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

CONTENTS

Annexes

SECTION A. General description of project activity

A.1. Title of the project activity:

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Project title: Hebei Shangyi Manjing North Wind Farm Project
PDD version: 1.2
Completion date: 05/01/2009

Revision history
Version 1.0: Draft for host country approval
Version 1.1: Draft for global stakeholder comment revised according DNA's comments
Version 1.2: Revision after DOE report, incorporating new template, guidance, methodology, data and tools.

A.2. Description of the project activity:

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Hebei Shangyi Manjing North Wind Farm Project ("the project") is located in Shangyi City, Hebei Province, and is developed by Guohua (Hebei) Renewable Energy Co., Ltd. The proposed project activity will consist of 33 wind turbines, each of which with a capacity of 1500kW; therefore, the total installed capacity of the proposed wind farm is 49.5MW. The total supplied power to the grid is expected to be 105,090MWh per year, which will be sold to the North China Power Grid (NCPG).

As the NCPG is dominated by the thermal power generation, the establishment of the proposed project will lead to greenhouse gas (GHG) emission reductions, which is estimated to be approximately 110,849 tonnes of CO_2e per year. The proposed project will help local government to promote economic development and improve the air quality.

The proposed project 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 baseline scenario, therefore, is the same as the scenario existing prior to the implementation of the project activity, i.e. generation of electricity by grid connected power plants.
The proposed project promotes local sustainable development through the following aspects:

- generate clean electricity;
- reduce greenhouse gas emissions in China compared to a business-as-usual scenario;
- create local employment opportunity during the assembly and installation of wind turbines, and for operation of the Hebei Shangyi Manjing North Wind Farm Project; and
- reduce other pollutants resulting from the fossil fuel fired power plants compared to a business-as-usual scenario, such as SO_2 and soot.

A.3. Project participants:

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Name of Party involved	**Private and/or public entity(ies) project participants (as applicable)**	**Party involved wishes to be considered as project participant (Yes/No)**
P.R. China (host)	Guohua (Hebei) Renewable Energy 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:

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A.4.1.1. Host Party(ies):

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People's Republic of China

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

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Hebei Province

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

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Shangyi County, 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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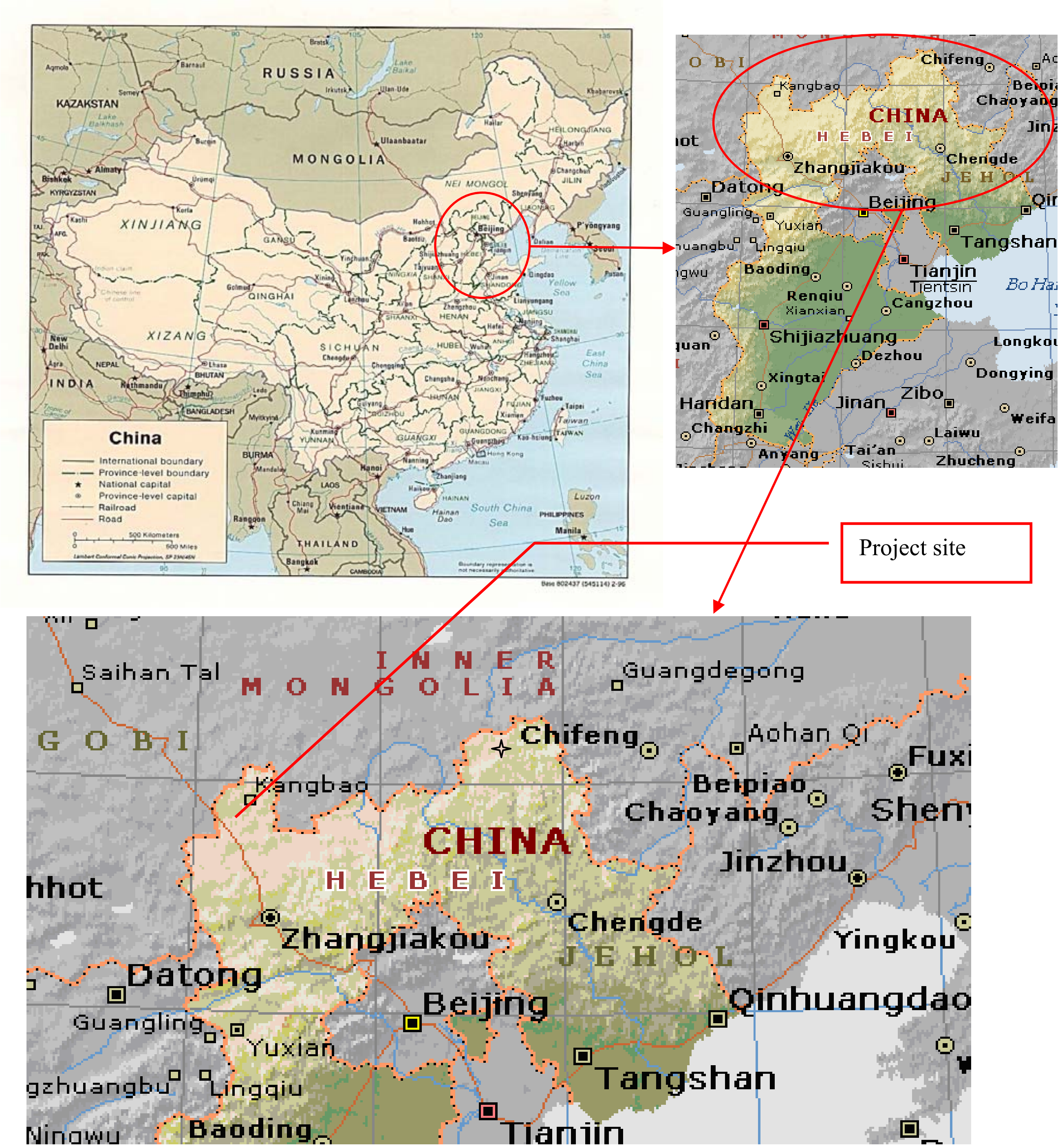
The project is located in Shangyi County, which is in the Northwest of Hebei Province in the People's Republic of China. Shangyi County lies in about 116 kilometres from Zhangjiakou City. Hebei Shangyi Manjing North Wind Farm Project is located in the east of Shangyi County. The project site is located at longitude 114°16' East and latitude 41°05' North. The altitude of the site ranges from 1550m to 1650m above mean sea level. Figure 1 shows the location of the project.

Figure 1 Map showing the location of the wind farm



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

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

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

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The 33 sets of 1500 kW GE turbines (model 1.5s) manufactured by GE Energy (Shenyang) Co., Ltd. were selected through competitive bidding. The technology used for the project is transferred from a developed country. The wind turbines are more advanced than the current available Chinese wind turbine technology and the technology is deemed to reflect current good practice. The detailed parameters are provided in Table 1.

Table 1 Key technology parameters of the turbines

Key technology parameter	Value
Rotor diameter (m)	70.5
Swept area (m^2)	3904
Cut-in wind speed (m/s)	4
Rated wind speed (m/s)	14
Cut-out wind speed (m/s)	25
Hub height of the wind turbines (m)	65
Load factor	24%
Rated voltage (V)	690

The total supplied power to the grid is expected to be 105,090MWh. The electricity generated from the project will be transmitted to Zhangbei 220kV substation of North China Power Grid via an 110kV transmission line. A 50MVA transformer (110kV/35kV) and one 110kV transmission line from Shangyi to Zhangbei will be installed. It is planned that the wind farm will be operational for a minimum of 20 years.

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

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Applying the proposed methodology, the project will achieve ex-ante estimated average annual emission reductions over the first seven-year renewable crediting period of 110,849 tCO_2e, as shown in Table 2 below.

Table 2 Estimated emission reductions of the proposed project in first crediting period

Period*	**Annual estimation of emission reductions in tonnes of CO_2e**
2009/09/01-2009/12/31	36,580
2010	110,849
2011	110,849
2012	110,849
2013	110,849
2014	110,849
2015	110,849
2016/01/01-2016/08/31	74,269
Total estimated reductions(tonnes of CO_2e)	775,943
Total number of first crediting years	7
Annual average over the crediting period of estimated reductions (tonnes of CO_2e)	110,849

A.4.5. Public funding of the project activity:

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There is no public funding for the 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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Approved baseline and monitoring methodology:

- *ACM0002: Consolidated methodology for grid-connected electricity generation from renewable sources* Version 08

Tools referenced in this methodology:

- *AM_Tool_01: Tool for the demonstration and assessment of additionality* Version 05.2
- *AM_Tool_07: Tool to calculate the emission factor for an electricity system* Version 01.1

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

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

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

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

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Emission sources:

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

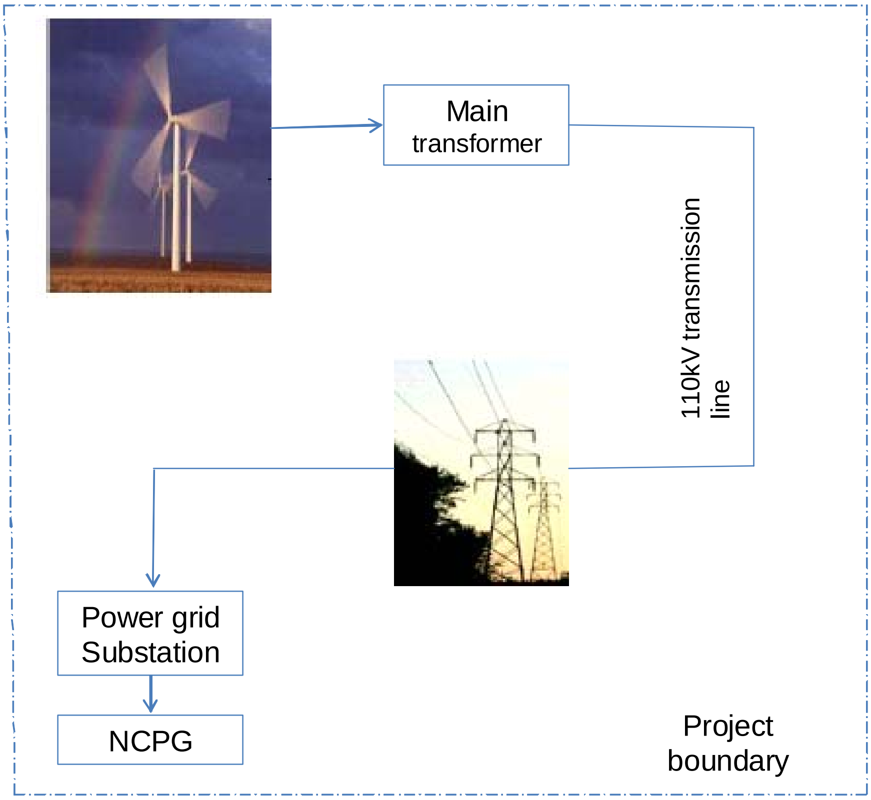
According to the approved methodology ACM0002, the emission sources and GHGs in the project boundary are as follows:

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

	Source	Gas	Included?	Justification / Explanation
Baseline	Grid	CO_2	Yes	Main emission source
		CH_4	No	Minor emission source.
		N_2O	No	Minor emission source.
Project Activity	No	CO_2	No	According to ACM0002, the project emission of the proposed project activity is zero.
		CH_4		
		N_2O		

Spatial boundary:

The spatial extent of the proposed project boundary includes Hebei Shangyi Manjing North wind farm site and all power plants connected physically to the NCPG.



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

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

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

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The project activity does not modify or retrofit an existing generating facility; therefore, the baseline scenario in accordance with ACM0002 for grid-connected electricity generation from renewable energy sources is the following:

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

Electricity delivered to the NCPG by the proposed project would have otherwise been generated by the operation of grid-connected power plants in the NCPG and by the addition of new generation sources in the NCPG, as reflected in the combined margin calculation in Section B.6.

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

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CDM consideration

The CDM was taken into account from the very beginning of the project[2].The Feasibility Study Report (FSR) which was prepared by Beijing Jikedian Renewable Energy Development Center found that the project was not financially attractive, with an IRR below the benchmark, without obtaining additional income from the sale of certified emission reductions, and therefore the CDM income was taken into account in the FSR to improve the IRR above benchmark. Therefore, the developer decided to develop the proposed project as a CDM project in December 2007. [3]The developer confirmed Carbon Resource Management as the CDM manager and signed an emission reduction purchase agreement on December 17th 2007. After the FSR of the proposed project was approved on February 27th 2008, the developer signed the purchasing contract of turbines with the turbine suppliers on March 20th 2008, which is the starting date of the proposed project. And finally the construction of the project started in March 31st 2008. Therefore, the incentive from the CDM, therefore, had been fully taken into account prior to the starting date of the project activity, aiming to obtain the additional funding to secure the project financially.

Table 4. Time schedule of the implementation of the project

Time	Milestone
2007.06.20	EIA approved
2007.11	Feasibility Study Report completed.
2007.12.10	The developer held a board meeting and decided to apply for CDM project.
2007.12.17	The developer signed the ERPA.
2008.02.27	FSR approved by Hebei Development and Reform Committee
2008.03.20	Turbine purchasing contract (i.e. starting date of the proposed project activity)
2008.03.31	Project construction started.
2008.07.04	Start of GSP

Additionality

The approved methodology ACM0002 requires the use of the latest version of the “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:

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[2] FSR, p119, p 123.

[3] Minutes of the board meeting in December 2007, by Guohua (Hebei) Renewable Energy Co., Ltd.

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

Four alternatives to the proposed project activity which provides outputs or services comparable with the proposed CDM project activity are identified. Below each of the alternatives is listed and it is discussed whether the alternative is realistic and credible. It is shown from the discussion below, and the following sections, that only alternative (d), electricity delivered by the NCPG, is a realistic and credible alternative.

a) *The proposed project activity undertaken without being registered as a CDM project activity.* The proposed project is financially less attractive, as demonstrated in step 2 below, and the proposed project activity undertaken without being registered as a CDM project activity is not a realistic alternative.

b) *Thermal power plant with comparable capacity or electricity generation.* This is not in line with current laws and regulations as explained in sub-step 1b.

c) *Other renewable energy with comparable capacity or electricity generation.* Other renewable energy technologies are possible sources that could be used in China. However, due to the high cost for power generation and the fact that these technologies are still in early stages of development, solar PV, geothermal and biomass of similar installed capacity or generation are not realistic alternatives in China.[4] In contrast, hydro power projects can have an investment return rate that competes with that of wind power projects in China.[5] However, there is no exploitable hydro power resource in the area of the proposed project activity[6], and therefore, this alternative is not realistic.

d) *Comparable capacity or electricity generation addition provided by North China Power Grid.* To meet the increasing electricity demand, the power grid company can increase generation from operating units or new built power plants connected to the grid. Indeed, this is the current route followed by the industry to meet demand, as reflected in the baseline calculations data presented: more than 99% of recently added capacity is thermal power. Therefore, comparable capacity or electricity generation addition provided by North China Power Grid can be taken as a realistic alternative for the project activity and comply with the applicable laws and regulations.

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

According to Chinese regulations, coal-fired power plants of less than 135MW are prohibited from being built in areas covered by the large grids such as provincial grids[7]. Therefore, a fossil fuel fired power plant with the same capacity as the proposed project activity, or with a capacity with comparable electricity generation, which would be 17.9MW[8], as described in alternative b in sub-step 1a, conflicts with Chinese regulations and practice. Alternative b, therefore, is not a realistic alternative.

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[4] http://scitech.people.com.cn/GB/5347113.html, http://www.sdpc.gov.cn/zjgx/t20071123_174054.htm;
[5] http://www.chinaenergy.gov.cn/news.php?id=15688;
[6] http://www.hwcc.com.cn/nsbd/NewsDisplay.asp?id=177699

[7] 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.

[8] According to the *China Electric Power Yearbook, Page 559 (2006 Edition), China Electric Power Press*, the average annual utilisation rate of thermal power units in China in 2006 was 5865 hours. A 17.9MW unit with average utilization rate could generate the same electricity as the proposed wind farm.

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

Step 2. Investment analysis

The purpose of this step is to determine whether or not the proposed project activity is the most economically or financially attractive option. To conduct the investment analysis, use the following sub-steps:

Sub-step 2a. Determine appropriate analysis method

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

Following the EB guidance on the assessment of investment analysis[9], 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*[10], the benchmark of total investment financial internal rate of return (IRR) of electric power industry is 8%, and only if the total investment IRR of the project is higher than or equivalent to this benchmark, the project is financially feasible. So this benchmark is widely used in assessment and approval of Chinese electricity power industrial Feasibility Study Report, especially for new projects. The approved FSR of the proposed project adopted the 8% as the benchmark from the *Interim Rules*. The benchmark of 8% IRR, therefore, is used in this analysis for the proposed project activity.

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

The investment estimation in the Feasibility Study Report is based on national regulation, material and equipment price levels. The relevant data is listed in table 5:

Table 5 Relevant indicators for financial assessment

Item	Value	Source
Supplied power to the grid	105,090 MWh	Feasibility study report
Static Total investment	437.18 million RMB Yuan	Feasibility study report

[9] Paragraph 15, 'Guidance on the Assessment of Investment Analysis' (version 02), EB 41 Annex 45.
[10] Issued by State Power Corporation of China in 2002.

Expected operational lifetime	20 Years	Feasibility study report
On-grid tariff (including VAT)	0.54 RMB / kWh	Feasibility study report [11]
Value added tax rate	8.5%	Feasibility study report
Income tax rate	25%	Feasibility study report
CER price	10 €/t CO_2e	Assumption

Table 6 shows the IRR of the project without and with CER revenue. It can be seen that IRR without CER revenue is below the benchmark 8% and with revenue from CDM at the assumed price level, the proposed project would be more financially attractive.

Table 6 Result of the investment analysis of the proposed project

Indicator	Without CDM	With CDM
IRR	6.5%	9.3%

The revenue from the sale of CERs is expected to have a significant impact on the expected IRR of the project. Although some uncertainties exist, investors would gain a reasonable financial return at such risk. The internal rate of return with CER revenues would appear financially attractive for prospective investors, as it exceeds the benchmark.

Sub-step 2d. Sensitivity analysis

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

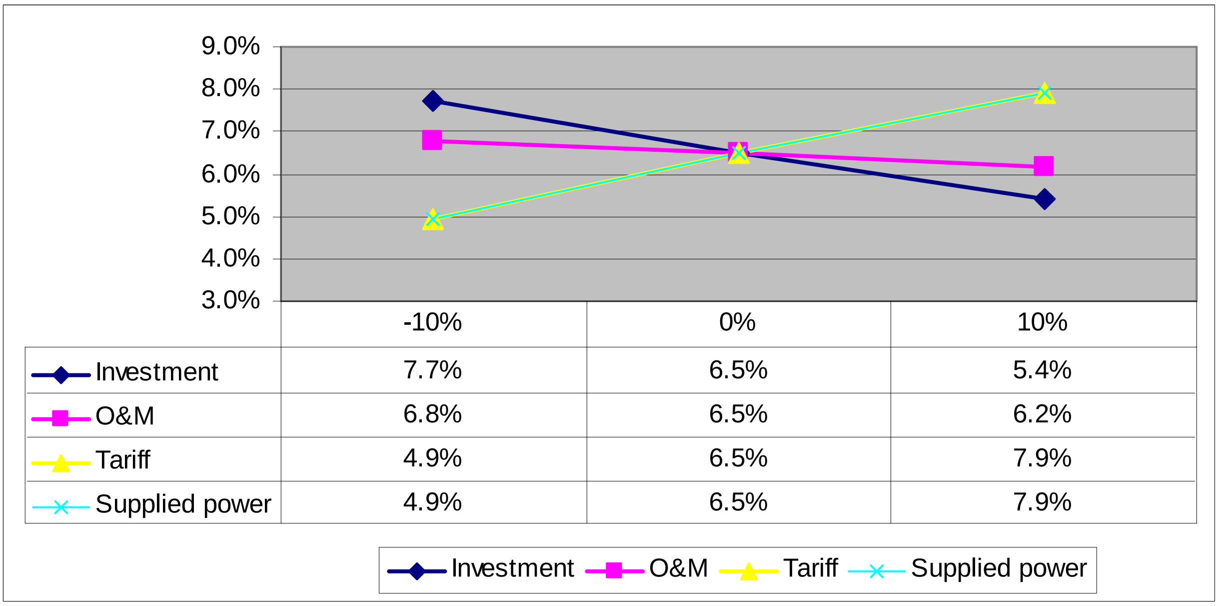
According to EB Guidance, only variables that constitute more than 20% of either total project costs or total project revenues should be subjected to reasonable variation. The most important parameters impacting the project IRR are:

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

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

[11] FSR, p119, the expected on-grid tariff used in FSR.
The on-grid tariff of the latest wind farms in Hebei province before the FSR was compiled was approved as 0.54RMB/kWh by NDRC in June 2007.(fagainengyuan[2007]1260). Therefore, the on-grid tariff of 0.54RMB/kWh was used in the calculation in the PDD.

Figure 2 IRR sensitivity analyses for the proposed project



Variations of -10% to +10% from the original assumptions for each of the critical variables are used in line with the regulations.

The financial analysis shows that the project is not the most financially attractive alternative, and the sensitivity analysis shows that it is unlikely to be financially attractive compared to the benchmark under reasonable variations in the assumptions. However, the revenue from the CERs will greatly improve the financial feasibility of the proposed project, and it will also improve the ability to hedge risks.

Table 7 shows the variations in the main parameters required from the assumed values in the financial analysis, in order for the calculated IRR to reach the benchmark 8%. Each of these variations is greater than can reasonable be expected, as also explained in more detail for each parameter below.

Table 7 Variation of financial parameters required to reach project IRR of 8%*

Parameter	**Variation required**
Static investment	Decrease by 11.95%
O&M cost	Decrease by 52.3%
On-grid tariff	Increase by 10.75%
Annual supplied power	Increase by 10.75%

*Note: * benchmark is 8%.*

Static investment

For the wind farm projects, the cost of turbine, engineering construction and related accessories comprise the majority budget of the static investment. As prices of turbines and other related equipment have been increasing in recent years, a decrease of the static investment is unlikely and there’s a much greater

likelihood of the static investment to go up.[12] Therefore, it was not realistic for the developer to assume that investment costs could decrease by the required 11.95% in order to reach the benchmark.

Tariff

The expected on-grid tariff used for the financial analysis refers to the tariff document of wind farms in Hebei province of NDRC in 2007, the most recent available at the time of writing the FSR. As the table 8 shows, the tariff in Hebei province has been gradually decreasing in recent years, it was almost certain at the time of making the decision to go ahead with the project that the finally agreed tariff will be the same or lower of than the recently approved 0.54 RMB/kWh. It is very unlikely that the tariff would be at least 10.75% higher than other recent wind farm projects, in order to reach the benchmark 8%. Therefore, within a reasonable range for the tariff, the proposed project will not reach the benchmark.

Table 8 The approved on-grid tariff of Hebei wind farms from 2005 to 2008

2005, Hebei Zhangbei wind farm	0.984 RMB/kWh	A study on Pricing Policy of Wind Power in China,P3
2006, Hebei Zhangbei and Hebei Chengde Hongsong Phase 1	0.650 RMB/kWh	The approval letter of Hebei bureau of price, Jijiaguanzi (2006)57
2006, Hebei Hongsong Phase2, Shangyi Phase 1&2 etc.	0.600 RMB/kWh	The approval letter of Hebei bureau of price, Jijiaguanzi (2006)57
2007, Hebei Songshan etc.	0.540 RMB/kWh	Fagainengyuan [2007]1260,[2007]3303
2008 ,Hebei Manjing Phase 3	0.540 RMB/kWh	Fagainengyuan [2008]1876

Generation

The expected power generation of the proposed project is calculated by an independent qualified design institute with the highest grade (Grade A) in the electricity report on the basis of wind assessment records for 1977 to 2006[13] and output of the turbines, using a scientific approach applied internationally. The volume of annual generation therefore represents the long-term average power supply during the lifetime of the wind farm, taking into account yearly variations in power generation.

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

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

[13] FSR p16

Therefore, it is not credible to assume that generation from the proposed project would increase by 10.75% or more over the lifetime of the project in order the reach the benchmark 8%.

O&M

The O&M costs in the approved feasibility study were derived from the extensive experience of the developer and the design institute, as well as quotes supplied to the developer. 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.[12]
As O&M costs would need to drop by nearly 52.3% in order to reach the benchmark rate of 8%, this possibility can be ruled out.

Conclusion

The financial analysis shows that the project is not the most financially attractive alternative, and the sensitivity analysis shows that it is unlikely to be financially attractive compared to the benchmark under any reasonable variations in the assumptions. However, the revenue from the CERs will greatly improve the financial feasibility of the proposed project, and it will also improve the ability to hedge risks.

Step 4. Common practice analysis

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

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

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

"Statistics of wind power installed capacity in China" by Professor Shi Pengfei is adopted as the data source. From this report, wind farms in Hebei province are selected to analyze common practice. Taking note of that the proposed project is a large scale project, the small scale projects, less than 15MW, and other CDM projects are excluded as per the EB guidance for common practice, see below Table 6.

Table 6. 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", Shi Pengfei; Notice on the adjustment of electricity price from the Hebei Price Bureau; *http://cdm.unfccc.int/Projects/registered.html*.

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

Both Chengde Hongsong wind farm and Shangyi Manjing wind farm did not obtain the anticipated high on-grid tariff, so these two projects were facing serious financial barriers.[14] Both projects overcome this serious barrier with the help of carbon funding.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 activity is not the baseline scenario and is additional.

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

In conclusion, all the steps above are satisfied, the project activity is additional.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

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1. Baseline Emission Calculation

According to ACM0002**,** the baseline emissions include only CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity, calculated as follows:

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

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

The baseline emission factor (EF_y) is calculated as a combined margin ($EF_{grid,CM,y}$), consisting of the combination of operating margin ($EF_{grid,OM,y}$) and build margin ($EF_{grid,BMy,}$) factors according to the following six steps defined in the "Tool to calculate the emission factor for an electricity system". Details of the calculations and data follow the published data from the Chinese DNA and official national statistics (China Energy Statistical Yearbook and China Electric Power Yearbook), and are also given in

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

Annex 3 of the PDD.

Step 1. Identify the relevant electric power system

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

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

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

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

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

The electricity imports from the Northeast Power Grid to the North China Power Grid has not changed significantly from 2003 to 2006 (see Annex 3), so for the purpose of determining the build margin emission factor, the spatial extent is limited to the project electricity system according to the tool.

Step 2. Select an operating margin (OM) method

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

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

Detailed information to carry out a dispatch data analysis is not publicly available; therefore the dispatch data analysis OM is not suitable for the proposed project.

According to the tool, the Simple OM method is applicable to the project if the low-cost resources constitute less than 50% of total grid generation in average of the five most recent years. Since generation from all sources (including hydro power) other than thermal plants were less than 1% of total generation in the North China Power Grid in each of the last 5 years (see Annex 3), the Simple OM method is applicable to the proposed project.

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

- Ex ante option: A 3-year generation-weighted average, based on the most recent data available at the time of submission of the CDM-PDD to the DOE for validation, without requirement to monitor and recalculate the emissions factor during the crediting period. The three most recent years for which data is available are 2004-2006.

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

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

- Based on data on fuel consumption and net electricity generation of each power plant / unit (Option A); or
- Based on data on net electricity generation, the average efficiency of each power unit and the fuel type(s) used in each power unit (Option B); or
- Based on data on the total net electricity generation of all power plants serving the system and the fuel types and total fuel consumption of the project electricity system (option C).

As data for options A and B are not available, the published DNA data uses option C for the calculation of the operating margin emission factor.

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

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

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 CO2 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:

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

Step 4. Identify the cohort of power units to be included in the build margin

The sample group of power units m used to calculate the build margin consists of the set of power capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently.[15] This option is chosen as it comprises larger annual generation than the five units built most recently. Following the deviation[16], the latest statistical data available (from the China Power Yearbook) is used by the DNA to determine the most recent year from which the added generation capacity is equal to or just exceeds 20% of the latest statistic year 2006. The added generation capacity is the sample group of power units *m* used to calculate the build margin.

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

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

Step 5. Calculate the build margin emission factor

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

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

$EF_{grid,BM,y}$ is the Build margin CO2 emission factor in year y(tCO_2/MWh);
$EG_{m,y}$ is the Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh);
$EF_{EL,m,y}$ is the CO2 emission factor of power unit *m* in year y (tCO2/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.

[15] If 20% falls on part capacity of a unit, that unit is fully included in the calculation.
[16] Deviation for projects in China (DNV, 7 Oct 05), see http://cdm.unfccc.int/Projects/Deviations.

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

- Use of capacity additions for estimating the build margin emission factor for grid electricity.
- Use of weights estimated using installed capacity in place of annual electricity generation.
- Using the latest statistical data available from China Energy Statistical Yearbook 2007 to calculate the different CO_2 emission percentage (λ_i) of solid, liquid and gas fuel in the total emission from thermal generation in the North China Power Grid in 2006.
- Based the emission percentage (λ_i) of different kind fossil fuels and the corresponding emission factor (EF_i) according to the best technology commercially available in the China, the weighted emission factor of thermal power ($EF_{thermal}$)is calculated.
- Using the latest statistical data available (from the China Electric Power Yearbook) determine the year from which the added generation capacity is equal to or just exceeds 20% of the capacity of the latest statistic year 2006. Regarding the added generation capacity above 20%, calculate the Build Margin through multiply the weighted emission factor of thermal power ($EF_{thermal}$) by the capacity percentage of the thermal power among the about 20% new capacity of 2006.

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

Step 6. Calculation of the combined margin emission factor

The combined margin emission factor is calculated as follows:

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

Where
$EF_{grid,BM,y}$ is the build margin CO_2 emission factor in year y (tCO2/MWh)
$EF_{grid,OM,y}$ is the operating margin CO_2 emission factor in year y (tCO2/MWh)
w_{OM} is the weighting of operating margin emissions factor (%)
w_{BM} is the weighting of build margin emissions factor (%).

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

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

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

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

Table 8 gives an overview of EF:

Table 8 Values obtained when calculating the baseline emission factor

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

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

2. Project emission

According to ACM0002, the proposed project is a wind farm, belongs to renewable energy activity, and PE_y of the proposed project is zero.

3. Leakage

According to ACM0002, no leakage is considered for the proposed project.

4. Calculate Emission Reduction

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

$$ER_y = BE_y - PE_y - L_y \tag{6}$$

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 net electricity supplied by the project activity to the grid (EG_y in MWh, equals to the power generation exported to NCPG minus the power imported from NCPG). The calculation formula is as follows:

$$BE_y = EG_y \times EF_{grid,CM,y} = (EG_{export,y} - EG_{import,y}) \times EF_{grid,CM,y} \tag{7}$$

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

Data / Parameter:	$FC_{i,y}$
Data unit:	tonne or m^3
Description:	the amount of the fossil fuel *i* consumed by power sources in year *y*
Source of data used:	China Energy Statistical Yearbook (2005,2006,2007)
Value applied:	See Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	The available data were published by the Chinese DNA, and officially accepted by the Chinese DNA in their emission factor calculations.

Any comment:	

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

Data / Parameter:	NCV_i
Data unit:	MJ/t(m^3)
Description:	the net calorific value (energy content) per mass or volume unit of a fuel *i*
Source of data used:	China Energy Statistic Yearbook
Value applied:	See Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	The available data were published by the Chinese DNA, and officially accepted by the Chinese DNA in their emission factor calculations.
Any comment:	

Data / Parameter:	$EF_{CO2,i}$
Data unit:	tCO2/TJ
Description:	the carbon dioxide emission factor per unit of energy of the fuel i
Source of data used:	Taken from DNA of China, see http://cdm.ccchina.gov.cn:80/english/NewsInfo.asp?NewsId=2190. Original data used are the IPCC default values from the 2006 IPCC Guidelines for National Greenhouse gas Inventories, Volume 2, Energy.
Value applied:	See Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	The available data were published by the Chinese DNA, and officially accepted by the Chinese DNA in their emission factor calculations.
Any comment:	

Data / Parameter:	*Installed Capacity*
Data unit:	MW
Description:	Installed capacity of the NCPG in year *y*
Source of data used:	China Electric Power Yearbook (2005,2006,2007)
Value applied:	See Annex 3
Justification of the choice	The available data were published by the Chinese DNA, and officially

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

Data / Parameter:	Efficiency of the best technology commercially
Data unit:	%
Description:	Best commercial available efficiency of coal, gas, oil fuel power plant
Source of data used:	http://cdm.ccchina.gov.cn/web/NewsInfo.asp?NewsId=2184
Value applied:	Best efficiency for coal plant is 37.28%; Best efficiency for oil plant is 48.81% Best efficiency for gas plant is 48.81%
Justification of the choice of data or description of measurement methods and procedures actually applied :	The available data were published by the Chinese DNA, and officially accepted by the Chinese DNA in their emission factor calculations.
Any comment:	

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

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

>>

The net power generation of the proposed project is estimated in the Feasibility Study Report to be 105,090 MWh annually. The emission reduction ER_y achieved by the project activity once fully operational are calculated as follows (for a 12-monthly period):

$$BE_y = EG_y \times EF_y = 105{,}090\ MWh/y \times 1.0548\ tCO2e/MWh = 110{,}849\ tCO2e/y$$
$$ER_y = BE_y - PE_y - L_y = 110{,}849 - 0 - 0 = 110{,}849\ tCO2e/y$$

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

>>

Emission reductions achieved by the proposed project in the first crediting period are given in Table 8 below.

Table 8 Values obtained when applying formulae above (tCO2e)

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 reduction (tCO_2e)
2009/09/01-2009/12/31	0	36,580	0	36,580
2010	0	110,849	0	110,849
2011	0	110,849	0	110,849
2012	0	110,849	0	110,849
2013	0	110,849	0	110,849
2014	0	110,849	0	110,849
2015	0	110,849	0	110,849
2016/01/01-2016/08/31	0	74,269	0	74,269
total(tCO_2e)	0	775,943	0	775,943

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

Following approved methodology ACM0002, the data that is required to be monitored to establish the emission reductions, is the net electricity generation (EG_y), which is calculated from exports from the project to the grid ($EG_{exports}$) and imports from the grid ($EG_{imports}$).

B.7.1 Data and parameters monitored:

Data / Parameter:	**Net electricity generation (EG_y)**
Data unit:	MWh
Description:	Net electricity supplied to the grid by the project in period y
Source of data to be used:	Calculated from $EG_{export\ and}$ EG_{import}
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Net supplied power is expected to be 105,090MWh/y
Description of measurement methods and procedures to be applied:	$EG_y = EG_{export} - EG_{import}$
QA/QC procedures to be applied:	
Any comment:	

Data / Parameter:	**Electricity exports (EG_{export})**
Data unit:	MWh
Description:	Quantity of annual electricity exported to the grid by the proposed project

Source of data to be used:	Monitored from electricity meters
Value of data applied for the purpose of calculating expected emission reductions in section B.5	105,090 MWh when fully operating
Description of measurement methods and procedures to be applied:	Grid-connected electricity generated by the proposed project will be monitored through metering equipment at the Zhangbei substation. The data will be measured at least hourly and recorded monthly, and the results will be supplied by the Grid Company to the Developer on a monthly basis. Monthly generation data will be approved and signed off by CDM manager before it is accepted and stored.
QA/QC procedures to be applied:	The metering equipments at the substation are calibrated and checked annually by qualified third party for accuracy according to Chinese electric industry regulation DL/T448. The back-up meter will be installed in the planned 110kV substation in the site of proposed project. The error in the metering equipments shall not exceed 0.5%. Electricity exported to the grid will be double checked against sales receipts or relevant commercial data.
Any comment:	

Data / Parameter:	**Electricity imports (EG_{import})**
Data unit:	MWh
Description:	Quantity of annual electricity imported from the grid by the proposed project
Source of data to be used:	Monitored from electricity meters
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0
Description of measurement methods and procedures to be applied:	Grid-connected electricity generated by the proposed project will be monitored through metering equipment at the Zhangbei substation. The data will be measured at least hourly and recorded monthly, and the results will be supplied by the Grid Company to the Developer on a monthly basis. Monthly generation data will be approved and signed off by CDM manager before it is accepted and stored.
QA/QC procedures to be applied:	The metering equipments at the substation are calibrated and checked annually by qualified third party for accuracy according to Chinese electric industry regulation DL/T448.

	The back-up meter will be installed in the planned 110kV substation in the site of proposed project. The error in the metering equipments shall not exceed 0.5%. Electricity exported to the grid will be double checked against sales receipts or relevant commercial data.
Any comment:	

B.7.2. Description of the monitoring plan:

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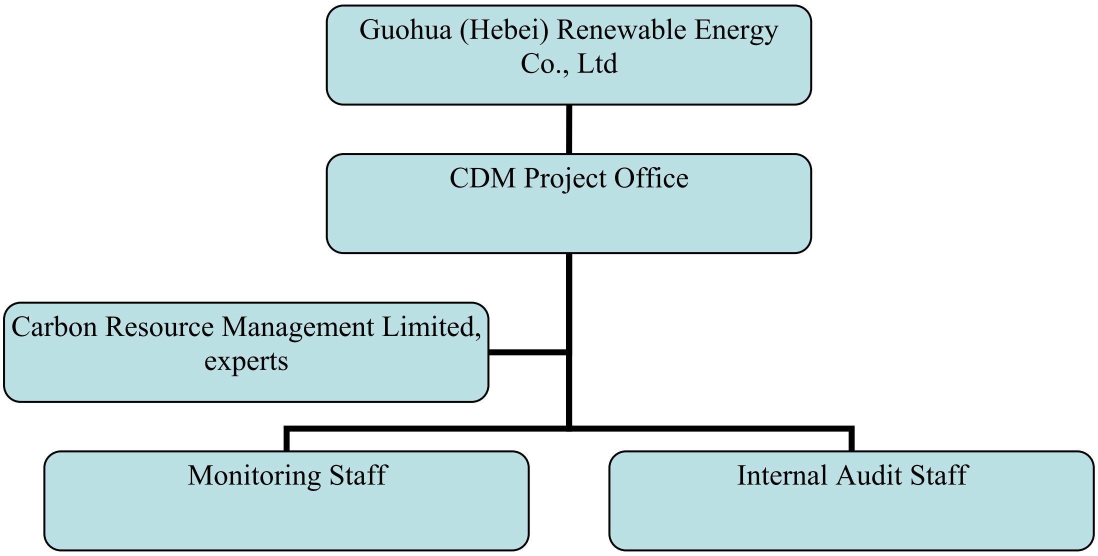
The operating and management structure is illustrated as follows:



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

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

>>

Date of completion of the application of the methodology: 05/01/2009

Name of the entity responsible: Carbon Resource Management (see Annex 1 for address)
Contact persons

- (China) Ms Gao Yan and Mr Shi Xiangfeng (gy@carbonresource.com)
- (UK) Mr Christiaan Vrolijk (cv@carbonresource.com)

Carbon Resource Management is a project participant.

SECTION C. Duration of the project activity / crediting period

C.1. Duration of the project activity:

C.1.1. Starting date of the project activity:

>>

20/03/2008

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

>>

20y-0m

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

C.2.1. Renewable crediting period:

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

>>

01/09/2009 (or the date of registration, if 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:

>>

C.2.2.2. Length:

>>

SECTION D. Environmental impacts

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

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An Environmental Impact Assessment (EIA) for the Hebei Shangyi Manjing North Wind Farm Project has been completed by Hebei Province Engineering Consulting Institute. The EIA has been approved by the Environmental Protection Bureau of Hebei Province. The EIA describe the environmental impact during construction and operation, as summarised below:

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

The main environmental impacts during the construction period are dust, noise, solid waste and waste water:

- At a wind speed of 3m/s, the dust concentration within 50m around the construction site doubles from the natural level. With an increase of the wind speed, the impact region of the dust will also increase. However, since the local residential area is 620m away from the wind farm site and local atmosphere environment capacity is very large, the impact of construction dust to the local region is light. Some measures will be taken to reduce impact of dust on the construction staff, such as watering, covering and so on.
- Construction machines, transportation vehicles and construction work will generate noise. The noise level of all kinds of equipments ranges from 70dB to 95dB. This is within the acceptable levels for the distance to the nearest habitation. Furthermore, using equipment with low noise levels, scheduling construction times can reduce the impact to the environment significantly.
- Solid wastes from the construction include waste soil and stone, construction wastes, and some office waste. These wastes are collected and disposed off properly and someone should be designated to be in charge of this work.
- Waste water includes washed water from machines and waste water from construction staff. The water will be treated and re-used for the construction or as fertilizer. Therefore, waste water will have little impact on the environment.

2. The analysis of the environment impact in operation period

- The operating noise level of the planned 1500kW turbines ranges from 50dB to 70dB. No serious impacts are caused at a distance of 300 meters as the noise levels drop down to the national standard of 45dB. Furthermore, the nearest residential regions are 620m away from the wind farm, so the noise does not influence the residential districts nearest to the site.
- Growth of local vegetation will not be impacted by the wind farm. The distance between turbines allows sufficient space and the operation will not negatively impact local animals.
- No wastes are generated by the operation of the wind turbines. Solid waste and liquid waste will be produced in the office by staff during operation. The waste quantity is very small and has no negative impact on the environment after treatment or disposal.

3. Conclusion

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

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

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Environmental impacts are not considered significant. The Hebei Provincial Environmental Protection Bureau has approved the EIA already.

SECTION E. Stakeholders' comments

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

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In December 2007, a survey of the stakeholders was carried out. Questionnaires were sent out to 50 households and the survey had a 100% response rate. The result of the survey indicated the support to the project. The survey is summarized in Section E.2 below.

E.2. Summary of the comments received:

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The survey shows that the proposed project has strong local support among the people:

- 100% of respondents agreed with the development of the project.
- 98% respondents believed that the project construction will not do harm to the environment and 2% didn't make any suggestions.
- 98% believed that the project construction will do no harm to the ecosystem and 2% didn't make any suggestions
- 100% believed that the project construction will have positive impact on local economic development.
- 100% believed that the project construction will have no impact to the environment of living, studying and working.

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

>>

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

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

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Guohua (Hebei) Renewable Energy Co., Ltd
Street/P.O.Box:	Kangleng Village, Shangyi County, Zhangjiakou City, Hebei Province
Building:	
City:	Zhangjiakou
State/Region:	
Postcode/ZIP:	076750
Country:	People's Republic of China
Telephone:	+86 313 2049988
FAX:	+86 313 2035529
E-Mail:	guohuawe@126.com
URL:	
Represented by:	Mr. Zhu Tao
Title:	Manager
Salutation:	
Last name:	Zhu
Middle name:	
First name:	Tao
Department:	
Mobile:	
Direct FAX:	+86 313 2035529
Direct tel:	+86 313 2049988
Personal e-mail:	guohuawe@126.com

Organization:	Carbon Resource Management Ltd.
Street/P.O.Box:	49 St. James's Street
Building:	
City:	London
State/Region:	
Postcode/ZIP:	SW1A 1JT
Country:	The United Kingdom
Telephone:	+44 20 7016 1420
FAX:	+44 20 7016 1421
E-Mail:	nac@carbonresource.com
URL:	
Represented by:	Nicholas A Clarke
Title:	Managing Director
Salutation:	Mr.
Last name:	Clarke
Middle name:	
First name:	Nicholas
Department:	
Mobile:	

Direct FAX:	+44 20 7016 1421
Direct tel:	+44 20 7016 1420
Personal e-mail:	nac@carbonresource.com

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

There is no public funding for the proposed project activity.

Annex 3

BASELINE INFORMATION

Step 1. Identify the relevant electric power system

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

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

Step 2. Select an operating margin (OM) method

According to Tool to calculate the emission factor for an electricity system, the Simple OM method is applicable to the project if the low-cost resources constitute less than 50% of total grid generation on average in the five most recent years or based on long-term average hydroelectric production. The Simple OM method, therefore, is applicable to the proposed project as the share of low-cost/must-run generation does not exceed 1% in the most recent last 5 years, with the average being 0.8% as presented below.

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

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

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

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

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

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

Table A2 Emission Factors of Fuels

Fuel types	Carbon Emission Factor (tC/TJ)

Coal	25.80
Cleaned Coal	25.80
Other washed coal	25.80
Coke	29.20
Shaped Coal	26.6
Crude Oil	20.00
Gasoline	18.90
Diesel	20.20
Fuel Oil	21.10
Other Petro Product	20.00
Natural Gas	15.30
Coke Oven Gas	12.10
Other Coal Gas	12.10
LPG	17.20
Refinery Gas	15.70
Other Coking Products	25.8
Other Energy	0

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

Fossil fuel consumption

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

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

2004

Fuel Type	Beijing	Tianjing	Hebei	Shanxi	Neimeng	Shandong	Fuel Consumption (Mt,Mm^3)	CO_2 Emission (MtCO_2)
Coal	8.9775	16.752	67.265	61.7645	62.7723	104.054	321.5853	636.0625
Cleaned coal						0.4218	0.4218	1.0512
Other washed coal	0.0657		1.6745	3.7365		1.0869	6.5636	5.1927
Coke					0.0021	0.0011	0.0032	0.0097
Coke oven gas	64	75	62	2108	39		2348	1.7424
Other coal gas	1609	786	3883		1837		9103	2.1110
Crude oil					0.0073		0.0073	0.0224
Gasoline			0.0001				0.0001	0.0003
Diesel	0.0048		0.0354		0.0012		0.0414	0.1308
Fuel oil	0.1225		0.0023		0.0006		0.1254	0.4057

LPG							0	0
Refinery gas			0.0902				0.0902	0.2391
Natural gas	28	8		276			312	0.6814
Other petro products							0	0
Other coke products							0	0
Other energy	0.0858		0.3235	0.6931	0.0727		2.3641	0
				CO_2 Emission			**549.0240 $MtCO_2$**	

Source: China Energy Statistical Year Book (2005);

2005

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

Source: China Energy Statistical Year Book (2006);

2006

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

Source: China Energy Statistical Year Book (2007).

Calculation of net generation from included sources

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

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

Provincial Grid	**2004**			**2005**			**2006**		
	Generation	**Self use rate**	**On-grid generation**	**Generation**	**Self use rate**	**On-grid generation**	**Generation**	**Self use rate**	**On-grid generation**
	(MWh)	**(%)**	**(MWh)**	**(MWh)**	**(%)**	**(MWh)**	**(MWh)**	**(%)**	**(MWh)**
Beijing	18579000	7.94	17103827	20880000	7.73	19265976	20705000	7.51	19150055

Tianjing	33952000	6.35	31796048	36993000	6.63	34540364	35924000	6.86	33459614
Hebei	124970000	6.5	116846950	134348000	6.57	125521336	143888000	6.63	134348226
Shanxi	104926000	7.7	96846698	128785000	7.42	119229153	150250000	7.45	139056375
Neimeng	80427000	7.17	74660384	92345000	7.01	85871616	139593000	7.58	129011851
Shandong	163918000	7.32	151919202	189880000	7.14	176322568	230922000	7.12	214480354
Total			489173110			560751013			669506473

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

Imports

The connected electricity systems are the Northeast Power Grid (NEPG), consisting of three provincial grids: Jilin, Liaoning and Heilongjiang and the Central China Power Grid (CCPG), consisting of six provincial grids: Jiangxi, Henan, Hubei, Hunan, Chongqing and Sichuan. There are electricity transfers from the connected electricity systems to the project electricity system, so the CO_2 emissions from the net electricity imports from the connected electricity systems should be taken into account. The DNA decided to use the "simple operating margin (OM) emission rate of the exporting grid".

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

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

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

2004

Fuel type	Liaoning	Jinlin	Heilongjiang	Fuel Consumption (Mt,Mm^3)	CO_2 Emission ($MtCO_2$)
Coal	41.442	23.109	30.848	95.399	188.6894
Cleaned coal	0.8475	0.0109	0.0488	0.9072	2.2609
Other washed coal	5.7767	0.1426	0.61	6.5293	5.1656
Coke				0	0
Coke oven gas	483	291		774	0.5744
Other coal gas	5733	419		6152	1.4267
Crude oil				0	0
Gasoline				0	0
Diesel	0.0204	0.0116	0.0024	0.0344	0.1087
Fuel oil	0.1281	0.0178	0.0286	0.1745	0.5645
LPG	0.0219			0.0219	0.0693
Refinery gas	0.0979		0.0114	0.1093	0.2898
Natural gas		3	253	256	0.5591
Other petro products				0	0
Other coke products				0	0

Other energy	0.2697	0.0507		0.3204	0
			CO_2 **Emission**		**199.7083 $MtCO_2$**

Source: China Energy Statistical Year Book (2005);

2005

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

Source: China Energy Statistical Year Book (2006);

2006

Fuel type	Liaoning	Jinlin	Heilongjiang	Fuel Consumption (Mt,Mm^3)	CO_2 Emission ($MtCO_2$)
Coal	46.8199	27.3824	36.9829	111.1852	200.4548959
Cleaned coal	0.0003			0.0003	0.000748
Other washed coal	6.7474	0.1783	0.96	7.8857	6.2387
Coke	0.00332			0.00332	0.1011
Coke oven gas	268	16	144	428	0.3176
Other coal gas	5526	143		5669	1.3147
Crude oil	0.0049			0.0049	0.015
Gasoline				0	0

Diesel	0.0075	0.0039	0.003	0.0144	0.0455
Fuel oil	0.1173	0.0045	0.0144	0.1362	0.4406
LPG				0	0.003797547
Refinery gas	0.0855		0.0427	0.1282	0.3399
Natural gas		19	210	229	0.5001
Other petro products				0	0
Other coke products				0	0
Other energy	0.1216	0.176	0.8277	1.1253	0
			CO_2 Emission		**229.2268 $MtCO_2$**

Source: China Energy Statistical Year Book (2007).

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

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

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

Source: China Power Year Book (2005 - 2007).

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

Fuel type	Jiangxi	Henan	Hubei	Hunan	Chongqing	Sichuan	Fuel Consumption (Mt,Mm^3)	CO_2 Emission ($MtCO_2$)
Coal	19.2602	80.9801	31.7979	24.5448	11.843	32.8522	201.2782	398.1075
Cleaned coal					0.0579		0.0579	0.1443
Other washed coal	0.0451	1.0412		0.0859	0.7921		1.9643	1.5540
Shape coal					0.0001		0.0001	0.00002
Coke		0.1723		0.0032			0.1755	0.5343
Coke oven gas		52	107	424	38	1	622	0.4616
Other coal gas	1269	395		170	436	1	2271	0.5267
Crude oil		0.0049					0.0049	0.0150
Gasoline		0.0001					0.0001	0.00003
Diesel	0.0091	0.0223	0.0141	0.0178	0.0096		0.0729	0.2303
Fuel oil	0.0051	0.0126	0.0131	0.008	0.0057	0.0349	0.0794	0.2569
LPG							0	0.0003

Refinery gas	0.0086	0.081	0.01	0.0097			0.1093	0.2898
Natural gas			28		16	1863	1907	4.1649
Other petro products							0	0.00788
Other coke products						0.0001	0.0001	0.00003
Other energy	0.1745	0.3736	0.3155	0.1829	0.2935		1.34	0
				CO_2 Emission			**406.2861 $MtCO_2$**	

Source: China Energy Statistical Year Book (2007)

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

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

Source: China Power Year Book (2007)

Operating Margin Emission Factor calculations

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

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

Table A9 Operating margin emission factor calculation

	Unit	**2004**	**2005**	**2006**	**3-year total/average**
NCPG					
Emission	$MtCO_2$	549.02	647.65	723.3	1919.97
Generation	TWh	489.17	560.75	669.51	1719.43
Import from NEPG	TWh	4.51	3.93	2.618	11.06155
EF NEPG	tCO_2/MWh	1.17384	1.15764	1.16688	
Emissions from imports	$MtCO_2$	5.30	4.55	3.05	12.90261877

Import from CCPG	TWh	-	-	0.497	0.497
EF CCPG	tCO_2/MWh	-	-	0.87599	
Emission from imports	$MtCO_2$	-	-	0.43536703	0.43536703
Total					
Emissions	$MtCO_2$	554.32	652.20	726.79	1933.31
Generation supply	TWh	493.68	564.68	672.63	1730.99
		Operating margin Emission Factor			**1.1169 tCO_2/MWh**

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

Step 4. Identify the cohort of power units to be included in the build margin

The sample group of power units m used to calculate the build margin consists of the set of power capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently. This option is chosen as it comprises larger annual generation than the five units built most recently. Following the deviation, the latest statistical data available (from the China Power Yearbook 2007) is used by the DNA to determine the most recent year from which the added generation capacity is equal to or just exceeds 20% of the latest statistic year 2006. The added generation capacity is the sample group of power units *m* used to calculate the build margin.

Step 5. Calculate the build margin emission factor

As described in step 4, 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 different CO_2 emission percentage of solid, liquid and gas fuel in the total emission of North China Power Grid in 2006 using new latest statistical data available from China Energy Statistical Year Book 2007.

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

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

Source: China Energy Statistical Year Book (2007).

$\lambda_{Coal} = 98.932\%$;

$\lambda_{Oil} = 0.093\%$;

$\lambda_{Gas} = 0.975\%$.

Sub-step 2:

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

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

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

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

So, emission factor of thermal plant is:

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

Sub-step3:

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

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

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

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

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

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

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

Step 6. Calculation of the combined margin emission factor

The combined margin emission factor is calculated as follows:

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

Annex 4

MONITORING INFORMATION

1. Introduction

The project adopts the approved consolidated monitoring methodology ACM0002 “Consolidated methodology for grid-connected electricity generation from renewable sources” (version 08) to determine the emission reductions from the net electricity generation from the wind farm. This plan describes in more detail the process.

2. Responsibility

Overall responsibility for monitoring and carrying out the monitoring following this monitoring plan lies with Guohua (Hebei) Renewable Energy Co., Ltd.

The CDM manager of Guohua (Hebei) Renewable Energy Co., Ltd.is responsible for the monitoring and reporting of the wind farm.

3. Training

Guohua (Hebei) Renewable Energy Co., Ltd. will assign and train the dedicated people carrying out the monitoring work. The monitoring personnel training will be completed before the registration, further training work will be completed with the preliminary verification.

4. Installation of meters

The net electricity supplied by the proposed project activity will be monitored through the use of main meter at the Zhangbei substation and the backup meter at the project site, recording exports to the grid (supply) and imports from the grid (consumption). Net generation supplied is calculated as exports minus imports.The electricity meters monitor the flow continuously and the accuracy of the meters is 0.5%, in accordance with industry standards (Chinese electric industry regulation DL/T448).

If some other wind farms share the same transformer, substation or transmission line with this wind farm, appropriate additional meters will be installed so that the electricity generation can be monitored for each wind farm separately so as to determine to 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 meter;

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

5. Monitored data

Grid-connected electricity generated by the proposed project will be monitored through metering equipment at the Zhangbei substation (interconnection facility connecting the facility to the grid). The data can also be monitored and recorded at the on-site control centre using a computer system. Every month the Zhangjiakou electric power company will obtain the on-grid electricity generation from the Zhangbei 220kv substation and report it to North China Power Grid.

5.1 Monitoring procedures

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

If it is necessary to monitor part of a month, for example if the date of registration is not at the start of the generation month, the following procedure will be used:

1. A special meter reading will take place on the starting date of the period to be monitored.
2. Using the normal monthly meter readings, the share of the monthly generation (and consumption) is calculated.
3. The normal monthly meter readings are cross-checked against the normal sales receipts.
4. The generation (and consumption) for part of the month is determined from the total month's data (determined in step 3) and the relevant share of the total month (determined in step 2).

- A special receipt may be issued by the grid company based on this special reading for the use of cross-checking.

6.Calibration and maintenance

The metering equipments at the substation are calibrated and checked annually by a qualified third party for accuracy according to Chinese electric industry regulation DL/T448. The error in the metering equipments shall not exceed 0.5%.

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

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

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

Should any previous months reading of the main meter be inaccurate by more than the allowable error, or otherwise functioned improperly, the net generation output shall be determined by:
(a) first, by reading backup meter, unless a test by either party reveals it is inaccurate;
(b) if the backup system is not within acceptable limits of accuracy or operation is performed improperly the Hebei Shangyi Manjing North Wind Farm and North China Power Grid 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 North China Power Grid and Hebei Shangyi Manjing North Wind Farm fail to agree then the matter will be referred for arbitration according to agreed procedures.

7. 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 Hebei Shangyi Manjing North Wind Farm project, the project material and monitoring results will be indexed. All paper-based information will be stored by the technology department of Hebei Shangyi Manjing North Wind Farm and all the material will have a copy for backup.

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

8. Reporting and Verification

The steps required to meet the requirements for emissions reduction monitoring include:

- Zhangjiakou Electric Power Company reads the main meter and supplies the readings to North China Power Grid Company monthly.
- Hebei Shangyi Manjing North Wind Farm records readings from the backup meter monthly and other relevant separated meters if needed.
- Hebei Shangyi Manjing North Wind Farm carries out an internal audit and reports the meter readings to the DOE before the verification.

Guohua (Hebei) Renewable Energy Co., Ltd. will facilitate the verification through providing the DOE with all required necessary information at any stage.

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