of additionality" version 5.2 (EB39 Annex 10, valid from 26 Aug 2008 onwards);
- AM Tool 02 "Combined tool to identify the baseline scenario and demonstrate additionality" version 03.0.0 (EB60 Annex 7, valid from 15 April 2011 onwards) (this tool is not applicable to the project);
- AM Tool 03 "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion" version 2 (EB41 Annex 11, valid from 2 Aug 2008 onwards) (this tool is not applicable to the project).

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

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This methodology is applicable to grid-connected renewable power generation project activities that (a) install a new power plant at a site where no renewable power plant was operated prior to the implementation of the project activity (Greenfield plant); (b) involve a capacity addition; (c) involve a retrofit of (an) existing plant(s); or (d) involve a replacement of (an) existing plant(s).

Therefore, the methodology is applicable as the proposed project activity is the installation of a Greenfield, grid-connected wind power plant (a).

The methodology is applicable under the following conditions:

Criteria	Applicability	Conclusion
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	The proposed project activity is the installation of a wind power plant.	OK

power plant/unit		
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 proposed project activity is a Greenfield plant and does not represent a capacity addition to an existing plant.	OK
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/m^2; or • 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.	Not applicable. The proposed project activity is a wind power plant.	OK

The methodology is not applicable to the following:

Criteria	**Applicability**	**Conclusion**
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	The proposed project activity does not involve switching from fossil fuels to renewable energy at the site of the project activity	OK

continued use of fossil fuels at the site;		
Biomass fired power plants	Not applicable. The proposed project activity is a wind power plant	OK
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 4 W/m^2	Not applicable. The proposed project activity is a wind power plant	OK

In addition, the applicability conditions included in the tools applied and referred to above apply as follows:

Tool / Criteria	**Applicability**	**Conclusion**
AM Tool 1 / Once the additionally tool is included in an approved methodology, its application by project participants using this methodology is mandatory.	The chosen methodology prescribes the use of this tool. There are no further applicability criteria for using the tool.	OK
AM Tool 7 / This tool may be applied to estimate the OM, BM and/or CM when calculating baseline emissions for a project activity that substitutes grid electricity, i.e. where a project activity supplies electricity to a grid or a project activity that results in savings of electricity that would have been provided by the grid (e.g. demand-side energy efficiency projects).	The Proposed Project Activity is the installation of a wind power plant supplying electricity to the Grid.	OK

Any conditions for the application of the tools are addressed in the sections below where the tools are used, sections B.5 and B.6, showing that the tools are applicable to the proposed project activity. In addition, it is noted that:

- the project is a Greenfield project, therefore the AM_Tool_02 “*Combined tool to identify the baseline scenario and demonstrate additionality*” is not required to identify the baseline scenario of the proposed project; and
- the project is a wind power project, there are no fossil fuels used for electricity generation, so there are no CO_2 emissions and leakage from combustion of fossil fuels, and thus the AM_Tool_03 “*Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion*” is not applicable to the proposed project.

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

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Emission sources and gases

Following the methodology, 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 for determining the baseline emissions. According to the methodology, project emissions from geothermal, solar thermal and hydro power plants need to be taken into account; there are no project emissions for a wind power plant, thus $PE_y = 0$.

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 are 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	For geothermal power plants, fugitive emissions of CH_4 and CO_2 from non-condensable gases contained in geothermal steam.	CO_2	No	Not applicable to wind.
		CH_4		
		N_2O		
	CO_2 emissions from combustion of fossil fuels for electricity generation in solar thermal power plants and geothermal power plants.	CO_2	No	Not applicable to wind.
		CH_4		
		N_2O		
	For hydro power plants, emissions of CH_4 from the reservoir.	CO_2	No	Not applicable to wind.
		CH_4		
		N_2O		

Spatial boundary

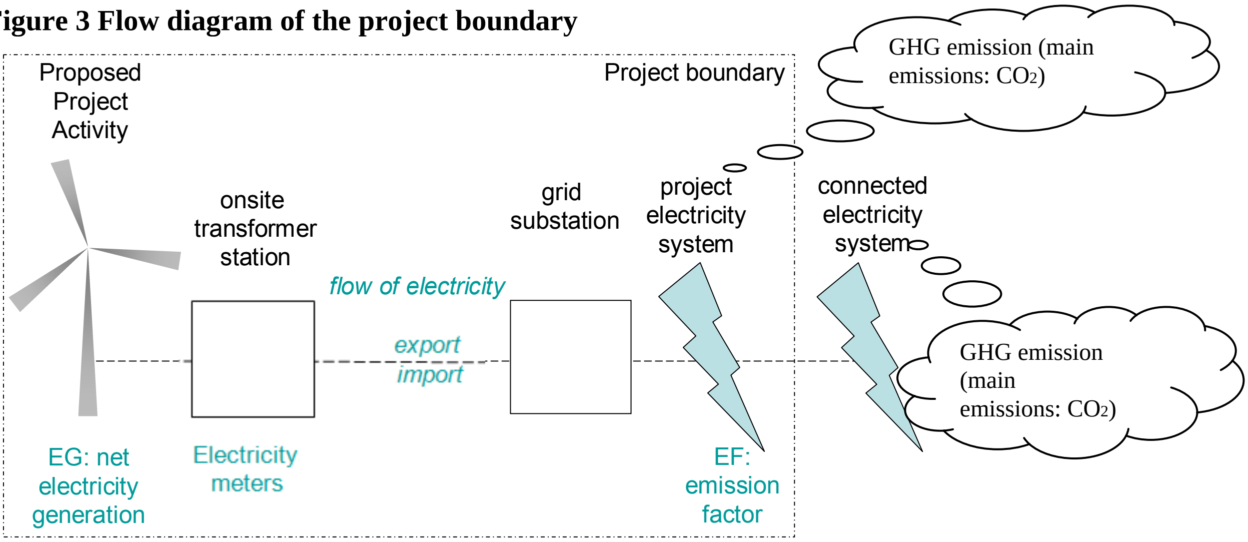
The spatial extent of the proposed project boundary includes the proposed project activity and all power plants connected physically to the project electricity system. The project electricity system is defined in AM_Tool_07 as the spatial extent of the power plants that are physically connected through transmission and distribution lines to the proposed project activity and that can be dispatched without significant transmission constraints.

A connected electricity system is defined as an electricity system that is connected by transmission lines to the project electricity system. Power plants within the connected electricity system can be dispatched without significant transmission constraints but transmission to the project electricity system has significant transmission constraint.

As the DNA of China has published a delineation of the project electricity system and connected electricity systems[2], these delineations are used. According to the delineation of grid boundaries as provided by the DNA of China, NCPG includes Beijing, Tianjin, Hebei, Shanxi, Inner Mongolia, and Shandong. NCPG is the project electricity system, as the power plants that are connected to NCPG can be dispatched without significant transmission constrains.

In line with the *Guidelines for Completing the Project Design Document (CDM-PDD) and the Proposed New Baseline and Monitoring Methodologies (CDM-NM)* (version 07), a flow diagram of the project boundary is presented in Figure 3 below. The flow diagram physically delineates the project boundary, includes the flow of electricity and represents the emissions included (EF: emission factor) and the monitoring variable (EG: net electricity generation).

Figure 3 Flow diagram of the project boundary



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, and is not a capacity addition, retrofit or replacement of existing grid-connected renewable power plant/unit, the baseline scenario, according to the methodology, 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".

The selected methodology prescribes the baseline scenario, thus no further analysis is required.[3] The baseline is determined and the combined margin calculated in Section B.6 below.

B.5. **Description of how the anthropogenic emissions of GHG by sources are reduced below**

[2] Chinese DNA designates it at http://qhs.ndrc.gov.cn/qjfzjz/t20090703_289357.htm
[3] VVM v1.2 para 105.

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 EB guidelines (EB 49 Annex 22) the project participant informed the Host Party DNA and the UNFCCC secretariat in writing of the commencement of the project activity and of the intention to seek CDM status, as the starting date of the project activity is after 02 August 2008. This notification was made within six months of the project activity start date as shown in the timeline below.

In addition to this confirmation of serious prior consideration of the CDM by the project participants, the timeline below indicates continuing and real actions to secure CDM status for the project in parallel with its implementation.

Table 4 Timeline of the implementation of the project

Time	Milestone
Sep-2007	Environmental Impact Assessment (EIA) completed
29-Dec-2007	EIA approved by Hebei Province Environmental Protection Bureau
Sep-2009	Feasibility Study Report (FSR) completed
23-Jun-2010	FSR approved by National Development and Reform Commission
16-Jul-2010	Board decision on CDM development of the project
19-Jul-2010	ERPA signed with Carbon Resource Management Ltd. (CRM)
28-Jul-2010	Turbines purchase contract was signed (i.e. the starting date of the project)
09-Aug -2010	Main Building Construction Contract signed
18-Aug-2010	Notification of the intention to develop this project as CDM to EB
25-Aug-2010	Tower Purchase Contract signed
16-Sep-2010	Notification of the intention to develop this project as CDM to DNA

The incentive from the CDM had been taken into account prior to the starting date of the project activity, aiming to obtain the additional funding to secure the project financially. In the feasibility study of the project, the revenue from CDM was analyzed and it is concluded that if the project is registered as a CDM project, the revenue from CDM will make the project attractive financially. Therefore, the project owner decided to apply for CDM registration to overcome the financial barriers in July 2010 and signed the Emission Reduction Purchase Agreement (ERPA) with the CER buyer before the start date of the project. The prior notification was also send to UNFCCC in August 2010 and China DNA in September 2010. Therefore, CDM was seriously considered in the decision to implement the project activity.

Additionality

The methodology requires the use of the latest version of *Tool for the demonstration and assessment of additionality*. The Tool consists of the steps below.

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

The Proposed Project Activity is the installation of a new grid-connected renewable power plant, and is not a capacity addition, retrofit or replacement of existing grid-connected renewable power plant/unit. Therefore, the baseline scenario according to the methodology 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".

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) A power plant using other source of renewable energy with the comparable capacity or electricity generation, such as PV, biomass and hydro, etc.

- Besides wind energy, other kinds of renewable energy technologies, such as solar PV, biomass, geothermal and hydro are possible grid-connected sources that could be used in China. However, due to the technology development status and the high cost for power generation, solar PV and biomass of similar installed capacity as the proposed project are not realistic alternatives in China[4]. Geothermal power generation also faces technology and investment barriers and is difficult to be operated without policies & financial support[5,6], only hydropower projects can have an investment return rate that competes with that of wind power projects in China[7]. However, due to dry climate and the lack of water resource recently years in the project area[8], there is no commercially exploitable hydro power resource which can provide same electricity generation output of the proposed project activity. Therefore, this alternative is not realistic.

d) Comparable capacity or electricity generation addition provided by the NCPG.

- 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.

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[4] http://scitech.people.com.cn/GB/5347113.html
[5] http://paper.people.com.cn/zgnyb/html/2009-08/03/content_310862.htm
[6] http://www.china.com.cn/news/tech/2010-12/20/content_21579531.htm
[7] http://www.chinanews.com/ny/news/2009/12-25/2037683.shtml
[8] http://www.zjksw.net/ReadNews.asp?NewsID=580

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

For the alternative (b) described in sub-step 1a, using comparable thermal power generation, both the installed capacity and the capacity that can generate the same annual electricity generation[9] would be prohibited. According to Chinese regulations coal-fired power plants of less than 135MW are prohibited to be built in the areas covered by the large grids such as provincial grids[10]. For these reasons, the possible alternative baseline scenario of building a thermal power plant conflicts with Chinese regulations.

According to the analysis in sub-step 1a and 1b, alternative (a) and alternative (d) are the realistic and feasible alternatives which comply with applicable laws and regulations.

Step 2. Investment analysis

The purpose of this step is to determine whether the proposed project activity is not:
(a) The most economically or financially attractive; or
(b) Economically or financially feasible, without the revenue from the sale of certified emission reductions (CERs).

To conduct the investment analysis, the following sub-steps are used and the guidance provided by the Board on investment analysis[11] is taken into account:

Sub-step 2a. Determine appropriate analysis method

The purpose of this sub-step is to determine whether to apply the simple cost analysis, investment comparison analysis or benchmark analysis (sub-step 2b):

The proposed project activity generates financial benefits by the sales of electricity, so the simple cost analysis (Option I) should not be applied. Following the EB guidance on the assessment of investment analysis[12], 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 project internal rate of

[9] Using the average load factor of thermal plant in Hebei Province which connected to NCPG, as reported in the *China Electric Power Yearbook* (2009 Edition), of 5,270 hours per year, a fossil fuel-fired plant of 40.6MW would generate 213,735 MWh per year.
[10] 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.
[11] 'Guidance on the Assessment of Investment Analysis' (version 03.1), EB 51 Annex 58.
[12] Paragraph 16, *Guidance on the Assessment of Investment Analysis* (version 03.1), EB 51 Annex 58.

return (IRR) of electric power industry is 8% (after tax), and only if the project IRR of the project is higher than or equivalent to this benchmark, the proposed project is financially feasible. This benchmark is commonly used in the electricity sector.

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

The investment estimation in the FSR was carried out by an independent design institute. The analysis is based on the national regulation and the material and equipment price level. Therefore, each of the input parameters is valid and applicable at the time of writing the FSR (September 2009), and the FSR has been approved by National Development and Reform Commission (23 June 2010). The period of time between the finalisation of the FSR and the project start date (28 Jul 2010) is less than one year, and therefore it is not likely that the input values would have materially changed and the decision to proceed with the investment was based on the FSR.

As indicated as a preference in the EB guidance, the period of assessment reflects the full period of expected operation of the underlying project activity (technical lifetime, i.e. 20 years from commissioning). However, while the assessment period covers the full lifetime of the equipment, the value of the proposed project activity assets at the end of the assessment period has been included as a cash inflow in the final year and, as stated in the FSR, was calculated in accordance with local accounting regulations.

The cost of financing expenditures is not included in the calculation of project IRR; however such costs must be calculated to help estimate the level of taxes due.

Input values

The key data for the calculation of the financial indicator, all derived from the FSR, are listed below, with full detail in the IRR calculation spreadsheet.

Table 5 Key data for the financial indicator calculation

Item	Value	Data Source
Net supplied power to the grid	213,735MWh	FSR
Static investment	1,032.80 million Yuan RMB	
Annual O&M	23.34 million Yuan RMB	
Expected operational lifetime	20 years	
Interest on long-term loan	5.94%	
Residue ratio	3%	
Feed-in tariff (including VAT.)	0.54 RMB/kWh	
Value added tax rate	17%*	
VAT rebate on wind tariff	50%*	
Rate of education tax	3%	
Rate of city build tax	5%	
Income tax rate	25%	

Source: Feasibility Study Report, Beijing National Water Conservancy & Electric Power Engineering Co., Ltd., September 2009. (Approved by National Development and Reform Commission in June 2010.)

*Note *: The normal VAT rate in China is 17%. According to the "Notice of Value Added Tax Policy Regarding Products Using Certain Synthesized Resources and Other Products (Cai Shui [2008]156)" issued by the Ministry of Finance and the State Administration of Taxation in Dec 2008, effective as of 1 Jan 2009, for wind power projects, it states that 17% VAT shall be levied first and then 50% will be refunded.*

Investment costs
The total investment was estimated by an experienced design institute which has been awarded the highest certificate (grade A). The estimated total investment for the proposed project activity is 10,277 RMB/kW, which is comparable to the investment level of previous wind projects by the Developer and in China in general[13] and in the range of the other similar projects in Hebei Province, which is 7,640~13,031 RMB/kW[14].

Additionally, these costs are also compared with the values presented by one of the most important wind energy studies in the World, "Wind Energy – The Facts" implemented by a consortium led by the European Wind Energy Association (EWEA) and published in March 2009[15]. According to the study, the investment costs per kW typically vary from around €1000/kW to €1350/kW[16] (9,094 to 12,277 RMB/kW[17]).

Therefore, it can be concluded that the estimated investment costs in the FSR are reasonable.

Generation / load factor
The expected power generation of the proposed project is calculated by an independent qualified design institute with the highest grade (Grade A) in the FSR, based on wind assessment records for the recent 38 years (1971-2008) and detailed information on the equipment. Therefore, the generation and plant load factor determination are in line with both options of the EB Guidelines for the reporting and validation of plant load factors (EB 48 Annex 11): (a) provided to the government while applying the project activity for implementation approval, and (b) determined by a third party contracted by the project participants.

Operating costs
The O&M costs were estimated by an experienced design institute which has been awarded the highest certificate (grade A). The estimated average annual O&M costs are 0.11 RMB/kWh, which is comparable to the costs of previous wind projects in Hebei Province, which ranges from 0.05 to 0.197 RMB/kWh[18]. Besides, the estimated annual O&M cost of proposed project is 232.22 RMB/kW, which is comparable to values of registered CDM project in Hebei Province, ranging from 91.18 RMB/kW to 464.65 RMB/kW[19].

Additionally, these costs are also compared with the values presented by one of the most important wind energy studies in the World, "Wind Energy – The Facts" implemented by a consortium led by the

[13] The average investment level of the wind farm is 8,000 to 12,000 RMB/kWh, see http://www.in-en.com/newenergy/html/newenergy-20072007042885858.html.
[14] Statistics of the registered projects in Hebei province.
[15] http://www.wind-energy-the-facts.org/en/home--about-the-project.html.
[16] *Wind Energy – The Facts, Part III, The Economics of Wind Power*, page 200, March 2009 (http://www.wind-energy-the-facts.org/documents/download/Chapter3.pdf).
[17] Using the exchange rate at the time of the publication (31 March 2009), www.x-rates.com.
[18] Statistics of the registered projects in Hebei province.
[19] Statistics of the registered projects in Hebei province.

European Wind Energy Association (EWEA) and published in March 2009.[20] According to the study, the O&M costs are generally estimated to be around 1.2 to 1.5 euro cents per kWh[21] (about 0.109 to 0.136 RMB/kWh[22]) of wind power produced over the total lifetime of a turbine.

Therefore, it can be concluded that the estimated average annual O&M costs in the FSR are reasonable.

Tariff

The expected on-grid tariff used for the financial analysis in the approved FSR refers to the most recent NDRC tariff notification of 20 July 2009 (Fa Gai Jia Ge [2009]1906) at the time of writing the FSR (September 2009). Therefore, the tariff in the FSR is appropriate and reasonable.

According to *Interim Measures for Renewable Energy Power Tariff and Cost-sharing*[23], issued by NDRC, and effective from 1 January 2006, all wind projects will receive the government guiding tariff. Additionally, NDRC stated in 2007 that the tariffs would remain stable[24]. All tariff notifications issued for Hebei Province since the entry into force of the Renewable Energy Law are presented in Table 6 below.

Table 6 Tariff notifications for Hebei Province

Date	Document reference	Tariff (RMB/kWh, including VAT)
June 2006	Ji Jia Guan Zi [2006]57[25]	0.60
2007	2008 Wind Power Report*	0.5006
9 June 2007	Fa Gai Jia Ge [2007] 1260[26]	0.54[#]
3 December 2007	Fa Gai Jia Ge [2007] 3303[27]	0.54
23 July 2008	Fa Gai Jia Ge [2008] 1876[28]	0.54
20 July 2009	Fa Gai Jia Ge [2009] 1906[29]	0.54[#]

*Notes: * China Wind Power Report 2008, China Renewable Energy Institute Association (CREIA) and WWF, in October 2008 (http://www.wwfchina.org/english/downloads/Wind%20Report/china%20wind%20power%202008.pdf).*

[#] Projects in the less-windy part of Hebei Province were awarded a higher tariff of 0.61 RMB/kWh (incl. VAT), however, all projects in wind resource region II in Hebei received this tariff and the higher tariff is not applicable to these projects. Nearly all projects are in the better wind resource area II, including the proposed project activity.

The NDRC issued its fifth tariff notification (Fa Gai Jia Ge [2009] 1906), covering all regions, at the end of July 2009, before the time of writing the FSR. As per the fifth tariff notification of Fa Gai Jia Ge [2009] 1906, it is clarified for the whole of China that tariffs are awarded on the basis of the wind resource in the regions and construction conditions, with fixed tariffs for each of four wind resource categories. For the

[20] http://www.wind-energy-the-facts.org/en/home--about-the-project.html.
[21] Wind Energy – The Facts, Part III, The Economics of Wind Power, page 205, March 2009.
[22] Using the exchange rate at the time of the publication (31 March 2009), www.x-rates.com.
[23] Fa Gai Jia Ge [2006] No. 7 (1 Jan 2006)
[24] Governor of NDRC at the International Summits for Alternative Energy and Power, 2007, see http://politics.people.com.cn/GB/5752740.html.
[25] http://www.hebwj.gov.cn/upfiles/xy_col32super_20081210161322124272.htm
[26] http://www.hebwj.gov.cn/upfiles/xy_col32gjc___20070718164220007126.htm
[27] http://www.ndrc.gov.cn/jggl/zcfg/t20080218_193008.htm
[28] http://www.sdpc.gov.cn/jggl/zcfg/t20080813_230726.htm
[29] http://www.ndrc.gov.cn/jggl/jggs/t20090727_292846.htm

tariffs of wind farm projects in the same wind resource area II (i.e. including Chengde City and Zhangjiakou City) in Hebei province have been maintained at the same level of 0.54 RMB/kWh (Inc. VAT) based on the fifth notification, the approved tariffs of wind farm projects in the same region had therefore been stable between 2007 and the time of writing the FSR. Furthermore, at the time of investment decision, it was confirmed again by the tariff notification issued by Price Bureau of Hebei province on 08 July 2010 (Ji Jia Guan [2010]35) that the tariff of the proposed project was also approved as 0.54 RMB/kWh (Inc. VAT). Therefore, the tariff of 0.54 RMB/kWh (Inc. VAT) used for investment analysis in the FSR/PDD is thus considered appropriate.

According to the "Information note on the highest tariffs applied by the Executive Board in its decisions on registration of projects in the People's Republic of China (version 01)", published on 24 June 2010, the highest historical tariff in Hebei Province is 0.65 RMB/kWh (Inc. VAT), which had only been awarded to two demonstration projects. Therefore, the sensitivity analysis below includes a calculation to show that the Proposed Project Activity is additional, even when taking this highest tariff into account.

Residual value

As indicated as a preference in the EB Guidance, the period of assessment reflects the full period of expected operation of the project activity. The fair value of the proposed project activity assets at the end of the assessment period has been included as a cash inflow in the final year and, as stated in the FSR, was calculated in accordance with local accounting regulations, by an experienced design institute. The estimated rate of residual value is 3%, which is in compliance with relevant national and industrial regulation[30].

Taxes

Each of the tax rates used in the FSR is in accordance with Chinese law as indicated below.

a) Value Added Tax: According to the "Provisional Regulation of Value Added Tax in China" (Regulation No. 134 [1993], 13 Dec 1993) the VAT rate was 17%. The State Council "Provisional regulations of the People's Republic of China on Value Added Tax" (State Council No. 538 [2009], 5 Nov 2008) is the current regulation for VAT, confirming the VAT rate at 17%.

   i) Value Added Tax: According to the "Provisional Regulation of Value Added Tax in China" (Regulation No. 134 [1993], 13 Dec 1993) the VAT rate was 17%. The State Council "Provisional regulations of the People's Republic of China on Value Added Tax" (State Council No. 538 [2009], 5 Nov 2008) is the current regulation for VAT, confirming the VAT rate at 17%.

   The Value Added Tax rate on electricity sales revenue in the FSR is 17%, the normal VAT rate in China. However, as a subsidy for wind projects, half the VAT amount is returned to the developer in accordance with the "Notice of the Ministry of Finance and the State Administration of Taxation about policies regarding the value added tax on comprehensive utilization of resources and other products" (Cai Shui [2008] 156, 9 Dec 2008).[31] The reduction in VAT on the electricity generated[32] was first introduced after 11 November 2001[33], however, this policy is taken into account in the assessment. This is conservative.

   The Value Added Tax on the purchase of the equipment for renewable energy projects can be

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[30] http://www.gov.cn/zwgk/2007-12/11/content_830645.htm

[31] http://www.js-n-tax.gov.cn/Page1/StatuteDetail.aspx?StatuteID=8931.

[32] "Notice of the Ministry of Finance and State Administration of Taxation about policies regarding the value added tax on comprehensive utilization of some recourses and other products" (Cai Shui [2001] 198, 1 Dec 2001).

[33] http://cdm.unfccc.int/EB/052/eb52annagan3.pdf

recouped from the VAT on sales revenue in accordance with the "Notice about implementation of VAT reform in the whole country" issued by Ministry of Finance and State Administration of Taxation of People's Republic of China (Cai Shui [2008] 170, 19 Dec 2008) [34]. This policy is taken into account in the assessment. This is conservative.
Value Added Tax recovery on investment: *Notice about implementation of VAT reform in the whole country (Cai Shui[2008]170)* allows for the VAT from the investment in wind projects to be recouped.

b) Income Tax: According to *People's Republic of China Enterprise Income Tax Provisional Regulations* issued in March 2007, State Council No. 63, the income tax was approved as 25%[35].
c) Education Tax: According to *Interim Provision on Education Tax Law*, the education rate is 3% of VAT[36].
d) City Building Tax: According to *National City Tax Law*, the city building tax rate is 5% of VAT[37].

Comparison of the financial indicators

Table 7 shows the project IRR 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 7 Comparison of indicators

without CDM	Benchmark	with CDM
5.06%	8%	8.49%

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, 8.49% for total investment, 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 economic or financial attractiveness is robust to reasonable variations in the critical assumptions. The investment analysis above provides a valid argument in favour of additionality as the 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 variations. For the proposed project activity, the key variable analysed are:

1) Investment;
2) O&M Costs;

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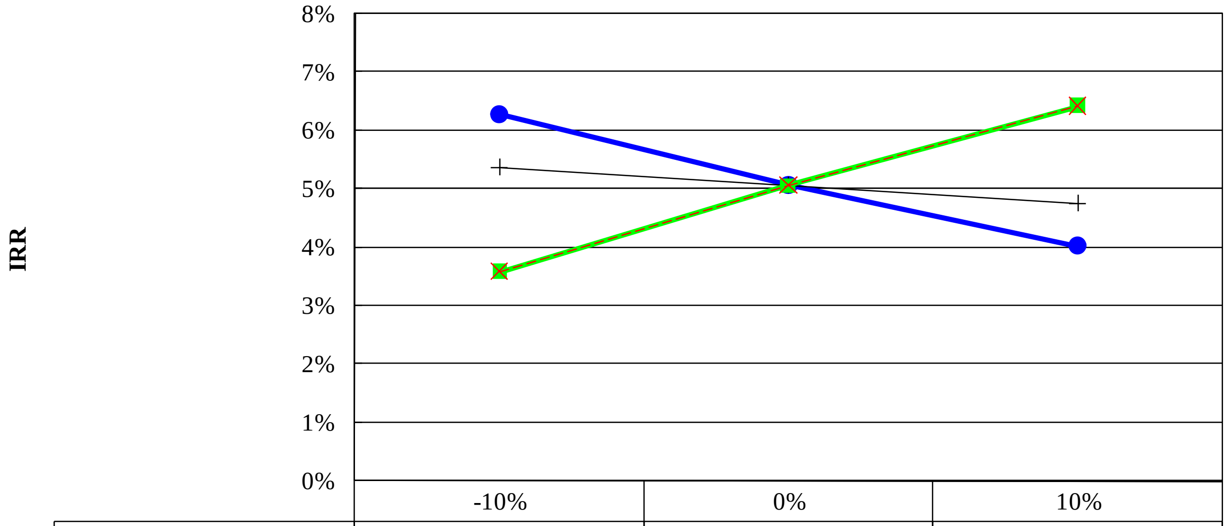
[34] http://www.jsgs.gov.cn/Page/StatuteDetail.aspx?StatuteID=8965
[35] http://www.gov.cn/ziliao/flfg/2007-03/19/content_554243.htm.
[36] http://www.law-lib.com/law/law_view1.asp?id=99771.
[37] http://202.108.90.130/chinatax/jibenfa/jibenfa0401.htm.

3) Generation / PLF;
4) Tariff.

In line with EB guidance[38], the range of variations in the sensitivity analysis covers a range of between –10% and +10%, which is also in line with the regulations in China[39]. Greater variations are unlikely, as discussed below, and in line with the regulations are not considered. The result of the sensitivity analysis is presented below, showing that the benchmark is not reached.

Figure 4 Sensitivity analysis



	-10%	0%	10%
Investment costs	6.27%	5.06%	4.02%
O&M costs	5.37%	5.06%	4.75%
Tariff	3.58%	5.06%	6.42%
Generation / load factor	3.58%	5.06%	6.42%

Variation

Investment

For wind farm projects, the costs of turbines, engineering construction and related accessories comprise the main budget of static investment. As prices of turbines and other related equipment have been increasing in recent years, a decrease of the static investment is unlikely[40]. Therefore, it was not realistic for the developer to assume that investment costs could decrease by 21.9% in order to reach the benchmark.

Indeed, the final price of the main contracts (including turbines, towers, and construction contract of turbine foundation and road works are 896.57 million RMB) was higher than that estimated in FSR (807.05 million RMB). And the actual costs of above main contracts of the proposed project are accounted for 84.19% of the estimated static investment in the FSR. Therefore, it was not realistic for the

[38] Paragraph 18, 'Guidance on the Assessment of Investment Analysis' (version 03.1), EB 51 Annex 58.
[39] "Codes on Compiling Feasibility Study Report of Wind Farms", issued by NDRC on 25/05/2005, prescribes the –10% to +10% variation range (http://www.windpower.org.cn/news/links/js_2005_0508.htm).
[40] http://www.stats.gov.cn/tjgb/ndtjgb/qgndtjgb/t20100225_402622945.htm

developer to assume that investment costs could decrease by 21.9% in order to reach the benchmark 8%. A large reduction in the investment costs can therefore be ruled out as a credible possibility.

O&M

The O&M costs in the approved feasibility study were derived from the qualified design institute. Past trends show that costs have been rising: as prices, including those of the requirement equipment and commodities, have been increasing in recent years, a significant reduction in the level of costs is particularly unlikely.[41] As the impact of the annual O&M costs is extremely slight, even if the O&M costs decreased to zero, to the IRR still could not reach the benchmark rate of 8%, this possibility can be ruled out.

Tariff

The expected on-grid tariff used for the financial analysis in the PDD and the approved FSR refers to the most recent NDRC tariff notification of 20 July 2009 (Fa Gai Jia Ge [2009]1906) available at the time of writing the FSR, as shown in Table 6 above.

Indeed, the starting date of the Proposed Project Activity is after the latest NDRC tariff notification which clarified that future projects in these regions would automatically be awarded this tariff upon approval of their FSR. Therefore, as the starting date of the project is after the approval of the FSR, the tariff was fixed at the time of making the decision to go ahead with the project. Therefore, the tariff for the Proposed Project Activity was agreed and fixed at 0.54 RMB/kWh (Inc. VAT), the same as estimated in the FSR. Any variation from this original assumption, therefore, can not be considered credible, as the tariff has been fixed prior to the project start date.

The tariff applied for the whole project life conservatively would need to be 22.7% higher than the assumed level in the approved FSR, at 0.663 RMB/kWh, for the project IRR to reach the benchmark. However, as the tariff was further fixed by the latest tariff notification issued by Price Bureau of Hebei province on 08 July 2010 (Ji Jia Guan [2010]35), the tariff of the proposed project was finally approved and agreed at the level of 0.54 RMB/kWh (Inc. VAT). Thus, assuming an increase in the tariff is not credible.

Even if the highest tariff of 0.65 RMB/kWh, indicated in the EB Information Note, is applied, the IRR of the proposed project is still lower than the benchmark of 8%.

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 approved FSR. Therefore, the generation and plant load factor determination are in line with both options of the EB Guidelines for the reporting and validation of plant load factors (EB 48 Annex 11): (a) provided to the government while applying the project activity for implementation approval, and (b) determined by a third party contracted by the project participants.

The annual electricity in the FSR is calculated based on detailed information of onsite measurement, meteorological data of the wind resource in the local area, for the recent 38 years (1971-2008) and the output characteristics of the turbines, using a scientific approach applied internationally. The volume of annual generation therefore is expected to accurately represent the long-term average power supply during the lifetime of the wind farm, taking into account yearly variations in power generation, and it is

[41] http://www.hetj.gov.cn/article.htm1?id=3824

not credible to assume that generation would be significantly higher over the lifetime of the proposed project activity than that which can be expected from the long-term averages.

As per the FSR, the estimated net supplied power is calculated from the turbine availability, grid availability and the wind speed. The professional software *WAsP* was used to select the rich wind source area. The yearly data was then processed in professional software to calculate the annual theoretical power generation, from which the annual effective power generation was obtained through discount by considering factors such as air density, trailing stream, wind turbine efficiency 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 more than 22.7% each year on average over the lifetime of the project in order the reach the benchmark 8%.

Conclusion

The financial analysis shows that the project is not financially attractive, and the sensitivity analysis shows that without CER revenue IRR of the project will not reach the benchmark 8% for any reasonable variation in the main parameters.

In conclusion, the proposed project is not financially feasible without the revenue of CERs. Therefore, the analysis proceeds to step 4.

Step 3. Barrier analysis

Not applied.

Step 4. Common practice analysis

The proposed project activity is not a first-of-its kind project, therefore the above test is complemented with an analysis of the extent to which the proposed project type has already diffused in the relevant sector and region, acting as a credibility check to the analysis above. The existing common practice is identified and discussed through the following sub-steps:

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 any other activities that are operational and that are similar to the Proposed Project Activity. Projects are considered similar if they are in the same country/region and/or rely on a broadly similar technology, are of similar scale, and take place in a comparable environment with regard to regulatory framework, investment climate etc.

In China, the regulatory framework and investment climate for wind farm projects are only similar and comparable for projects connected to the same grid and located 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.

In April 2002, China implemented power sector reform to establish a more commercialized power market

in China[42], which completely changed the regulatory environment for the whole power sector, both for conventional and renewable energy projects. After the power sector reform, the Renewable Energy Law entered into force on 1 January 2006, which changed the market conditions for wind power project development significantly. However, to be more inclusive / conservative in the analysis, the common practice analysis includes all projects since the Power Sector Reform.

The appropriate criteria to determine whether other activities are similar to the Proposed Project Activity are:

Scope	Criterion
Geography	Hebei
Technology	Wind
Scale	Large-scale project (using the CDM definition of large scale, >15MW)
Other	None

Other CDM projects activities (registered project activities and project activities which have been published on the UNFCCC website for global stakeholder consultation as part of the validation process) are not to be included in this analysis, according to the EB guidance on the additionality tool.

Using the statistics collated by Professor Shi Pengfei[43] of installed wind power in China and annual updates from the grid company of connected and operating plant, any other activities that are operational and that are similar to the Proposed Project Activity, using the criteria selected above and excluding other CDM project activities as required, are listed in Table 8 below.

Table 8 Similar wind farm projects located in Hebei Province

Name	Commissioning Date	Capacity (MW)	Notes
Shangyi Manjing	Jul, 2005	34.5	Facing financial barriers, receiving carbon funding
Chengde Hongsong	Dec, 2005	50.1	Facing financial barriers, receiving carbon funding

Source: Statistics of domestic wind farm installation capacity in 2007, Statistics of domestic wind farm installation capacity in 2008, Shi Pengfei; Statistics of domestic wind farm installation capacity in 2009; http://cdm.unfccc.int/Projects/registered.html.

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

Several wind farms are applying for, or have already received CDM financing support. Many project developers have been encouraged by the positive experiences on the CDM registration of other projects, and are now taking the revenue from emission reductions into account in their decisions before construction and are applying for CDM registration.

[42] Chinese National Development and Reform Commission, Separate Power Plants from Network and Compete in Price to Enter Network, April 11, 2002, http://www.ndrc.gov.cn/xwfb/t20050708_28096.htm.

[43] *"Statistics of domestic wind farm installation capacity in 2007", Shi Pengfei, see* http://www.cwea.org.cn/download/display_info.asp?id=25; *"Statistics of domestic wind farm installation capacity in 2008", Shi Pengfei, see* http://www.cwea.org.cn/upload/20090305.pdf; *"Statistics of domestic wind farm installation capacity in 2009", see* http://www.cwea.org.cn/upload/201006102.pdf.

Prior to the implementation of the Renewable Energy Law, thus in a different regulatory environment, two projects were commissioned: Chengde Hongsong wind farm[44] and Shangyi Manjing wind farm[45]. The IRR of these two projects was lower than the benchmark 8%, so these two projects were also facing serious financial barriers during operating period and could not be implemented without carbon finance.[46] Both projects agreed carbon funding to help overcome this serious barrier.

All the other wind farms in Hebei have already successfully been registered or are applying as CDM projects in EB. Presently, without a higher supporting tariff or favourable financial support, further development of similar wind farms in Hebei province faces financial barriers and is not feasible in Hebei province. Therefore, the wind power projects similar with the proposed project are not the common practice in Hebei Province.

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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Project emissions

According to the methodology**,** for most renewable energy project activities, PE_y = 0. However, the methodology prescribes project emission calculations for geothermal, solar thermal and hydro power plant. As a wind power plant, therefore, there are no project emissions according to the methodology:

$PE_y = 0$

Baseline emissions

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:

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

Where:

BE_y = Baseline emissions in year y (tCO_2/yr).

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

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

Calculation of $EG_{PJ,y}$

[44] http://tools.carbonneutral.com/cnregistry/projectsearch.asp

[45] http://www.personal.barclays.co.uk/PFS/A/Content/Files/3370_Bar_CN_Wind_China_V3.pdf

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

As the proposed project activity 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, the following applies:

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

Where:
$EG_{PJ,y}$ is the 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).
$EG_{facility,y}$ is the quantity of net electricity generation supplied by the project plant/unit to the grid in year y (MWh/yr).

Baseline emission factor

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 ($EF_{grid,BM,y}$) factors according to the following seven 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 and follow the published data from the Chinese DNA[47]: *China Energy Statistical Yearbook* and *China Electric Power Yearbook*, and are presented in Annex 3 of the PDD and the EF calculation spreadsheet.

Step 1. Identify the relevant electricity systems

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 NCPG, consisting of three provincial grids: Beijing, Tianjin, Hebei, Shanxi, Inner Mongolia and Shandong.

There are electricity transfers from connected electricity systems to the project electricity system (electricity imports). The connected electricity systems are 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 are no electricity imports from another country.

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

[47] http://cdm.ccchina.gov.cn/english/NewsInfo.asp?NewsId=3841, Department of Climate Change, NDRC, 2009-9-3.

For the purpose of determining the operating margin emission factor, one of the following options to determine the CO_2 emission factor(s) for net electricity imports from a connected electricity system within the same host country(ies) is used:

(a) 0 tCO_2/MWh, or
(b) The weighted average operating margin (OM) emission rate of the exporting grid, determined as described in Step 4 (d) below; or
(c) The simple operating margin emission rate of the exporting grid, determined as described in Step 4 (a), if the conditions for this method, as described in Step 3 below, apply to the exporting grid; or
(d) The simple adjusted operating margin emission rate of the exporting grid, determined as described in Step 4 (b) below.

For imports from connected electricity systems located in another host country(ies), the emission factor is 0 tonnes CO_2 per MWh. However, there are no electricity imports from another country.

Electricity exports should not be subtracted from electricity generation data used for calculating and monitoring the electricity emission factors.

Following the calculations of the DNA, option (c) is used to calculate the CO_2 emission factors for net electricity imports ($EF_{grid,import,y}$).

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

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

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

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

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

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

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

According to the Tool, the simple OM method (option a) can only be used if low-cost / must-run resources constitute less than 50% of total grid generation in: 1) average of the five most recent years, or 2) based on long-term averages for hydroelectricity production. This criterion is met (see Annex 3) and therefore the project participants chose to use the simple OM method (option a).

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: 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. The three most recent years for which data is available are 2005-2007.

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

(a) Simple OM

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. Two options can be selected to calculate the simple OM:

Option A: Based on the net electricity generation and a CO_2 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.

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

The criteria for Option B are met, as (a) the necessary data for Option A is not available as indicated in the calculations of the DNA, (b) only nuclear and renewable power generation are considered as low-cost / must-run power sources and the quantity of electricity supplied to the grid by these sources is known, and (c) Option I is chosen in Step 2.

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

According to the Tool, where Option B is used, 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 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[48]:

$EF_{grid,OMsimlpe,y}$ = 1.0069 tCO_2/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 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.[49] This option is chosen as it comprises larger annual generation than the five units built most recently.

Following the deviation[50], 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 generation capacity is equal to or just exceeds 20% of the latest statistic year 2007. 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 6. 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:

[48] http://qhs.ndrc.gov.cn/qjfzjz/t20090703_289357.htm
[49] If 20% falls on part capacity of a unit, that unit is fully included in the calculation.
[50] Deviation for projects in China (DNV, 7 Oct 05), see http://cdm.unfccc.int/Projects/Deviations.

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

$EF_{grid,BM,y}$ is the Build margin CO_2 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 CO_2 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 4 (a) for the simple OM, using options A1, A2 or A3, using for y the most recent historical year for which power generation data is available, and using for m the power units included in the build margin.

However, due to the limited availability of publicly available data, the DNA uses the accepted deviation mentioned in Step 5 to calculate $EF_{BM,y}$, as follows:

- The CO_2 emission factor used is the weighted average emission factor for thermal power plant calculated from the average net energy conversion efficiency of the best technologies commercially available in China for solid, liquid and gas fuels, using option A2, weighted on the basis of the emissions from each of these fuel types in the latest year for which data is available.
- The added generation capacity is taken instead of generation, as with the determination of the cohort of plant included in the build margin.

The build margin emission factor is calculated by the DNA using this methodology:

$EF_{grid,BM,y}$ = 0.7802 tCO_2/MWh

Step 7. Calculation of the combined margin emission factor

The combined margin emission factor is calculated as follows:

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

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 rounded down to the fourth digit), and fixed ex-ante:

$EF_{grid,CM,y}$ = 0.9502 tCO2/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.

Table 9. Values obtained when calculating the baseline emission factor

Variable	**Value**
Operating Margin Emissions Factor ($EF_{grid,OM,y}$ in tCO_2/MWh)	1.0069
Build Margin Emissions Factor ($EF_{grid, BM,y}$ in tCO_2/MWh)	0.7802
Baseline Emissions Factor ($EF_{grid,CM,y}$ in tCO_2/MWh)	0.9502

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 ($EG_{PJ,y}$).

Leakage

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

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) and project emissions (PE_y), as follows:

$$ER_y = BE_y - PE_y \quad (5)$$

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 ($EG_{PJ,y}$ in MWh). The calculation formula is as follows:

$$BE_y = EG_{PJ,y} * EF_{grid,CM,y} = (EG_{export,y} - EG_{import,y}) \times EF_{grid,CM,y} \quad (6)$$

With:
$EG_{export,,y}$ is the quantity of annual electricity delivered to the grid by the proposed project(MWh);
$EG_{import,y}$ 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:

This section includes a compilation of information on the data and parameters that are not monitored throughout the crediting period but that are determined only once and thus remain fixed throughout the crediting period and that are available when validation is undertaken. Following EB guidance, data that is calculated with equations provided in the methodology or default values specified in the methodology are not included in the compilation.

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(2006-2008)*
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 accepted and used by the DNA for the official 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(2006-2008)*
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 accepted and used by the DNA for the official emission factor calculations
Any comment:	-

Data / Parameter:	NCV_i
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(2006-2008)*
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, accepted and used by the DNA for the official 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://qhs.ndrc.gov.cn/qjfzjz/t20090703_289357.htm which uses the IPCC default values at the lower limit of the uncertainty at a 95% confidence interval as provided in table 1.4 of Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories.
Value applied:	See Annex 3

Justification of the choice of data or description of measurement methods and procedures actually applied :	The IPCC default values at the lower level of 95% confidence interval are accepted and used by the DNA for the official emission factor calculations, and are the default value in the tool.
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://qhs.ndrc.gov.cn/qjfzjz/t20090703_289357.htm
Value applied:	Best efficiency for coal plant is 38.10%; Best efficiency for oil plant is 49.99% Best efficiency for gas plant is 49.99%
Justification of the choice of data or description of measurement methods and procedures actually applied :	Based on official national statistics, accepted and used by the DNA for the official emission factor calculations
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(2006-2008)*
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:	$EF_{grid,CM,y}$
Data unit:	tCO_2/MWh
Description:	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” (version 2.1.0)
Source of data used:	http://qhs.ndrc.gov.cn/qjfzjz/t20090703_289357.htm
Value applied:	0.9502
Justification of the choice of data or description of measurement methods	As per the “Tool to calculate the emission factor for an electricity system” (version 2.1.0)

and procedures actually applied :	
Any comment:	-

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

>>
The annual emission reduction is (rounded to whole tonnes):
$BE_y = EG_y \times EF_{grid,CM,y}$ = 213,735 MWh/yr × 0.9502 tCO_2/MWh = 203,090 tCO_2/yr
$ER_y = BE_y - PE_y$ = 203,090 – 0 = 203,090 tCO_2/yr

The ex-ante calculations are included in the ER calculation spreadsheet.

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

>>
Table 10 Summary of the ex-ante estimation of emission reductions

Year	Estimated value of emission of the proposed project activity(tCO_2e)	Estimated value of emission of the baseline (tCO_2e)	Estimated value of emission of leakage (tCO_2e)	Estimated value of total emission (tCO_2e)
2011.07.01-2011.12.31	0	101,545	0	101,545
2012.01.01-2012.12.31	0	203,090	0	203,090
2013.01.01-2013.12.31	0	203,090	0	203,090
2014.01.01-2014.12.31	0	203,090	0	203,090
2015.01.01-2015.12.31	0	203,090	0	203,090
2016.01.01-2016.12.31	0	203,090	0	203,090
2017.01.01-2017.12.31	0	203,090	0	203,090
2018.01.01-2018.06.30	0	101,545	0	101,545
Total (tCO_2e)	0	1,421,630	0	1,421,630

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

>>
The following baseline and monitoring methodology is used:

- Approved consolidated baseline and monitoring methodology ACM0002 "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" version 12.1.0 (EB58 Annex 7, valid from 17 Sep 2010 onwards)

B.7.1 Data and parameters monitored:

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 if not indicated otherwise in the tables below. All measurements are conducted with calibrated measurement equipment according to relevant industry standards.

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

Source of data to be used:	Electricity meter (s), monitoring supply to the grid and imports from the grid
Value of data applied for the purpose of calculating expected emission reductions in section B.5	213,735 MWh/year when fully operating
Description of measurement methods and procedures to be applied:	Net electricity generated by the proposed project activity will be monitored continuously through the main metering equipment installed at the project activity site, recording exports to the grid ($EG_{export,y}$) and imports from the grid ($EG_{import,y}$). Net generation is calculated as exports minus imports. $EG_{facility,y} = EG_{export,y} - EG_{import,y}$
QA/QC procedures to be applied:	The metering equipment is calibrated and checked annually for accuracy by the qualified third party in accordance with relevant industry standards. The error resulting of the meters will not exceed 0.5%. Monthly net generation data will be approved and signed off by CDM manager before it is accepted and stored.
Any comment:	

Data / Parameter:	$EG_{export,y}$
Data unit:	MWh
Description:	Quantity of annual electricity exported to the grid by the proposed project
Source of data to be used:	Monitored from bidirectional electricity meter (s)
Value of data applied for the purpose of calculating expected emission reductions in section B.5	213,735 MWh when fully operating
Description of measurement methods and procedures to be applied:	The electricity supplied by the proposed project activity will be monitored continuously through the main metering equipment installed at the project activity site. The results from the main meter will be recorded monthly. The error resulting of the meters will not exceed 0.5%.
QA/QC procedures to be applied:	The metering equipment is calibrated annually for accuracy by a qualified third party in accordance with industry standard. Monthly generation data will be approved and signed off by CDM manager before it is accepted and stored. The supply of electricity to the grid is cross-checked against records for sold electricity.
Any comment:	Additional generating capacity not part of this proposed project activity may be connected to the same transmission line of the power grid company. The share of this wind farm of the electricity supply to the grid will be accounted for proportionally to generation of the proposed project activity and any additional capacity in this case.

Data / Parameter:	$EG_{import,y}$
Data unit:	MWh

Description:	Quantity of annual electricity imported from the grid by the proposed project
Source of data to be used:	Monitored from bidirectional electricity meter (s)
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 electricity imported to the proposed project activity will be monitored continuously through the main metering equipment installed at the project activity site. The results from the main meter will be recorded monthly. The error resulting of the meters will not exceed 0.5%.
QA/QC procedures to be applied:	The metering equipment is calibrated annually for accuracy by a qualified third party in accordance with industry standard. Monthly data of electricity imports will be approved and signed off by CDM manager before it is accepted and stored. The electricity import from the grid is cross-checked against records for sold electricity.
Any comment:	Additional generating capacity not part of this proposed project activity may be connected to the same transmission line of the power grid company. The share of this wind farm of the electricity supply from the grid will be accounted for proportionally to generation of the proposed project activity and any additional capacity in this case.

B.7.2. Description of the monitoring plan:

>>
The proposed project adopts ACM0002 (Version 12.1.0) to determine the emission reductions from the net electricity generation from the wind farm. This plan describes in more detail the process.

The responsibility for monitoring lies with CGN (Chabei) Wind Power Co., Ltd. who operates the proposed project activity. The company will establish 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 detailed 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: 21/02/2011.

Contact information of the entity and persons responsible:

- Carbon Resource Management Ltd. prepared the PDD. CRM Ltd. is a project participant listed in Annex 1.
- The persons preparing the documentation were:
  - Ms. Zhang Ling, zl@carbonresource.com, Tel: +86 10 8447 5246/12
  - Mr. Shi Xiangfeng, sxf@carbonresource.com, Tel: +86 10 8447 5246/30

- Mr. Christiaan Vrolijk, cv@carbonresource.com, Tel: +44 20 7016 1420.

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:

>>
28/07/2010

The starting date of a CDM project activity is the earliest of the date(s) on which the implementation or construction or real action of a project activity begins/has begun. The starting date of the proposed project activity is the signing date of Turbines Purchase Contract, as this is the earliest date as indicated in the timeline in Section B.5.

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

>>
20y-0m from commissioning

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

C.2.1. Renewable crediting period:

A renewable crediting period is chosen.

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

>>
01/07/2011 or the date of registration, whichever is later

C.2.1.2. Length of the first crediting period:

>>
7y-0m

C.2.2. Fixed crediting period:

Not chosen

C.2.2.1. Starting date:

>>
n/a

C.2.2.2. Length:

>>
n/a

SECTION D. Environmental impacts

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

>>
Environmental Impact Assessment (EIA) for the proposed project has been completed by Beijing National Water Conservancy & Electric Power Engineering Co., Ltd. and approved by Hebei Province Environmental Protection Bureau.

The analysis of the environment impact in the construction period

- The air pollution from the proposed project is mainly due to the dust emitted from the construction activity. The major measures for dust control include spreading water regularly on the construction site, covering the construction materials, minimizing the temporary land occupation, etc.
- Construction machinery and construction activity will generate noise. The low-noise equipment will be applied and be maintained regularly; the driving time and routine will be controlled; the construction plan and area involved will be well organized. Therefore, the impact of construction noise to the local region is minimal.
- The waste water during construction period is mainly from construction workers, and this small quantity of waste water will cause no impact on the local water environment.
- The solid waste in the construction period is mainly from building waste, construction waste and household garbage. The household garbage waste will be collected and then moved to the local landfill plant; the building waste will be collected by construction party; the construction soil will be refilled. Therefore, the solid waste will not have the impact on the environment.
- The necessary measures will be undertaken in order to minimize the impact to the environment, by means of reducing the land occupation, protecting the plants, surface soil conservation, recovering the ground, and compensation for the land occupation.

The analysis of the environment impact in operation period

- The operation of wind farm will cause some noise. The equipment will be maintained regularly. The distance between turbines and sensitive site will satisfy the protection requirement. Therefore, the noise does not influence the residential districts nearest to the site.
- The waste water during operation period is mainly from operation staff, and this small quantity of waste water during construction, which is used to water the plants after treatment, will cause no impact on the local water environment.
- The solid waste in the operational period is mainly from the household garbage. The household garbage waste will be collected and then moved to the local landfill plant. Therefore, the solid waste will not have the impact on the environment.
- In order to avoid the light and shadow influence to the local residents, the local government promise not to approve the residence buildings.
- In the operation period, all the land except the foundations of the wind turbines, could be recovered, therefore no impacts will be caused to the environment. In addition, the wild animals will be protected and the farmers will be taken care of.

Conclusion

Wind power is renewable energy and the impacts caused by wind farms on the surrounding ecosystem, water, noise, and atmosphere environment is insignificant.

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:

>>

Environmental impacts are not considered significant. Hebei Province Environmental Protection Bureau has approved the EIA (29 December 2007).

SECTION E. Stakeholders' comments

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

>>

In June 2010, the staff from the Developer carried out a survey of the local villagers and residents near the area. Questionnaires were sent to 50 stakeholders and the survey had a 100% response rate. As the project area is rural, far away from urban areas, and sparsely populated, the number of stakeholders are representative for a large area. The result of the survey indicated the support to the project.

The questionnaire was designed to be understandable and easy to fill in for the local stakeholders. The questionnaire included a short summary of the proposed project activity, questions about the responding stakeholder and a number of specific questions and the opportunity for further comments.

E.2. Summary of the comments received:

>>

Stakeholders surveyed

Item	Content	Vote	Proportion
Gender	Male	35	70%
	Female	15	30%
Education	Elementary school	10	20%
	Junior high school	20	40%
	Senior high school	16	32%
	University or above	4	8%

Responses

1. Will the project affect your environment of living, studying and working?	Yes	No	Not Sure
	0	100%	0%
2. Will construction, operation or decommissioning of the project affect natural resources or ecosystems, such as water, habitats, etc?	Yes	No	Not Sure
	0	100%	0%
3. Will the project cause noise, vibration or release of electromagnetic radiation that could adversely affect your health?	Yes	No	Not Sure
	0	100%	0%
4. Will the project help to reduce GHG emissions, comparing to conventional thermal power plant?	Yes	No	Not Sure
	98%	0	2%
5. Do you think the proposed project will have a positive impact on local economic development?	Yes	No	Unclear
	100%	0	0
6. Do you agree with the development of the Project?	Yes	No	No Concern
	100%	0	0

No further comments were given.

Conclusions from the survey

The survey shows that the proposed project has strong support among the local stakeholders. 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 stakeholders are all supportive of the proposed project activity, and up to date there has been no need to modify the project design according to the comments received.

The project developer 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 from Annex I used for the financing of the proposed project activity.

Annex 3

BASELINE INFORMATION

Step 1. Identify the relevant electricity systems

See B.6.

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 grids: Jiangxi, Henan, Hubei, Hunan, Chongqing, Sichuan.

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

See B.6. Option I is chosen: only grid power plants are included in the calculation.

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

Table A1 Power generation in NCPG from 2003 to 2007

Year	Low-cost/must-run generation	Total generation	Share
	10^8kWh	10^8kWh	
2003	39.79	4,617	0.9%
2004	40.32	5,308	0.8%
2005	45.51	6,078	0.7%
2006	48.04	6,100	0.8%
2007	76.40	8,457	0.9%
Total	250.06	30,559	0.8%
Average	50.01	6,112	0.8%

Source: China Power Year Book (2004/p709) (2005/p474) (2006/p568) (2007/p638) (2008/p733)

Note: Only nuclear/renewables are considered low-cost/must-run

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

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

Table A2 Net calorific value and CO2 emission factor of fossil fuels

Fuel	Net Calorific Value		CO2 Emission Factor * (kgCO2/TJ)
Solids			
Raw coal	20,908	kJ/kg	87,300
Clean coal	26,344	kJ/kg	87,300
Other washed coal	8,363	kJ/kg	87,300
Moulding coal	20,908	kJ/kg	87,300
Coke	28,435	kJ/kg	95,700
Liquids			
Crude oil	41,816	kJ/kg	71,100
Gasoline	43,070	kJ/kg	67,500
Diesel	42,652	kJ/kg	72,600
Fuel oil	41,816	kJ/kg	75,500
Other petroleum products	41,816	kJ/kg	75,500
Other coking products	28,435	kJ/kg	95,700
Gases			
Natural gas	38,931	kJ/m3	54,300
Coke oven gas	16,726	kJ/m3	37,300
Other gas	5,227	kJ/m3	37,300
LPG	50,179	kJ/kg	61,600
Refinery gas	46,055	kJ/kg	48,200
Other energy	0		0

Sources: LCV from China Energy Statistical Year Book 2008, p284; CO2 emission factor from the Chinese DNA (also 2006 IPCC Guidenlines for National Greenhouse Gas Inventories, Vol 2 (Energy), Chapter 1, Tables 1.3 and 1.4)

*Note: * Using IPCC default values at the lower limit of the uncertainty at a 95% confidence interval as provided in table 1.4 of Chapter1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories*

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 for fuel use is presented in Table A3.

Table A3 Fuel consumption in thermal power generation in NCPG, 2005-2007

Fuel	Unit	2005	2006	2007	Total
Raw coal	10^4 t	32,158.53	35,607.41	40,115.43	107,881.37
Clean coal	10^4 t	42.18	39.77	18.43	100.38
Other washed coal	10^4 t	656.36	1,198.00	1,446.87	3,301.23
Moulding coal	10^4 t	-	35.74	50.79	86.53
Coke	10^4 t	0.32	3.23	4.11	7.66
Coke oven gas	10^8 m^3	23.48	35.56	45.57	104.61
Other gas	10^8 m^3	91.03	140.73	238.39	470.15
Crude oil	10^4 t	0.73	0.74	-	1.47
Gasoline	10^4 t	0.01	0.01	0.01	0.03
Diesel	10^4 t	4.14	9.61	8.38	22.13
Fuel oil	10^4 t	12.54	10.56	7.27	30.37
LPG	10^4 t	-	0.01	-	0.01
Refinery gas	10^4 t	9.02	4.75	4.56	18.33
Natural gas	10^8 m^3	3.12	4.67	10.53	18.32
Other petroleum products	10^4 t	-	0.28	1.72	2.00
Other coking products	10^4 t	-	-	4.74	4.74
Other E (standard coal)	10^4 tce	236.41	429.50	643.68	1,309.59

Sources: DNA; and China Power Year Book (2006, 2007, 2008)

Emissions from fossil fuel consumption

The emissions from this fuel use are calculated using the following formulae in B.6., and are presented in Table A4:

Table A4 Emissions from thermal generation in NCPG, 2005-2007

Fuel	2005	2006	2007	Total
Raw coal	586,979,486	649,930,803	732,214,267	1,969,124,556
Clean coal	970,069	914,643	423,859	2,308,571
Other washed coal	4,792,018	8,746,477	10,563,452	24,101,947
Moulding coal	-	652,351	927,054	1,579,405
Coke	8,708	87,896	111,843	208,446
Coke oven gas	1,464,870	2,218,517	2,843,020	6,526,407
Other gas	1,774,786	2,743,772	4,647,821	9,166,378
Crude oil	21,704	22,001	-	43,705
Gasoline	291	291	291	872
Diesel	128,197	297,577	259,490	685,263
Fuel oil	395,901	333,391	229,522	958,814
LPG	-	309	-	309
Refinery gas	200,231	105,443	101,225	406,899
Natural gas	659,553	987,216	2,225,993	3,872,762
Other petroleum products	-	8,840	54,302	63,142
Other coking products	-	-	128,986	128,986
Other E (standard coal)	-	-	-	-
Total	597,395,812	667,049,525	754,731,124	2,019,176,462

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 A5 below.

Table A5 Thermal generation, own consumption rate, and net supply in NCPG

	2005		
Region	Gross generation (10^8 kWh)	Own use (%)	Net generation (10^8 kWh)
Beijing	208.80	7.73	192.66
Tianjin	369.93	6.63	345.40
Hebei	1,343.48	6.57	1,255.21
Shanxi	1,287.85	7.42	1,192.29
Inner Mongolia	923.45	7.01	858.72
Shandong	1,898.80	7.14	1,763.23
NCPG			5,607.51
	2006		
Region	Gross generation (10^8 kWh)	Own use (%)	Net generation (10^8 kWh)
Beijing	207.05	7.51	191.50
Tianjin	359.24	6.86	334.60
Hebei	1,438.88	6.63	1,343.48
Shanxi	1,502.50	7.45	1,390.56
Inner Mongolia	1,395.93	7.58	1,290.12
Shandong	2,309.22	7.12	2,144.80
NCPG			6,695.06
	2007		
Region	Gross generation (10^8 kWh)	Own use (%)	Net generation (10^8 kWh)
Beijing	223.00	7.51	206.25
Tianjin	399.00	6.53	372.95
Hebei	1,633.00	6.67	1,524.08
Shanxi	1,734.00	7.99	1,595.45
Inner Mongolia	1,801.00	7.77	1,661.06
Shandong	2,591.00	7.23	2,403.67
NCPG			7,763.46

Source: DNA; and China Power Year Book (2006,2007,2008)

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. There are electricity transfers from the connected electricity systems to the project electricity system, and therefore the emissions related to these imports should be accounted for.

Table A6 Electricity imports and origin

	2005	2006	2007
Origin (exporting grid)	10^8kWh	10^8kWh	10^8kWh
Northeast Power Grid (NEPG)	39.29	26.18	17.90
Central China Power Grid (CCPG)	0	4.97	8.03

Source: Electricity industry statistical document summary (2006, 2007, 2008)

The project participants chose to use the average operating margin, in line with the DNA calculations. The average emission rate is calculated using the same steps as above for NCPG, namely fuel consumption and net generation as indicated in the calculation spreadsheet. The resulting average emission factors are presented in Table A7 below.

Table A7 Average emission factors of NEPG and CCPG

Exporting grid	2005	2006	2007
NEPG	1.1649	1.1497	1.0819
CCPG	n/a	1.1216	1.1020

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 A8.

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

Table A8 Operating margin emission factor calculation

	2005	2006	2007	Total / 3-year average
CO2 emissions (tCO2)	597,395,812	667,049,525	754,731,124	2,019,176,462
Net generation (MWh)	560,751,013	669,506,473	776,346,330	2,006,603,816
Imports				
From NEPG (MWh)	*3,929,000*	*2,618,060*	*1,789,750*	*8,336,810*
Associated EF (tCO2/MWh)	*1.1649*	*1.1497*	*1.0819*	
Associated emissions (tCO2)	*4,576,870*	*3,010,025*	*1,936,260*	*9,523,155*
From CCPG (MWh)		*497,060*	*803,000*	*1,300,060*
Associated EF (tCO2/MWh)		*1.1216*	*1.1020*	
Associated emissions (tCO2)		*557,486*	*884,885*	*1,442,371*
Total CO2 emissions (tCO2)	601,972,682	670,617,037	757,552,268	2,030,141,988
Total supply (MWh)	564,680,013	672,621,593	778,939,080	2,016,240,686
EF OM (tCO2/MWh)	1.0660	0.9970	0.9725	1.0069

Based on above data, the simple OM emission factor of NCPG is calculated ex-ante using a 3-year generation-weighed average is 1.0069 tCO_2e/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 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 2008) 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 2007. The added generation capacity is the sample group of power units *m* used to calculate the build margin.

Table A9 Identify the year from which the added generation capacity is equal to or just exceeds 20% of the latest statistic year 2006

Plant type	Capacity 2005	Capacity 2006	Capacity 2007	Added 2005-2007	Added 2005-2007	Share of additions 2005-2007
Thermal	111,069	141,538	164,800	53,731	23,262	95.25%
Hydro	3,216	4,004	4510	1,294	506	2.29%
Nuclear	-	-	0	-	-	0.00%
Other	336	937	1719.2	1,384	782	2.45%
Total	114,620	146,479	171029.2	56,409	24,550	100.00%
Share of recent additions				33%	14%	
Selected				Yes	No	

Source: China Power Year Book (2006, 2007, 2008).

Step 6. Calculate the build margin emission factor

As described in step5, 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 CO_2 emission share of thermal generation by fuel type

The fuel emission shares in the latest year are calculated from the emissions presented in Table A4 above.

Table A10 Fuel shares in NCPG in 2006

Fuel type	Emissions (tCO2e)	Share λ
Solid	744,369,461	98.63%
Liquid	543,604	0.07%
Gas	9,818,059	1.30%
Total	754,731,124	100%

Source: China Energy Statistical Year Book (2008).

Sub-step 2: Calculate the weighted emission factor of thermal power

Table A11 Calculation of CO2 Emission Factor of Coal, Oil and Gas Fuel Power Plant with the Best Commercial Efficiency in China

Plant type	Best efficiency η	Carbon Emission Factor (kgCO2/TJ)	EFi,Adv (tCO2e/MWh)
Coal/solid	38.10%	87,300	0.8249
Oil/liquid	49.99%	75,500	0.5437
Gas	49.99%	54,300	0.3910
Source: http://qhs.ndrc.gov.cn/qjfzjz/t20090703_289357.htm			

Using the fuel shares as indicated in Table A10 above, the weighted average emission factor for thermal power plant can be calculated.

Table A12 Weighted average emission factor for thermal power plant in the build margin

Plant type	EFi,Adv (tCO2e/MWh)	Share λ	EFthermal (tCO2e/MWh)
Coal/solid	0.8249	98.63%	
Oil/liquid	0.5437	0.07%	
Gas	0.3910	1.30%	
Thermal			0.8190

Sub-step 3: Calculate the build margin emission factor

Using the identified cohort of power units (step 5) and the emission factor of thermal power, calculate the build margin emission factor.

Table A13 Build margin calculation

Plant type	Added capacity (%)	EFi (tCO2e/MWh)	EFBM (tCO2e/MWh)
Thermal	95.25%	0.8190	
Hydro	2.29%	-	
Nuclear	0.00%	-	
Other	2.45%	-	
Total	100.00%		0.7802

Step 7. Calculate the combined margin (CM) emissions factor.

The combined margin emission factor is calculated as follows (rounded to the fourth digit):

$$EF_{grid,CM,y} = w_{OM} \bullet EF_{grid,OM,y} + w_{BM} \bullet EF_{grid,BM,y} = 0.75 \times 1.0069 + 0.25 \times 0.7802 = 0.9502\ tCO_2/MWh$$

Annex 4

MONITORING INFORMATION

1. Introduction

The proposed Project adopts the approved consolidated monitoring methodology ACM0002 "Consolidated baseline methodology for grid-connected electricity generation from renewable sources (version 12.1.0) to determine the emission reductions from the net electricity generation from the wind farm.

2. Responsibility

Overall responsibility for monitoring and carrying out the monitoring following this monitoring plan lies with CGN (Chabei) Wind Power Co., Ltd..

3. Training

The CDM project management office will assign and train the dedicated people carrying out the monitoring work. The CDM project manager will complete the monitoring personnel training before the registration, further training work will be completed with the preliminary verification.

4. Installation of meter

The annual net supplied power of the proposed project activity to the grid will be monitored through the use of main meter (s) at the onsite substation of the wind farm project, recording quantity of annual electricity exported to the grid ($EG_{export,y}$) and quantity of annual electricity imported to the grid ($EG_{import,y}$). Annual net generation is calculated as $EG_{export,y}$ minus $EG_{import,y}$. The backup meter(s) will be installed at the onsite substation. The error resulting of the meters will not exceed 0.5%. The main meter(s) monitor the flow continuously and are reported monthly.

The main meter(s) will be read by the qualified operating staff of the wind farm. A monthly report of the net on-grid electricity from the main meter installed at the onsite substation will be established on the basis of the data.

4.1 Additions to the proposed generating capacity

If in the future, other wind farms share the same transformer, substation or transmission line with this wind farm, appropriate additional meters will be installed at the project site so that the electricity generation can be monitored for each wind farm (or each turbines) separately so as to calculate the share of this wind farm of the net supply to the grid.

The net electricity supplied by the project activity ($EG_{project}$) will be calculated as follows:

$EG_{project} = EG_{total} * E_{project} / (E_{project} + E_{others})$

EG_{total} is the total net electricity supplied to the grid based on the data metered by the main meter;

$E_{project}$ is the electricity generation from the project activity metered by the separate meters;

E_{others} is the electricity generation from other projects metered by the other separate meters.

5. Calibration

The metering equipment will be calibrated and checked for accuracy in accordance with industry standards. The error resulting of the meters will not exceed 0.5%.The net generation output registered by the meter alone will suffice for the purpose of billing and emission reduction verification as long as the error in the meter is within the agreed limits.

The metering equipment 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 entity with the records being supplied to CGN (Chabei) Wind Power Co., Ltd., and these records will be maintained by CGN (Chabei) Wind Power Co., Ltd..

The metering equipment installed shall be tested by qualified entity after: the detection of a difference larger than the allowable error in the readings of main meter; 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 within acceptable limits of accuracy or operation is performed improperly CGN (Chabei) Wind Power Co., Ltd.. and the Power Grid Company 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 Power Grid Company and CGN (Chabei) Wind Power Co., Ltd. fail to agree then the matter will be referred for arbitration according to agreed procedures.

6. Monitored data

Grid-connected electricity generated by the proposed project will be monitored through the main metering equipment. Every month CGN (Chabei) Wind Power Co., Ltd. will obtain the on-grid electricity generation from the substation.

7. 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.

8. Data management system

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 project, the project material and monitoring results will be indexed. All paper-based information will be stored by the technology department of CGN (Chabei) Wind Power Co., Ltd. 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.

9. Reporting and verification

- CGN (Chabei) Wind Power Co., Ltd. records readings from the main meter monthly.
- CGN (Chabei) Wind Power Co., Ltd. carries out an internal audit on the readings and calculations.
- CGN (Chabei) Wind Power Co., Ltd., after the internal audit, reports the readings, grid data and calculations to the DOE for verification.

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