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

CONTENTS

SECTION A. General description of project activity

A.1 Title of the project activity:

>>
Shandong Weihai 69 MW Wind Power Project
Version number of the document: 04
Date: 28 September 2007

A.2. Description of the project activity:

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The objective of Shandong Weihai 69 MW Wind Power Project (the "Project" or the "proposed project"), a grid-connected renewable project, is to utilize the wind resources for generating electricity to be sold into the Shandong Power Grid, an sub-grid of the North China Grid (NCG). The Project activity will achieve greenhouse gas (GHG) emission reductions by avoiding CO_2 emissions from the business-as-usual scenario electricity generation produced by those fossil fuel-fired power plants within the NCG.

The Project is sited in the north of Weihai City, Shandong Province of China. The Project involves of installation of 46 sets of turbines, each of which has a capacity of 1500 kW, providing a total installed capacity of 69 MW.

According to the anemometry data collected during the past years, the Project site has excellent wind resources with an average wind speed about 6.6 m/s at the height of 70 m and the estimated electricity output supplied to the North China Grid from the 46 sets of turbines of the Project is 140.033 GWh per year.

The Project clearly fits into the development priority of China, and will support China in stimulating and accelerating the commercialization of grid-connected renewable energy technologies and the green-power market development. It will therefore help reduce 2,882,019tCO2e GHG emissions in a 7x3 crediting period resulting from the high-growth, coal-dominated business-as-usual scenario.

At present, the city of Weihai was supplied by purely fossil coal-fired power plants, and the development of wind power will effectively expand renewable energy utilization in the local area. The Project will not only supply renewable electricity to the grid, but also contribute to sustainable development of the local community, host country and the world by means of:

- Reducing greenhouse gas emissions compared to business-as-usual scenario;
- Helping to stimulate the growth of the wind power industry in China;
- Reducing the emission of other pollutants resulting from the power generation industry in China, compared to business-as-usual scenario; and
- Creating local employment opportunities during the project construction and operation period.

A.3. Project participants:

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Participants to the project activity are the following:

Please list project participants and Party(ies) involved and provide contact information in Annex 1. Information shall be in indicated using the following tabular format.		
Name of Party involved (*) ((host) indicates a host Party)	**Private and/or public entity(ies) project participants (*) (as applicable)**	**Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)**
P.R.China (host)	Huaneng Zhongdian Weihai Wind Power Co. Ltd. (project owner)	No
Spain	Endesa Generación S.A.	No
(*) In accordance with the CDM modalities and procedures, at the time of making the CDM-PDD public at the stage of validation, a Party involved may or may not have provided its approval. At the time of requesting registration, the approval by the Party(ies) involved is required.		

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

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The Project is sited within Weihai City in the east of Shandong peninsula. The Project has geographical coordinates with east longitude of 121º11'~122°42′ and north latitude of 36º41'~37°35′. Weihai City is located east to Yantai City, west to Korea and Japan, south to the Liaodong peninsula and borders on the Yellow Sea in east, north and south. The 13 sets of turbines of the Project are installed on the north side of the Huanhai Road from the Chaoyang Harbor to the Xianrenqiao Bridge and the 33 sets of turbines of the Project are installed on the south side of the Huanhai Road from the Daxi Village to the Xiaoyao Harbor and the west bank of the Hutoujiao. Figure 1 shows the location of Weihai City.

Figure 1. Location Sketch Map for Weihai City

A.4.1.1. Host Party(ies):

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The Host Country is the People's Republic of China.

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

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Shandong Province

A.4.1.3. City/Town/Community etc:

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Weihai City

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

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The Project site is near a seaport in the lower hilly areas of Jiaodong Peninsula. The 13 sets of turbines of the Project are installed on the north side of the Huanhai Road from the Chaoyang Harbor to the Xianrenqiao Bridge. Figure 2 shows the land layout of the 13 sets turbines of the Project.

The 33 sets of turbines of the Project are installed on the south side of the Huanhai Road from the Daxi Village to the Xiaoyao Harbor and the west bank of the Hutoujiao. Figure 3 shows the land layout of the 33 sets turbines of the Project.

Figure 2. Location Sketch Map for the 13 sets turbines of the Project

Figure 3. Location Sketch Map for the 33 sets turbines of the Project

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

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This category would fall within sectoral scope 1: energy industries.

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

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According to the Feasibility Study Report, 46 sets of turbines with a unit capacity of 1500 kW were selected for the Project. The turbines will be arranged according to the wind resource conditions as well as the geographical characteristics of the Project site.

The 13 sets of turbines of the the Project are arranged 30 m north to the Huanhai Road in a single row. And the other 33 sets of turbines of the Project are arranged 50 m parallel south to the Huanhai Road. The space between two turbines is about 400 m. The hub height is 70 m. The estimated electricity output to the grid is 140.033 GWh per year, the annual average operating hour is 2037 h, and the capacity factor is 0.232.

The unit capacity in the Project is 1500 kW, which are not localized in China, the key parts of the technology are required to import from abroad.

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

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It is expected that the Project activities will generate emission reductions, within the North China Grid, in an average annual amount of 135,920 tCO2e over the first 7-year renewable crediting period from 1 October, 2007 to 30 September, 2014. Estimated emission reductions are achieved by avoiding CO2 emissions from electricity generation of those fossil fuel-fired power plants connected into the North China Grid.

Years	Annual estimation of emission reductions in tonnes of CO_2e
01 October 2007	20,395
2008	93,248
2009	145,704
2010	145,704
2011	145,704
2012	145,704
2013	145,704
30 September 2014	109,278
Total estimated reductions (tonnes of CO_2e)	**951,441**
Total number of crediting years	**7**
Annual average over the crediting period of estimated reductions (tonnes of CO_2e)	135,920

A.4.5. Public funding of the project activity:

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There is no public funding from Annex I Parties for this Project.

SECTION B. Application of a baseline and monitoring methodology

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

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ACM0002.ver 06 – "Consolidated baseline methodology for grid-connected electricity generation from renewable sources." For more information regarding the methodology please refer to http://cdm.unfccc.int/methodologies/approved.

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

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Wind power generation technology is a renewable electricity generation technology to displace fossil fuel-fired power generation technology to supply electricity to the grid. Therefore the Project applies the consolidated baseline methodology ACM0002 approved by CDM EB to determine the project baseline and calculate GHG emission reductions achieved by wind power generation.

The Project meets all applicability conditions of the consolidated baseline methodology ACM0002 as follows:

1. The Project involves the electricity capacity additions from wind power.

2. The Project does not involve switching from fossil fuels to renewable energy at the site of the Project activity.

3. The geographic and system boundaries for the North China Grid can be clearly identified and information on the characteristics of the North China Grid is available.

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

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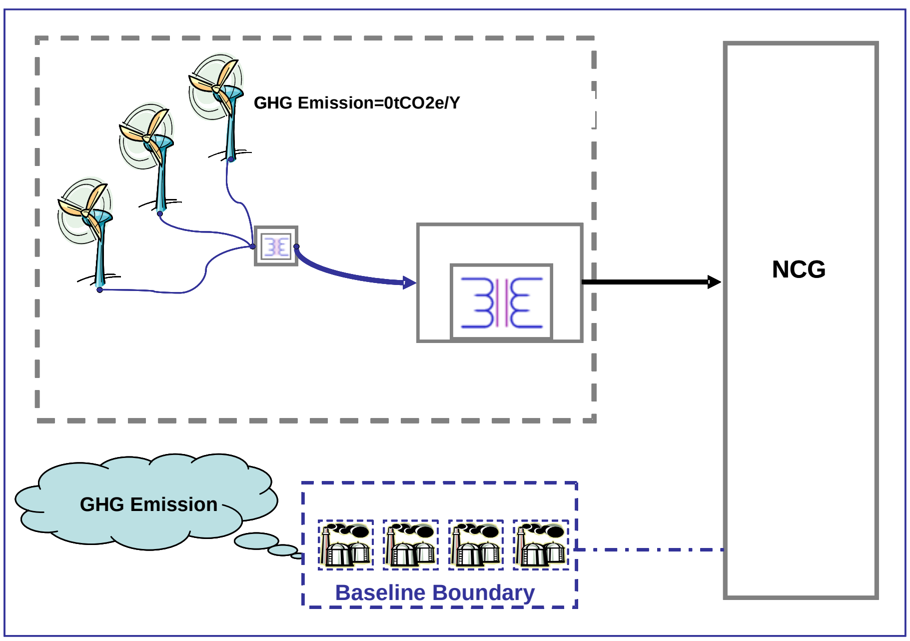
The electricity displaced by the Project activity should be the electricity generated by the North China Grid. Therefore, the boundary when calculating the baseline operating margin emission factor and build margin emission factor is set within the North China Grid. The spatial scope of the Project boundary covers those fossil fuel-fired power plants physically connected into the North China Grid that are influenced by the Project activity.

The North China Grid is composed of Beijing Power Grid, Tianjin Power Grid, Hebei Power Grid, Shanxi Power Grid, Shandong Power Grid and Inner Mongolia Power Grid.

The source and gases included in the project boundary was shown in the following table.

	Source	Gas	Included?	Justification / Explanation
Baseline	Fuel fired power plant	CO_2	Yes	The primary emission gas.
		CH_4	No	Unidentified in the baseline methodology
		N_2O	No	Unidentified in the baseline methodology
Project Activity	Proposed project	CO_2	No	Clean resource with zero emission
		CH_4	No	Clean resource with zero emission
		N_2O	No	Clean resource with zero emission

Figure4. The project boundary and baseline boundary of the Project



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

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Plausible and credible alternatives available to the Project that provide outputs or services comparable to the proposed CDM project activity include:

Alternative I: Construction of a fuel–fired power plant with equivalent amount of annual electricity generation;

Alternative II: The proposed project activity not undertaken as a CDM project activity;

Alternative III: Construction of a power plant using other sources of renewable energy with equivalent amount of annual electricity generation; and

Alternative IV: Provision of equivalent amount of annual power output by the grid where the Project is connected (excluding those low cost/must run plants).

Based on Step 2: Investment Analysis, the Project is not financially attractive without consideration of CDM sales revenues. Alternative II is not feasible.

The Project site is a seaport in the lower hilly areas of Jiaodong Peninsula. There exists no river nearby or at the project site[1] that it is not suitable for development of hydropower project. In China, biomass power generation technology is still in the demonstration phase and can bring only poor economic benefits, which can not be operated without support from the national policies[2]. Since there exist no economically exploitable hydro or biomass resources with a commensurate scale within the area of the Project. Alternative III is not feasible.

For Alternative I, considering the same annual electricity generation, the alternative baseline scenario for the proposed project should be a fuel-fired power plant with installed capacity of 35 MW or lower. Further, as the proposed project is a grid-connected wind power generation project, the alternative baseline scenario must be a grid-connected fuel-fired power generation project. However, according to China's regulations, construction of fuel-fired power plants with unit capacity of equal or less than 135 MW are prohibited in the areas which can be covered by large grids such as provincial grids[3]. For these reasons, the possible alternative baseline scenario of building a 35 MW fuel-fired power plant conflicts with China's current regulations. Therefore, Alternative I is not feasible.

For Alternative II, the Project activity not undertaken as a CDM project activity satisfies China's regulations.

For Alternative IV, the installed capacity of the North China Grid for both the existing power plants and the power plants to be built in a foreseeable future satisfies China's regulations, which is also economically feasible.

Therefore Alternative II and Alternative IV are analyzed in Step 2 and Step 3 as potential baseline alternatives.

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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[1] *Date source: The FSR of the Project.*
[2] *Date source: Tentative Management Measures for Price and Sharing of Expenses for Electricity Generation from Renewable Energy, Document No. NDRC Energy [2006]13.*
[3] *Date source:* Notice *on Strictly Prohibiting the Installation of Fuel-fired Generators with the Capacity of 135 MW or Below issued by the General Office of the State Council, decree no. 2002-6.*

The additionality of the Project is demonstrated and assessed by using the *Tool for the Demonstration and Assessment of Additionality (Version 3)* approved by CDM EB. It includes the following steps:

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

The objective of the Step 1 is to define realistic and credible alternatives to the project activity(s) that can be (part of) the baseline scenario through the following sub-steps:

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

Plausible and credible alternatives available to the Project that provide outputs or services comparable to the proposed CDM project activity include:

Alternative I: Construction of a fuel–fired power plant with equivalent amount of annual electricity generation;

Alternative II: The proposed project activity not undertaken as a CDM project activity;

Alternative III: Construction of a power plant using other sources of renewable energy with equivalent amount of annual electricity generation; and

Alternative IV: Provision of equivalent amount of annual power output by the grid where the Project is connected (excluding those low cost/must run plants).

Based on Step 2: Investment Analysis, the Project is not financially attractive without consideration of CDM sales revenues. Alternative II is not feasible.

The Project site is a seaport in the lower hilly areas of Jiaodong Peninsula. There exists no river nearby or at the project site[4] that it is not suitable for development of hydropower project. In China, biomass power generation technology is still in the demonstration phase and can bring only poor economic benefits, which can not be operated without support from the national policies[5]. Since there exist no economically exploitable hydro or biomass resources with a commensurate scale within the area of the Project. Alternative III is not feasible.

Sub-step 1b. Enforcement of applicable laws and regulations:

For Alternative I, considering the same annual electricity generation, the alternative baseline scenario for the proposed project should be a fuel-fired power plant with installed capacity of 35 MW or lower. Further, as the proposed project is a grid-connected wind power generation project, the alternative baseline scenario must be a grid-connected fuel-fired power generation project. However, according to China's regulations, construction of fuel-fired power plants with unit capacity of equal or less than 135 MW are prohibited in the areas which can be covered by large grids such as provincial grids[6]. For these reasons, the possible alternative baseline scenario of building a 35 MW fuel-fired power plant conflicts with China's current regulations. Therefore, Alternative I is not feasible.

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[4] *Date source: The FSR of the Project.*
[5] *Date source: Tentative Management Measures for Price and Sharing of Expenses for Electricity Generation from Renewable Energy, Document No. NDRC Energy [2006]13.*
[6] *Date source: Notice on Strictly Prohibiting the Installation of Fuel-fired Generators with the Capacity of 135 MW or Below issued by the General Office of the State Council, decree no. 2002-6.*

For Alternative II, the Project activity not undertaken as a CDM project activity satisfies China's regulations.

For Alternative IV, the installed capacity of the North China Grid for both the existing power plants and the power plants to be built in a foreseeable future satisfies China's regulations, which is also economically feasible.

Therefore Alternative II and Alternative IV are analyzed in Step 2 and Step 3 as potential baseline alternatives.

Step 2. Investment Analysis

The purpose of this step is to determine whether the Project activity is economically or financially less attractive than other alternatives without an additional revenue/funding, possibly from the sale of certified emission reductions (CERs). The investment analysis was conducted in the following steps:

Sub-step 2a. Determine appropriate analysis method

Tools for the Demonstration and Assessment of Additionality suggests three analysis methods which are simple cost analysis (Option I), investment comparison analysis (Option II) and benchmark analysis (Option III). Since the Project will earn the revenues not only from the CER sales but also from electricity sales, the simple cost analysis method is not appropriate. Investment comparison analysis method is only applicable to projects whose alternatives are similar investment projects. The alternative baseline scenario of the Project is the North China Grid rather than new investment projects. Therefore Option II is not appropriate. The Project will use benchmark analysis method (Option III) based on the consideration that benchmark IRR of the power sector is available.

Sub-step 2b. Benchmark Analysis Method (Option III)

With reference to the *Interim Rules on Economic Assessment of Electrical Engineering Retrofit Projects,* the financial benchmark rate of return (after tax) of China's power industries is 8% for the IRR of total investment. Presently, the financial benchmark rate of return is used in the analysis of wind power projects in China. On the basis of above benchmark, calculation and comparison of financial indicators are carried out in sub-step 2c.

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

(1) Financial parameters for calculation of IRR of total investment

Financial parameters for calculation of IRR of total investment are obtained from the Feasibility Study Report of the Project as summarized in Table 1.

Table 1. Financial Parameters for Calculation of IRR of Total Investment of the Project

NO.	Parameters	Value
1	**Installed capacity (MW)**	69
2	**Electricity supplied to NCG (GWh/y)**	140.033
3	**Bus-bar tariff (RMB / KW·h)**[7]	0.70(excluding VAT); 0.76(including VAT)

[7] *Date source: Refer to the approval letter on bus-bar tariff of the Project issued by the Development and Reform Commission of Shangdong Province.*

4	**Project lifetime (yrs)**	22.5 (Construction period 1.5 yrs; Operational period 21yrs）
5	**Total investment (Million RMB)**	705.1141(equity/debt ratio:1:2)
6	**Debt rate**	6.39%
7	**Circulating fund(Million RMB)**	1.5
8	**Investment of transmission line (Million RMB)**	14.8
9	**Income tax rate**	33%
10	**Sale tax (Including tax of city construction and education, Million RMB)**	13.28
11	**O&M cost (RMB/MWh)**	128.5

(2) Comparison of the financial benchmark of IRR of total investment for the Project

In accordance with the benchmark analysis (Option III), if the financial indicators (such as IRR of total investment) of the Project are lower than the benchmark, the Project is not considered as financially attractive. Based on the data, without CERs sales revenues, the IRR of total investment of the Project is 6.72%, which is lower than the benchmark (8%). The Project is not financially attractive.

With CDM, CERs revenue will improve IRR of total investment by up 1.94% above the benchmark scenario.

Therefore, the proposed project, with the CDM revenue, can be considered as financially viable to the investors. Table 2 shows the IRR of the Project with and without CDM revenues.

Table2. Financial indicators of the Project

	IRR(total investment) benchmark=8%
Without CDM	6.72%
With CDM	8.66%

Sub-step 2d. Sensitivity analysis

The objective of sensitivity analysis is 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 only if it consistently supports (for a realistic range of assumptions) the conclusion that the project activity is unlikely to be the most financially attractive or is unlikely to be financially attractive.

For the Project, following financial parameters were taken as uncertain factors for sensitive analysis of financial attractiveness:

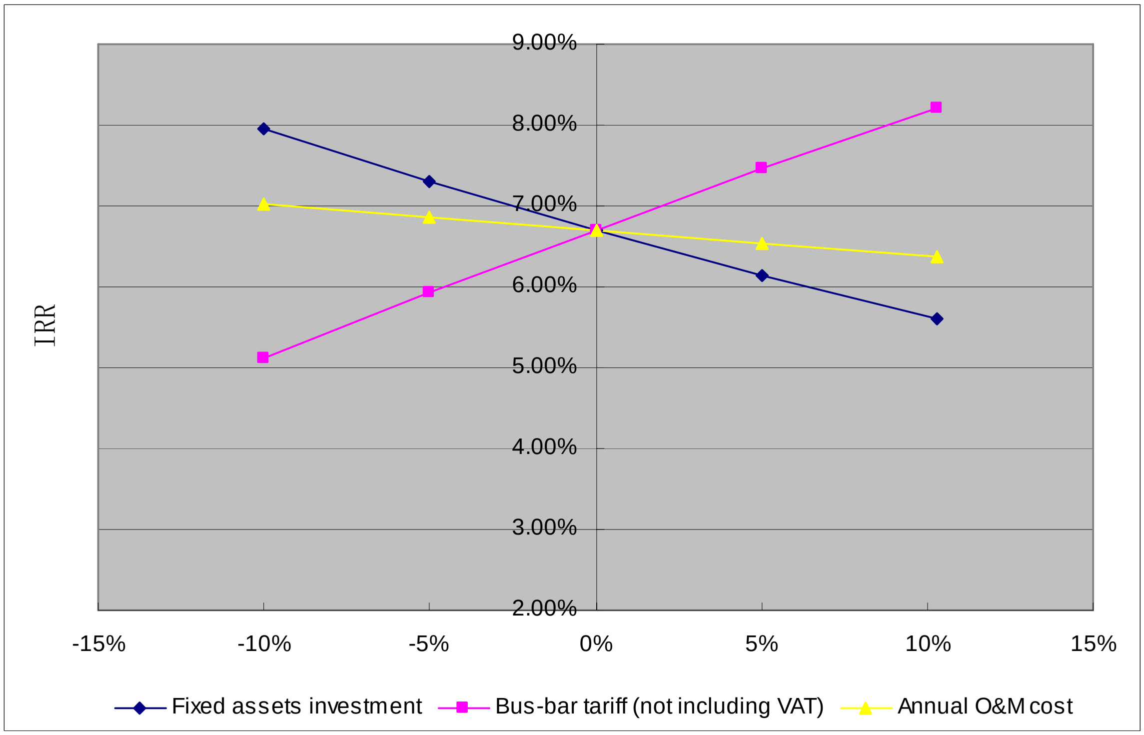
- Total investment
- Bus-bar tariff (not including VAT)
- Annual O&M cost

The impacts of total investment, bus-bar tariff (not including VAT)and annual O&M cost of the Project on IRR of total investment were analyzed. The results of sensitive analysis of three indicators are shown in Table 3 and Figure 5.

Table 3. IRR sensitivity to different financial parameters of the Project
(total investment, without CDM)

	-10%	-5%	0	+5%	+10%
Fixed assets investment	7.98%	7.33%	6.72%	6.16%	5.63%
Bus-bar tariff (excluding VAT)	5.13%	5.94%	6.72%	7.48%	8.22%
Annual O&M cost	7.04%	6.88%	6.72%	6.56%	6.40%

Figure 5. IRR sensitivity to different financial parameters of the Project (total investment, without CDM)



As can be concluded from the above analysis, the Project IRR will not reach 8% with a reduction of 10% in fixed assets investment and an annual O&M costs, and with 5% increasing in the price. It however, with an increasing in the price by 10%, the project IRR will be higher than the benchmark IRR as shown in the sensitivity analysis. However, the assumption of 10% increasing in tariff of wind power will most unlikely to happen because that the tariff of this project has been settled according to the Letter of Approval endorsed by Shandong province price bureau (Evidence was provided to DOE).

Then again, the assumption of 10% increasing in tariff of wind power will most unlikely to happen in the RPC power market in the foreseeable future giving the facts of:

1. **China will continue to use the scheme of tendering for the wind power pricing.** Just recently, the 4th of September 2007, in a press conference held by the State Council Information Office, Chen Deming, vice minister of National Development and Reform Commission, stated that China will continue to use the scheme of tendering for the wind power pricing, because "only in this way can the wind power generation prices to gradually lowering down." (for detailed information please refer to the news report at http://finance.sina.com.cn/china/hgjj/20070905/11043948808.shtml)
2. **The tendering tariff of the wind power project is remaining at the lower end.** The average tendering tariff of the wind projects currently existing in the PRC power market is about

RMB0.52/kwh[8].

3. **China will not increase the tariff of wind power at present.** 19 May 2007，Li Junfeng, deputy director of Energy Research Institute of China's National Development and Reform Commission participated in the "International Summits for Alternative Energy and the Power" said China's wind power tariff will remain stable for a period of time unchanged, the State does not plan to the introduction of a more active policy to support the development of wind power[9].

Base on above analysis, the assumption of 10% increasing of the wind power tariff, will not be a case in the reality of the PRC power market.

The sensitivity analysis confirms that the Project is unlikely to be financial attractive and therefore it self-presents a clear additionality of the Project.

Step 3. Barrier analysis

This step is used only as a complementary statement to further support the additionality of the proposed project activity has been demonstrated by the Step 2 above. Some of real barriers the proposed project faces therefore are:

(a) Prevent the implementation of this type of proposed project activity; and

(b) Do not prevent the implementation of at least one of the alternatives.

Step 3 uses the following sub-steps:

Sub-step 3a. Identify barriers that would prevent the implementation of type of the proposed project activity:

Establish that there are barriers that would prevent the implementation of the type of proposed project activity from being carried out if the Project activity was not registered as a CDM activity, those barriers include:

Investment barriers

The per kW investment cost of 1500 kW turbine adopted by the Project is about 10,059 RMB/kW which is much higher than that of conventional coal-fired power plants of the North China Grid. Although prospective tariff policy and other incentives with respect to wind power projects are currently in place, financial indicators of grid-connected wind power projects have not fundamentally changed and the loan repayment capability remains weak. For example, when it applies for the commercial loan, the wind project has neither enjoyable preferential interest rates, nor the reasonable loan repayment period as the conventional power investment projects, and it has to compete with the conventional power investment projects as well as other fixed asset investment projects in the PRC market for the bank’s approval. In

[8] *Data source: Wind Power Projects and the Issue of Price*

[9] *Data source: China will not increase the tariff of wind power at present. http://politics.people.com.cn/GB/5752740.html*

addition, the design of wind farm life in general only about 20 years, resulting in a greater repayment pressure and much higher financial costs[10].

Since the investment of the Project will be financed entirely through commercial way, which means there is no preferential financing for the Project, the higher per kW investment cost and project owners realize financing through attracting commercial investment. However, the unattractive financial indicators make the Project difficult in closure of its financing package. Based on the *Notification by the State Council on Trying out Capital Mechanism for Fixed Assets Investment Projects* (Guofa [1996]35)[11], the Project could acquire 80% of the total project investment through commercial loan, but in fact only 60% has been obtained in the form of bank loan, which poses significant capital pressure on the project owner.

Sub-step 3 b. Show that the identified barriers would not prevent the implementation of at least one of the alternatives (except the proposed project activity):

As analysed in Sub-step 1a, only Alternative II and Alternative IV are potential baseline alternatives. Alternative II faces barriers described above. For Alternative IV, there exist no above identified barriers.

Step 4. Common practice analysis

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

The installed capacity of the Project is 27.2 MW. Key information of the wind power projects installed in the North China Grid from 2000 to 2005 with installed capacity higher than 10 MW is listed in Table 3 below.

Table 4. Wind power projects installed in the North China Grid from 2000 to 2005[12]

No.	Name	Co. or Model	Unit capacity (kW)	No. of sets	Installed capacity (MW)
1	**Qahar Youyi Zhongqi Huitengxile**	Wandian	600	1	0.6
		Nordex	600	9	5.4
		NEG Micon	900	12	10.8
		GE Wind	1500	10	15.0
2	**Hexigten Qi Dali**	Yituo-MADE	660	6	3.96
		NEG-Micon	750	13	9.75
		Goldwind	600	17	10.2
		NEG Micon	750	28	21.0
3	**Hexigten Qi Saihanba**	Vestas	850	36	30.6
4	**Changdao Liancheng**	Nordex	600	11	6.6
		Windey	750	2	1.5
		Goldwind	600	7	4.2
5	**Jimo Fengshan**	Nordex	250/300/1300	15	16.4
6	**Rongcheng Dongchudao**	DFSTW	1500	4	6.0
		Nordex	1500	3	4.5
7	**Weichang Hongsongwa**	Goldwind	600	82	49.2
		Goldwind	750	6	4.5
8	**Shangyi Damanjing**	GE Wind	1500	23	34.5

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

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[10]*Data source: The Difficulties Faced by the China Wind Power and It's Solution http://www.enpinfo.com/Fan/Tech/Expert/200703/9575.html*

11 http://tzs.ndrc.gov.cn/xkxmql/xkxmyj/t20060802_78919.htm

[12] *Installed Capacity of Wind Farm in China in 2005 (20060323 Revised Version)* by Mr. Shi Pengfei, Vice *Chairman of the Chinese Wind Association.*

Existing projects are not comparable to the Project in respect of financial channel, per kW investment, annual operating hours and so on as summarized in Table 4. The existence of these projects will not influence the additionality of the Project.

Table 5. Explanation on why it has no impact on the additionality of the Project

No.	Name	Explanation on why it has no impact on the additionality of the Project
1	Qahar Youyi Zhongqi Huitengxile	It is consisted of the first registered CDM project in China (25.8 MW installed in 2004) [13], the 0.6 MW turbine supplied by Wandian for performance test[14] and the 9×600 kW turbines introduced with German Governmental Mixed Loans[15].
2	Hexigten Qi Dali	Supported by Special Fund for Treasury Bond[16].
3	Hexigten Qi Saihanba	Registered as CDM Project[17].
4	Changdao Liancheng	It is a pilot wind power project of Shandong province, financed by a sum of loan from German[18].
5	Jimo Fengshan	Investment of this project is 8240 RMB per kW, about 16% lower than that of the Project[19].
6	Rongcheng Dongchudao	Under CDM development[20].
7	Weichang Hongsongwa	Annual operating hours of this project is 2410 h, about 13% higher than that of the Project[21].
8	Shangyi Damanjing	Under CDM development[22].

Furthermore, many wind farms under construction in the North China Grid are applying for being CDM projects[23], which will prove the additionality of the Project in certain extent.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

1. Calculate baseline emission

The combined emission factor of the North China Grid is calculated ex ante.GHG emission reductions of the Project were calculated based on the consolidated baseline methodology ACM0002.

Baseline emission factors of operating margin ($EF_{OM,y}$) and build margin ($EF_{BM,y}$) were determined ex ante based on the data of the North China Grid, which include installed capacity, electricity output and consumption of different types of fuels of all plants. The baseline emission factor (EF_y) is calculated as a combined margin (CM) of $EF_{OM,y}$ and $EF_{BM,y}$, according to the following three steps:

STEP 1. Calculate the Operating Margin Emission Factor(s) ($EF_{OM,y}$) based on one of the four following methods:

[13] *http://cdm.unfccc.int/Projects/registered.html*
[14] *http://www.cinn.cn/show.asp?ClassID=83&id=24404*
[15] *http://www.cwc.cn/Commerce/ShowNews.asp?Newsid=751*
[16] *http://cangzhou.mofcom.gov.cn/column/print.shtml?/sjhbohaisq/200605/20060502338640*
[17] *http://cdm.unfccc.int/Projects/registered.html*
[18] *http://www.infra-vest.com/infravest_simplified_chinese/main_frame/newsletter.files/news9912.html*
[19] *Http://www.jmstc.cn/ReadNews.asp?NewsID=761&BigClassName=%BF%C6%BC%BC%B6%AF%CC%AC&SmallClassName=%D7%EE%D0%C2%B6%AF%CC%AC&SpecialID=0.*
[20] *http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File1230.pdf*
[21] *http://www.sme.gov.cn/web/assembly/action/browsePage.do?channelID=1115874795835&contentID=*
[22] *http://cdm.unfccc.int/Projects/validation.html*
[23] *http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File1097.htm*

(a) Simple OM, or

(b) Simple adjusted OM, or

(c) Dispatch data analysis OM, or

(d) Average OM.

Each method is analyzed as below.

Method (a) Simple OM

The simple OM method only can be used when low-cost/must run resources constitute less than 50% of total amount of grid generating output 1) in the recent five years, or 2) by taking into account long-term normal for hydroelectricity generation. Among the total electricity generations of the North China Grid which the Project is connected into, the amount of low-cost/must run resources accounts for about 1.13% in 2000, 0.85% in 2001, 0.89% in 2002, 0.86% in 2003 and 0.76% in 2004, all less than 50% (see Annex 3 for details). Thus, the method (a) Simple OM can be used to calculate the baseline emission factor of operating margin ($EF_{OM,y}$) for the Project.

Method (b) Simple adjusted OM

The application of simple adjusted OM method requires annual load duration curve of the grid. The power sector in China is in a transitional period of "separating the plant operation from the grid operation", resulting in the detailed data of dispatch and fuel consumption are often taken as confidential business information by the grid company and the power plants. Therefore those data are not publicly available. In most cases, it is difficult for the CDM projects in China to adopt Method (b) for the calculation of the baseline emission factor of operating margin ($EF_{OM,y}$). Similarly, the Project can not adopt Method (b) for the calculation of the baseline emission factor of operating margin ($EF_{OM,y}$) due to unavailability of the dispatch data of the North China Grid.

Method (c) Dispatch data analysis OM

Dispatch data analysis OM method should be the first choice if the dispatch data are available, because the method can truly reflect the substitutable relationship between the amount of electricity output from power plants of the baseline grid and that from the Project activity and the emission reductions generated. However, Method (c) cannot be adopted for the Project because of unavailability of the dispatch data of the North China Grid, similar reason as method (b).

Method (d) Average OM

Method (d) can only be used when 1) low-cost/must run resources constitute more than 50% of total amount of grid electricity output and 2) detailed data required by applying method (b) and method (c) is unavailable. Among the total electricity generations of the North China Grid which the Project is connected into, the amount of low-cost/must run resources accounts for about 1.13% in 2000, 0.85% in 2001, 0.89% in 2002, 0.86% in 2003 and 0.76% in 2004, all less than 50% (see Annex 3 for details). Therefore method (d) cannot be applied to the Project.

In conclusion, Method (a) Simple OM is the only reasonable and feasible method among the four methods for the calculation of the operating margin emission factor(s) ($EF_{OM,y}$) of the Project.

In accordance with the consolidated baseline methodology ACM0002, the Simple OM emission factor ($EF_{OM,simple,y}$) is calculated ex ante. The formula of $EF_{OM,simple,y}$ calculation is

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

where:

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

$COEF_{i,j,y}$ is the total amount the CO_2 emission coefficient of fuel i (tCO_2/mass or volume unit of the fuel), taking into account the carbon content of the fuels (coal, oil and gas) used by province j and the oxidation rate of the fuel in year(s) y, and

$GEN_{j,y}$ is the electricity output (MWh) supplied to the grid by province j.

The CO_2 emission coefficient $COEF_i$ is then obtained from equation (2) as

$$COEF_i = NCV_i \cdot EF_{CO2,i} \cdot OXID_i \qquad (2)$$

where:

NCV_i is the net calorific value (energy content) per mass or volume unit of fuel i,

$OXID_i$ is the oxidation factor of the fuel i (see page 1.29 in the 2006 Revised IPCC Guidelines for Default Values), and

$EF_{CO2,i}$ is the CO_2 emission factor per unit of energy of the fuel i.

When there exists net electricity imports ($COEF_{i,j,imports}$) from a connected electricity system within the same host country(ies):

(b) the emission factor(s) of the specific power plant(s) from which electricity is imported, if and only if the specific plants are clearly known, or

(d) the emission factor of the exporting grid, if the specific plants are not clearly known.

The data on electricity generation and auxiliary electricity consumption are obtained from the *China Electric Power Yearbook* from 1998 to 2005 (published annually). The data on different fuel consumptions for power generation and the net caloric values of the fuels are obtained from the *China Energy Statistical Yearbook* from 2000 to 2005 (published annually after 2003). The emission factors and oxidation factors of the fuels adopted are obtained from *2006 IPCC Guidelines for National Greenhouse Gas Inventories: Workbook*.

With reference to the *Notification on Determining Baseline Emission Factor of China's Grid*[24], the

[24] *The Notification on Determining Baseline Emission Factor of China's Grid is issued by China's DNA on December 15th, 2006 on its official website (http://cdm.ccchina.gov.cn/web/NewsInfo.asp?NewsId=1235). Therefore,*

Simple OM emission factor ($EF_{OM,y}$) of the North China Grid is calculated as 1.0799 tCO_2e/MWh (see Annex 3 for details).

STEP 2. Calculate the Build Margin Emission Factor ($EF_{BM,y}$ **)** according to the consolidated baseline methodology ACM0002 using equation (3):

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

where:

$F_{i,m,y}$ is the amount of fuel i (tCe) consumed by relevant power source m in year(s) y,

$COEF_{i,m,y}$ is the CO_2 emission coefficient of fuel i (tCO_2/tCe), taking into account the carbon content of the fuels (coal, oil and gas) used by relevant power source m and the percent oxidation of the fuel in year(s) y, and

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

Option 1, calculate the Build Margin emission factor ($EF_{BM,y}$) ex-ante based on the most recent information available on plants already built for sample group m at the time of PDD submission was selected for the Project.

According to the consolidated baseline methodology ACM0002, the sample group m consists of either (1) the five power plants that have been built most recently, or (2) the power plant capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently. It is suggested that the sample group that comprises the larger annual generation should be used.

Currently in China, in general, grids and power plants connected into the grids do not intend to provide detailed data on electricity generation and fuel consumption at plant level because these data are considered as confidential information by the company itself and the grid in China. On the other hand, the aggregated data on electricity generation mix and capacity mix by fuel category above the provincial power grid level could be publicly available from official publications, such as the China Electric Power Yearbook, the China Energy Statistical Yearbook and provincial statistical yearbook, etc.

Taking into account such situations in China, on the 22nd meeting of CDM EB, it is decided to accept three deviations[25] based on the request for deviation proposed by DNV on Oct. 7th, 2005[26], to use the grid aggregated data at generation mix level instead of those at power plant level, as follows:

1) Alternative solutions in the absence of data:

   (1) For small-scale project activities, use the average emission factor of the grid as described in the AMSI.D; and

the data is transparent and reliable.

[25] *Data source: http://cdm.unfccc.int/UserManagement/FileStorage/AM_CLAR_QEJWJEF3CFBP1OZAK6V5YXPQKK7WYJ*

[26] *Data source: http://cdm.unfccc.int/UserManagement/FileStorage/6POIAMGYOEDOTKW25TA20EHEKPR4DM*

(2) Use the efficiency level of the best technology commercially available in the provincial/ regional or national grid of China, as a conservative proxy, for each fuel type in estimating the fuel consumption to estimate the build margin (BM). For the estimation of the operating margin (OM) the average emission factor of the grid for each fuel type can be used.

2) Use of capacity additions during last 1 - 3 years for estimating the build margin emission factor for grid electricity. (i.e. the capacity addition over 1 - 3 years, whichever results in a capacity addition that is closest to 20% of total installed capacity).

3) Use of weights estimated using installed capacity in place of annual electricity generation, (which could be used to calculate BM baseline emission factor).

CDM EB's decision on the agreed deviations is a formal response to the DNV's request for deviation: "the application of AM0005 and AMS-I.D in China". Nevertheless it can be reasonably understood that these agreed deviations are also effective to ACM0002, since the simple OM and BM methods applied by the AM0005 and ACM0002 are almost the same[27].

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

1) For the Project, the most recent year of which data is available is 2004, and the sample group m consists of installed capacity addition during 2002 to 2004. The total capacity addition during 2002 to 2004 accounts 25.69% of total installed capacity in 2004, while that during 2003 to 2004 accounts for 16.37% of total installed capacity in 2004. The weight of installed capacity additions for thermal power plant is accounted for 99.58% of total installed capacity additions. (See Annex 3 for detailed calculation.)
2) According to the statistics by State Electricity Regulatory Commission (SERC) on newly built thermal plants in the "Tenth Five-Year Plan" period, the coal consumption per kWh electricity supplied to grid of domestically produced sub-critical power unit of 600 MW is estimated as 336.66 g SCe/kWh, which is selected as the best technology commercially available in China[28]. The IPCC default value of emission factor 25.8 tC/TJ for carbon content of the coal, carbon oxidization factor of 100% and the local value of 29271.2 MJ/tCe are used to calculate the BM. On their basis, the CO_2 emission factor of coal-fired capacity addition is calculated to be 0.9323 tCO_2/MWh. (See Annex 3 for detailed calculation.)
3) The $EF_{BM,y}$ of the North China Grid is calculated as

$$EF_{BM,y} = \frac{CAP_{Thermal}}{CAP_{Total}} \times EF_{Adv,Thermal} \qquad (4)$$

where

CAP_{Total} is the total capacity addition,

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

$EF_{Adv,Thermal}$ is the CO_2 emission factor of the best thermal power technology commercially available.

Follow the data and formula above, the $EF_{BM,y}$ of the NCG is calculated to be 0.9253 tCO_2/MWh. The

[27] *Data source: In fact, CDM EB holds the same understanding, and accepts requests for registration of such kind PDDs, in which ACM0002 methodology is applied and those deviations originally agreed by CDM EB for AM0005 are applied as well. Especially, given that the AM0005 has been cancelled and its major elements are intergraded into ACM0002 as decided by the 23rd meeting of CDM EB, legally we can apply these three deviation approaches into the ACM0002 application.*

[28] *Data source: http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File1051.pdf*

detailed calculation and data were listed in Annex 3.

However, the capacity addition data of oil and gas power plants is not available in China currently, and coal is the overwhelming dominant fuel in the NCG and there is only a little oil and gas consumption, which accounts for 0.67% of total grid in terms of CO_2 emission in 2004. Moreover, the oil and the gas are not combusted directly for power generation; instead they are mostly for start-ups of boilers. Thus, the CO_2 emission from the oil and the gas could be ignored. Therefore, it is reasonable to treat all the thermal capacities as coal-fired power plants, and the above calculation used CO_2 emission factor of coal-fired capacity addition as that of thermal power capacity addition. To be more conservative, the $EF_{BM,y}$ calculated above could be discounted by multiplying a coefficient. The $EF_{BM,y}$ is discounted as 0.9253× (1-0.67%) = 0.9221 tCO_2e/MWh.

Data source for $EF_{BM,y}$ calculation includes: installed capacity, power generation, and self-usage rate of power plants are obtained from China Electric Power Yearbooks 2002~2005; the consumption data of various types of fuels and their caloric values are obtained from China Energy Statistical Yearbooks 2000~2005. The CO_2 emission factors per unit energy and the oxidation factors are obtained from the Revised 2006 IPCC Guidelines for National Greenhouse Gas Inventories. (see Annex 3 for details).

STEP3. Calculate the baseline emission factor (EF_y)

Based on the consolidated baseline methodology ACM0002, the baseline emission factor (EF_y) is calculated as the weighted average of the operating margin emission factor ($EF_{OM,y}$) and the build margin emission factor ($EF_{BM,y}$), as

$$EF_y = w_{OM} \cdot EF_{OM,y} + w_{BM} \cdot EF_{BM,y} \qquad (5)$$

According to the consolidated baseline methodology ACM0002, the weight w_{OM} is 0.75 and the weight w_{BM} is 0.25 for wind power projects. Therefore the combined baseline emission factor

EF_y =0.75×1.0799+0.25×0.9221=1.0405 (tCO_2e/MWh).

Baseline emissions

Baseline emissions are calculated with combined baseline emission factor and electricity output of the Project as follows:

$$BE_y = EG_y \times EF_y$$

2. Calculate the Project emission

Being a wind power project, no emissions from the Project activity were identified. There are therefore no formulae included here.

3. Calculate the Leakage

According to the consolidated baseline methodology ACM0002, the main indirect emissions potentially giving rise to leakage in the context of electric sector projects result from activities such as power plant construction, fuel handling(mining, processing, and transportation), and land inundation (for hydroelectric projects). The project developer does not need to consider such indirect emissions when applying the methodology. So the Project can take no account of such leakages, $L_y = 0$.

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

Data / Parameter:	Fi,y
Data unit:	*t/m3*
Description:	*Amount of fuel I consumed in year(s) y for generation*
Source of data used:	*China Energy Statistical Yearboo,k*
Value applied:	*See Annex 3*
Justification of the choice of data or description of measurement methods and procedures actually applied :	*Since the detailed fuel consumption data by power plants are not publicly available, therefore the aggregated data by fuel types are used instead.*
Any comment:	

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

Data / Parameter:	*NCVi*
Data unit:	*GJ/t(ce)*
Description:	*Net caloric value of fuel i*
Source of data used:	*China Energy Statistics Yearbook 2004, p535*
Value applied:	*See Annex 3*
Justification of the choice of data or description of measurement methods and procedures actually applied :	*This data comes from an official statistics.*
Any comment:	

Data / Parameter:	OXIDi
Data unit:	
Description:	*The oxidation factor of fuel i*
Source of data used:	*IPCC default value in revised 2006 IPCC Guideline for National Greenhouse Gas Inventories*
Value applied:	*See Annex 3*
Justification of the choice of data or description of measurement methods and procedures actually applied :	*This data is based on IPCC default value because the national specific value is unavailable.*
Any comment:	

Data / Parameter:	EFco2,i
Data unit:	*tCO2/GJ*
Description:	*The emission factor of fuel i*
Source of data used:	*IPCC default value in revised 2006 IPCC Guideline for National Greenhouse Gas Inventories*
Value applied:	*See Annex 3*

Justification of the choice of data or description of measurement methods and procedures actually applied :	*Since the detailed generation data by power plants are not publicly available, therefore the aggregated data by fuel types are used instead.*
Any comment:	

Data / Parameter:	COEFi
Data unit:	*tCO2/t(m3)*
Description:	*CO2 emission coefficient of fuel i*
Source of data used:	*Calculated*
Value applied:	*See Annex 3*
Justification of the choice of data or description of measurement methods and procedures actually applied :	*Calculated according to the formula suggested by ACM0002.*
Any comment:	

B.6.3 Ex-ante calculation of emission reductions:

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The Project activity will generate greenhouse gas (GHG) emission reductions by avoiding CO_2 emissions from electricity generation by fossil fuel power plants. The emission reduction (ER_y) during a given year y is calculated as follows: $ER_y = BE_y - PE_y - L_y$

Since the project emission for wind power PE_y and L_y is considered as zero, the emission reduction is equal to baseline emission BE_y, i.e.:

$$ER_y = BE_y = EG_y \cdot EF_y$$

Here, BE_y is (in the absence of the project activity) the GHG emission of the part of electricity generation, which is equivalent to that of the Project (140033MWh), of the NCG, i.e. annual emission reductions of the project, 145,704tCO2e/a.

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

>>

It is expected that the Project activities will generate emission reductions, within the North China Grid, in an average annual amount of 135,920 tCO_2e over the first 7-year renewable crediting period from July, 2007 to June 2014. Estimated emission reductions are achieved by avoiding CO_2 emissions from electricity generation of those fossil fuel-fired power plants connected into the North China Grid.

The ex post calculation of baseline emission rates may only be used if proper justification is provided. Notwithstanding, the baseline emission rates shall also be calculated ex ante and reported in the CDM-PDD. The result of the application of the formulae above shall be indicated using the following tabular format.

Year	**Estimation of project activity emissions (tonnes of CO_2e)**	**Estimation of baseline emissions (tonnes of CO_2e)**	**Estimation of leakage (tonnes of CO_2e)**	**Estimation of overall emission reductions (tonnes of CO_2e)**
1 October 2007	0	20,395	0	20,395
2008	0	93,248	0	93,248
2009	0	145,704	0	145,704

2010	0	145,704	0	145,704
2011	0	145,704	0	145,704
2012	0	145,704	0	145,704
2013	0	145,704	0	145,704
30 September 2014	0	109,278	0	109,278
Total (tCO_2e)	**0**	**951,441**	**0**	**951,441**

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

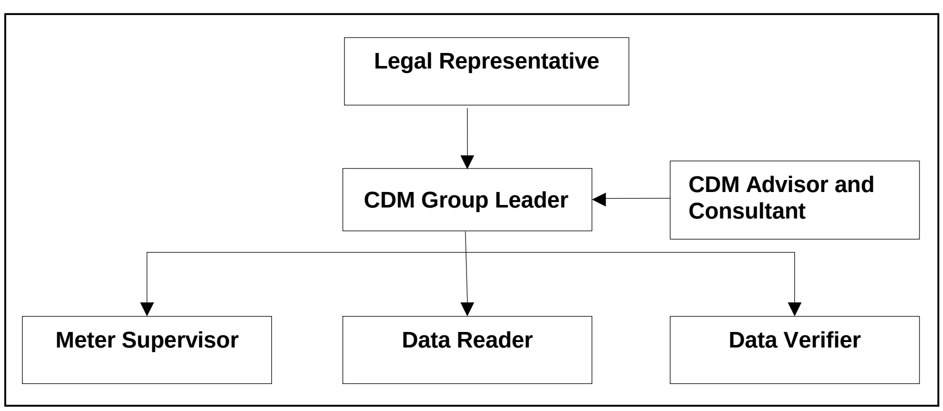
Data / Parameter:	EG_y
Data unit:	MWh
Description:	Electricity supplied to the grid by the Project
Source of data to be used:	ammeter
Value of data applied for the purpose of calculating expected emission reductions in section B.5	140,033
Description of measurement methods and procedures to be applied:	Hourly measurement and monthly recording
QA/QC procedures to be applied:	The grid-connected electricity generation will be monitored by electric-meter in compliance with relevant standards in China. Electricity sales receipts from the commercial metering system for power wheeled into the North China Grid will also be obtained as an additional check.
Any comment:	Double Checked by receipts of electricity sales.

B.7.2 Description of the monitoring plan:

>>

The Project owner will be responsible for the monitoring related work, including the relevant data collection, monitoring and verification. It is expected that a CDM working panel will be established internally, and to be assisted by an external CDM consulting company. The operational and organizational structure for the monitoring process is showed as in the Figure 6.

Figure 6. The Operational and Organizational Structure



Furthermore, a CDM manual was designed as a guideline for the project owner for management of the Project and monitoring of the data during the operation period. The manual is available for validation by the DOE and will be updated and revised post-validation based on the comments from the DOE. Details on the authority and responsibility for registration, monitoring, measurement and reporting, the procedures for the training of monitoring personnel, the procedures for day-to-day records handling, the procedures for internal audits, the procedures for corrective actions and so on are provided in the CDM manual for the Project owner.

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)

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The baseline study of the Project was completed on December 24th, 2006 by Green Capital Consulting Company and Tuttle International, and the contact information is as follows:

For Green Capital Consulting Company: Huang Jinfeng, project manager of Technical Service Department, Suit 1503, Building 8, Jianwai SOHO, Beijing 100022, China, Tel. (8610)5869-3461/3462/7862; Email: tech-service@greencapital-eimc.com.

For Tuttle International: Mr. Zheng Zhaoning and Ms. Pan Tao. Email：Zhaoning.zheng@tuttle-international.com.

Neither the Green Capital nor the Tuttle International is project participant listed in Annex 1.

SECTION C. Duration of the project activity / crediting period

C.1 Duration of the project activity:

C.1.1. Starting date of the project activity:

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16/07/2005 (The completion date of the Feasibility Study Report for the proposed project ）

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

>>

21y-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:

>>

01/10/2007[29]

C.2.1.2. Length of the first crediting period:

>>

7y-0m

C.2.2. Fixed crediting period:

[29] *The crediting period shall start after the registration of the project. If the registration date is late than the 01/10/2007, the starting date of the first crediting period should be revised to the registration date.*

C.2.2.1. Starting date:

>>

Not applicable.

C.2.2.2. Length:

>>

Not applicable.

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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The Environmental Impact Registration Form were completed by the Project owner and approved by the Environment Protection Bureau of Shandong Province

The environmental impacts arising from the Project are analyzed in the following two phases:

Construction Phase

Water loss and soil erosion

The Project is located in an alluvial coastal plain. Due to the water loss and soil erosion possibly caused by excavation and reclamation of the land and the damage of the vegetation cover, protection measures against water loss and soil erosion are specially designed for the main work, temporary construction facilities, electrical cable trenches, roads and the burrow pit, and special budget is made for it.

A special water and soil conservation management organization which is responsible for carrying out and monitoring ex post the water and soil conservation measures is set up by the Project owner in order to reduce the impacts to the minimum.

Land use

The Project mainly takes tidal flat and barren land for permanent and temporary construction use. Permanently occupied land for the wind farm is about 42.719 acre on which evergreen vegetation will be planted to decorate the surroundings at the end of the construction period. Temporarily occupied land is about 26.818 acre and will be restored according to its characteristics after construction and its realization will be ensured.

All the original land user of the permanently and temporarily occupied land will be financially compensated according to relevant regulations approved in advance by the relevant land use management organization from the government. Overall, land use impact on the local residents arising from the Project is considered to be insignificant.

Noise

The running noise of mechanical facilities and the traffic noise are the main source of noises in the construction process. The Project owner will control and manage the noise pollution source during the construction in order to be in line with the relevant rules of the Noise Limits on the Border of the Construction Site (GB12523-90) imposed on the noise during the construction period around the construction site by means of selecting low-noise construction machinery, arranging appropriate working time and vehicle route and strengthening the workers' protection equipments.

As to a few mariculture farms near the wind farm which might be disturbed by the construction noise, the Project owner will minimize the noise impacts by means of installing double side windows, moving the farms or compensating them. There is not a heavy transportation and roads used for getting in and out of the wind farm are the main lines of communication that currently exist, so there will be only a little traffic noise impacts on the local residents nearby caused by the construction vehicles.

Dust and exhaust gas

Due to the earthwork excavation and the construction transportation dust, reentrainment of dust and tail gas is possibly generated around working area and nearby. The Project owner will control and manage the air pollution source to make the air quality around the construction site meet the national standard grade two of Air Quality Standards (GB3095-96) by means of dust wetting, adoption of advanced environment friendly equipment and strengthening the workers' protection devices.

Waste water

Certain amount of production wastewater (73 m^3/d) and sanitary wastewater (24 m^3/d) will be generated during the construction period. In order to reduce the pollution to the water environment nearby production wastewater and sanitary wastewater will not be directly discharged into the surrounding waters. The waste water will be treated by chemicals using simple separation sedimentation tank and then reutilized for flushing the road and concrete mixing. Biological treatment complexes for small scale sanitary wastewater biological treatment complexes which treat sanitary wastewater using anaerobic-aerobic process will be equipped in the residential area. The outflow will be reutilized.

Solid waste

The extra excavated earthwork during the construction period will be transported to the reclamation area nearby to smooth the field, whose impact on the environment is insignificant. As to the waste generated by living activities, the Project owner will arrange garbage cans for the waste sorted by areas and by types and ask the environmental sanitation service company organization to clean and transport them.

<u>Operation Phase</u>

Ecological impact

Weihai City is located at one of the four biggest swan hibernacula in the world, however the Project construction site is far from the migration route, so the probability of the migration swans colliding with the turbine blades is nearly zero since the flying height of the migration swans is 350~12000 m which is much higher than the height of turbine blades. Overseas research on modern wind farms with high turbine power and low rotor speed shows that such probability is as low as 0.0015~0.006% in the case of other birds which fly at relatively low altitudes. Further more, the Project is far from the tidal flat and swamp land where the water fowls and wading birds inhabit and feed, so birds barely pass the wind farm area. Therefore, the probability of birds colliding with turbine blades is nearly zero.

Noise

The operating noise of wind power turbine generator system comes from the friction between wind and blades and from the running mechanical parts inside it. These noise values satisfy the national standards in the daytime while respectively 4.2 dB(A) and 3.1 dB(A) higher at night. Considering this situation, the Project owner will minimize the noise impacts by means of installing double side windows, moving the farms or compensating them.

Sanitary wastewater and municipal waste

The sanitary wastewater from the management staff of the wind farm will be discharged into integrated waste water treatment facilities and the outflow is reutilized for irrigation. And the municipal waste from the management staff of the wind farm will be collected to the Weihai landfill for treatment by the environmental sanitation service company.

Electromagnetic radiation

There is some distance from the box type transformer substation and the 35 kV wind farm switching station to the wind farm control centre, which meets the requirement of electromagnetic radiation protection. Electromagnetic radiation generated by the transformer equipments has insignificant impacts on the surroundings considering range attenuation and shielding effect of the equipment cover and case.

The environment management during the construction period is co-undertaken by the development side, construction side and the supervision side. And the management organization of the wind farm is in charge during the Project operation. From above all, the impact of the Project on the natural environment and social environment of the surroundings 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:

>>

Impacts are not considered significant.

SECTION E. Stakeholders' comments

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

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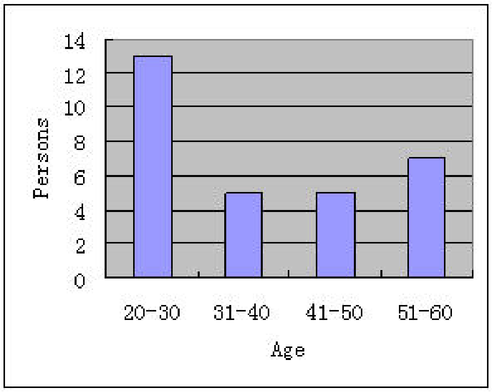
In May 2006, staff from the Project owner carried out a survey of the local residents possibly impacted in the area where the Project will be sited. Comments received through the survey are summarized as follows. The government of Weihai City issued a support letter for the Project. It is available for DNA and DOE.

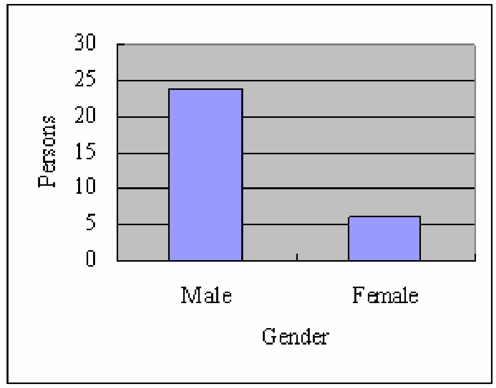
E.2. Summary of the comments received:

>>

The survey was conducted through distributing and collecting responses to a questionnaire. Totally 30 questionnaires returned out of 30 with 100% response rate. The basic constitutes of the respondents are shown with following figures.

Figure 7. Age structure **Figure 8. Gender ratio**





The following is a summary of the key findings based on 30 returned questionnaires.

- 2 (7%) persons of the respondents know well about wind power, 8 (27%) persons know a little and 20 (67%) persons have no knowledge about wind power.
- 18 (60%) persons of the respondents support the local constructed wind farm, 11 (37%) persons show carelessness and 1 (3%) person opposes.
- The respondents consider construction and operation of the Project may mitigate air pollution (33%), increase employment opportunities (60%) and income (40%), improve living level (33%) and decrease local electricity price (40%).
- The respondents consider construction and operation of the Project may induce noise (57%), improper land occupancy (33%), disturbance on TV and other receivers (67%), destruction on natural environment (40%), increase of the amount of waste (7%) and etc.
- 18 (60%) persons of the respondents think the construction of the Project will have direct positive impacts, 9 (30%) persons think basically no impact and 3 (10%) think negative impacts.
- 27 (90%) persons of the 30 respondents support the construction of the Project and 3 (10%) persons oppose.

The survey shows that local residents of the Project know little about wind power but the respondents generally believe the Project will have positive impacts on many aspects of their lives.

In the survey, it is the same three respondents that consider the construction of the Project will basically have direct negative impacts and do not support the construction of the Project. They are all residents from the Daxi Village near the construction site of the Project. And they are all worried about the construction of the Project will induce the disturbance of noise and on radio receivers, which is also the main problem considered by other respondents.

According to the Environmental Impact Registration Form, the Project owner has already fully considered the possible noise and electromagnetic radiation impacts on the residents nearby. The Project owner will minimize the noise impacts by means of installing double side windows, moving the farms or compensating them. And the radiation shielding of the turbines and the transformer relevant equipments will be strengthened to minimize the electromagnetic radiation impact.

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

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The residents and local government are all supportive of the Project therefore there has been no need to modify the project due to the comments received.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

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There is no public funding from Annex I Parties for the Project.

Annex 3
BASELINE INFORMATION

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To determine the Simple OM emission factor ($EF_{OM,y}$) and the Build Margin emission factor ($EF_{BM,y}$) for the Project, data recommended in the *Notification on Determining Baseline Emission Factor of China's Grid* for the North China Grid are adopted.

The *Notification on Determining Baseline Emission Factor of China's Grid* is issued by China's DNA on December 15th, 2006 on its official website.

(http://cdm.ccchina.gov.cn/web/NewsInfo.asp?NewsId=1235). Therefore, the data is transparent and reliable.

The following tables summarise the numerical results from the equations listed in the approved methodology ACM0002 (version 6). The information provided by the tables includes data, data sources and the underlying calculations.

Table A1. Electricity Generation of the North China Grid in 2002

Regions	Electricity Generation (MWh)	Rate of Electricity Consumption (%)	Electricity Supply to Grid (MWh)
Beijing	17,886,000	7.95	16,464,063
Tianjin	27,263,000	7.08	25,332,779.6
Hebei	100,970,000	6.72	94,184,816
Shanxi	82,256,000	7.98	75,691,971.2
Inner Mongolia	51,382,000	7.93	47,307,407.4
Shandong	124,162,000	6.79	115,731,400.2
Total			374,712,437.4

Data source: China Electric Power Yearbook 2003.

Table A2. Electricity Generation of the North China Grid in 2003

Regions	Electricity Generation (MWh)	Rate of Electricity Consumption (%)	Electricity Supply to Grid (MWh)
Beijing	18,608,000	7.52	17,208,678
Tianjin	32,191,000	6.79	30,005,231
Hebei	108,261,000	6.5	101,224,035
Shanxi	93,962,000	7.69	86,736,322
Inner Mongolia	65,106,000	7.66	60,118,880
Shandong	139,547,000	6.79	130,071,759
Total			425,364,906

Data source: China Electric Power Yearbook 2004.

Table A3. Electricity Generation of the North China Grid in 2004

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

Data source: China Electric Power Yearbook 2005.

Table A4. Calculation of Simple OM Emission Factor of the North China Grid in 2002

Energy	Unit	Beijing A	Tianjin B	Hebei C	Shanxi D	Inner Mongolia E	Shandong F	Total Fuel G=A+B+…+F	Emission Factor (tC/TJ) H	Oxidation Rate (%) I	NCV (MJ/t or $1000m^3$) J	Emission[30] (tCO_2e) K
Coal	10^4t	691.84	1,052.74	4,988.01	4,037.4	3218	5,162.86	19,150.84	25.8	100	20,908	378,783,851.5
Cleaned coal	10^4t	0	0	0	0	0	80.71	80.71	25.8	100	26,344	2,011,408.131
Other washed coal	10^4t	3.43	0	65.2	135.56	0	106.32	310.51	25.8	100	8,363	2,456,568.193
Coke oven gas	10^8m^3	0.17	1.71	0	0.75	0.16	0.04	2.83	12.2	100	16,726	834,913.937
Other gas	10^8m^3	15.82	0	7.34	0	10.35	0	33.51	13	100	5,227	459,362.6987
Crude oil	10^4t	0	0	0	0	0	14.98	14.98	20	100	41,816	19,400.8815
Gasoline	10^4t	0	0	0	0	0	0.65	0.65	18.9	100	43,070	579,693.2841
Diesel	10^4t	0.26	2.35	4.12	0	1.6	10.02	18.35	20.2	100	42,652	1,163,041.65
Fuel oil	10^4t	13.94	0.04	1.22	0	0.42	20.33	35.95	21.1	100	41,816	6,383.223
Refinery gas	10^4t	0	0	0.27	0	0	0	0.27	14	100	46,055	124,489.6587
Natural gas	10^8m^3	0	0.55	0	0	0.02	0	0.57	15.3	100	38,931	0
Other energy	10^4tCe	0	0	0	0	1.1	15.92	17.02	0	0	0	0

Net electricity import from the Northeast China Grid to the North China Grid (MWh)	2,905,200
Average emission factor of the Northeast China Grid (tCO2e/MWh)	1.1163291
Total emission of the North China Grid (tCO_2e)	389,894,016
Fossil power supply of the North China Grid (MWh)	377,617,637
OM emission factor of the North China Grid (tCO_2e/MWh)	1.0325101

Data sources: China Energy Statistical Yearbook (2000-2002).

[30] *If the unit of the fuel is 10^4 t, then $K=G\times H\times I\times J\times 44/12/10^4$; if the unit of the fuel is 10^8 m^3, then $K=G\times H\times I\times J\times 44/12/10^3$. The same about the calculation of K in Table A5 and Table A6.*

Table A5. Calculation of Simple OM Emission Factor of the North China Grid in 2003

Energy	Unit	Beijing A	Tianjin B	Hebei C	Shanxi D	Inner Mongolia E	Shandong F	Total Fuel G=A+B+…+F	Emission Factor (tC/TJ) H	Oxidation Rate (%) I	NCV (MJ/t or 1000m^3) J	Emission (tCO_2e) K
Coal	10^4t	714.73	1,052.74	5,482.64	4,528.5	3,949.32	6,808	22,535.94	25.8	100	20,908	445,737,636.1
Cleaned coal	10^4t	0	0	0	0	0	9.41	9.41	25.8	100	26,344	234,510.5998
Other washed coal	10^4t	6.31	0	67.28	208.21	0	450.9	732.7	25.8	100	8,363	5,796,681.315
Coke	10^4t	0	0	0	0	2.8	0	2.8	29.2	100	28,435	85,244.33867
Coke oven gas	10^8m^3	0.24	1.71	0	0.9	0.21	0.02	3.08	12.2	100	16,726	230,448.5979
Other gas	10^8m^3	16.92	0	10.63	0	10.32	1.56	39.43	13	100	5,227	982,412.9077
Crude oil	10^4t	0	0	0	0	0	29.68	29.68	20	100	41,816	910,139.1787
Gasoline	10^4t	0	0	0	0	0	0.01	0.01	18.9	100	43,070	298.4751
Diesel	10^4t	0.29	1.35	4	0	2.91	5.4	13.95	20.2	100	42,652	440,693.2596
Fuel oil	10^4t	13.95	0.02	1.11	0	0.65	10.07	25.8	21.1	100	41,816	834,672.4496
Refinery gas	10^4t	0	0	0.27	0	0	0.83	1.1	14	100	46,055	26,005.72333
Natural gas	10^8m^3	0	0.5	0	0	0	1.08	1.58	15.3	100	38,931	345,076.5978
Other energy	10^4tCe	9.83	0	0	0	0	39.21	49.04	0	0	0	0

Net electricity import from the Northeast China Grid to the North China Grid (MWh)	4,244,380
Average emission factor of the Northeast China Grid (tCO2e/MWh)	1.109916942
Total emission of the North China Grid (tCO_2e)	460,334,729
Fossil power supply of the North China Grid (MWh)	429,609,286
OM emission factor of the North China Grid (tCO_2e/MWh)	1.0715195

Data sources: China Energy Statistical Yearbook 2004.

Table A6. Calculation of Simple OM Emission Factor of the North China Grid in 2004

Energy	Unit	Beijing A	Tianjin B	Hebei C	Shanxi D	Inner Mongolia E	Shandong F	Total fuel G=A+B+…+F	Emission factor (tC/TJ) H	Oxidation rate (%) I	NCV (MJ/t or 1000m³) J	Emission (tCO_2e) K
Coal	10^4t	823.09	1,410	6,299.8	5,213.2	4,932.2	8,550	27,228.29	25.8	100	20,908	538,547,476.6
Cleaned coal	10^4t	0	0	0	0	0	40	40	25.8	100	26,344	996,856.96
Other washed coal	10^4t	6.48	0	101.04	354.17	0	284.22	745.91	25.8	100	8,363	5,901,190.882
Coke	10^4t	0	0	0	0	0.22	0	0.22	29.2	100	28,435	6,697.769467
Coke oven gas	10^8m^3	0.55	0	0.54	5.32	0.4	8.73	15.54	12.2	100	16,726	1,162,717.926
Other gas	10^8m^3	17.74	0	24.25	8.2	16.47	1.41	68.07	13	100	5,227	1,695,989.009
Diesel	10^4t	0.39	0.84	4.66	0	0	0	5.89	20.2	100	42,652	186,070.4874
Fuel oil	10^4t	14.66	0	0.16	0	0	0	14.82	21.1	100	41,816	479,451.3838
Refinery gas	10^4t	0	0.55	1.42	0	0	0	1.97	14	100	46,055	46,573.88633
Natural gas	10^8m^3	0	0.37	0	0.19	0	0	0.56	15.3	100	38,931	122,305.6296
Other energy	10^4tCe	9.41	0	34.64	109.73	4.48	0	158.26	0	0	0	0

Net electricity import from the Northeast China Grid to the North China Grid (MWh)	4,514,550
Average emission factor of the Northeast China Grid (tCO2e/MWh)	1.1518
Total emission of the North China Grid (tCO_2e)	554345178
Fossil power supply of the North China Grid (MWh)	493,687,660
OM emission factor of the North China Grid (tCO_2e/MWh)	1.1228662

Data sources: China Energy Statistical Yearbook 2005.

Therefore the operating margin emission factor(s) ($EF_{OM,y}$) of the Project is calculated as 1.0799 tCO_2e/MWh.

Table A7. Emission of CO2 of ECG in ECG

Energy	Unit	Beijing A	Tianjin B	Hebei C	Shanxi D	Inner Mongolia E	Shandong F	Total G=A+B+…+F	NCV (MJ/t or 1000m^3) H	Emission Factor (tC/TJ) I	Oxidation Rate J	Emission (tCO_2e) K
Raw coal	10^4t	823.09	1410.00	6299.80	5213.20	8550.00	4932.20	27228.29	20,908	25.8	1	538,547,477
Cleaned coal	10^4t	0	0	0	0	40．00	0	40	26,344	25.8	1	996,857
Other washed coal	10^4t	6.48	0	101.04	354.47	284.22	0	745.91	8,363	25.8	1	5,901,191
Coke	10^4t	0	0	0	0	0	0.22	0.22	28,435	29.2	1	6,698
Sub-total												**545,452,222**
Diesel	10^4t	0.39	0.84	4.66	0	0	0	5.89	42,652	20.2	1	186,070.49
Fuel oil	10^4t	14.66	0	0.16	0	0	0	14.82	41,816	21.1	1	479,451.38
Sub-total												**665,521.87**
Natural gas	10^7m^3	0	3.7	0	1.9	0	0	5.6	38,931	15.3	1	122,305.63
Coke oven gas	10^7m^3	5.5	0	5.4	53.2	87.3	4.0	155.4	16,726	12.2	1	1,162,717.93
Other gas	10^7m^3	177.4	0	242.5	82.0	14.1	164.7	680.7	5,227	13	1	1,695,989.01
Refinery gas	10^4t	0	0.55	1.42	0	0	0	1.97	50,179	17.2	1	0.00
Sub-total												**3,027,586.45**
Total												**549,145,330.54**

Data sources: China Energy Statistical Yearbook 2005.

Table A8. The Emission Factor of Coal, oil, Gas-Fired Power Plant

	Variable	Efficiency of Power Supply A	Emission Factor of the Fuel (tc/TJ) B	Oxidation Factor C	Emission Factor (tCO_2/MWh) D=3.6/A/1000*B*C*44/12
Coal-based power plants	$EF_{Coal,Adv}$	36.53%	25.8	1	0.9323
Gas-based power plants	$EF_{Gas,Adv}$	45.87%	15.3	1	0.4403
Oil-based power plants	$EF_{Oil,Adv}$	45.87%	21.1	1	0.6072

Calculate with data provided in Table A7 and formula (4)~(6), the value for λ_{Coal} is 99.327%, the value for λ_{Oil} is 0.121% and the value for λ_{Gas} is 0.551%. Therefore $EF_{Thermal} = \lambda_{Coal} \times EF_{Coal,Adv} + \lambda_{Oil} \times EF_{Oil,Adv} + \lambda_{Gas} \times EF_{Gas,Adv}$ =0.9292 tCO_2e/MWh.

Table A9. Installed capacity of the North China Grid in 2004

	Beijing	Tianjin	Hebei	Shanxi	Inner Mongolia	Shandong	Total
Fuel-fired power (MW)	3,458.5	6,008.5	19,932.7	17,693.3	13,641.5	32,860.4	93,594.9
Hydro power (MW)	1,055.9	5	783.8	787.3	567.9	50.8	3,250.7
Wind power and Other (MW)	0	0	13.5	0	111.8	12.4	137.7
Total (MW)	4,514.4	6,013.5	20,730	18,480.5	14,321.2	32,923.6	96,983.2

Data source: China Electric Power Yearbook 2005.

Table A10. Installed Capacity of the North China Grid in 2002

	Beijing	Tianjin	Hebei	Shanxi	Inner Mongolia	Shandong	Total
Fuel-fired power (MW)	3407.5	6,245.5	16,745.7	14,327.8	9,778.7	25,102.4	75,607.6
Hydro power (MW)	1,038.5	5	775.9	795.3	592.1	50.8	3,257.6
Wind power and Other (MW)	0	0	13.5	0	76.6	0	90.1
Total (MW)	4,446	6,250.5	17,535.1	15,123.1	10,447.4	25,153.1	78,955.2

Data source: China Electric Power Yearbook 2003.

Table A11. Installed Capacity of the North China Grid in 2001

	Beijing	Tianjin	Hebei	Shanxi	Inner Mongolia	Shandong	Total
Fuel-fired power (MW)	3,412.5	5,632	16,474.9	13,415.8	8,898.3	20,957.7	68,791.3
Hydro power (MW)	1,058.1	5	742.6	795.9	566.2	56.2	3,224
Wind power and Other (MW)	0	0	9.9	0	46.7	0	56.6
Total (MW)	4,470.6	5,637	17,227.4	14,211.8	9,511.2	21,013.9	72,071.9

Data source: China Electric Power Yearbook 2002.

Table A12. Calculation of BM Emission Factor of the North China Grid

	Installed capacity in 2001 (MW) A	Installed capacity in 2002 (MW) B	Installed capacity in 2004 (MW) C	Change in Installed Capacity from 2001 to 2004 D=C-A	The Proportion of the Total Change Capacity
Fuel-fired power	68,791.3	75,607.6	93,594.9	24,803.6	99.58%
Hydro power	3,224	3,257.6	3,250.7	26.7	0.10%
Wind power and Other	56.6	90.1	137.7	81.1	0.32%
Total	72,071.9	78,955.2	96,983.2	24,911.3	100.00%
The proportion of the total change capacity of 2004	74.31%	81.41%	100%		

$EF_{BM,y}$ =0.9292×99.58%=0.9253 tCO_2e/MWh.

Table A13. Share of Low-cost/must Run Resources in the North China Grid

	2000	2001	2002	2003	2004
Fuel-fired power (GWh)	**327,327.03**	**358,066**	**403,919**	**457,675**	**526,772**
Hydro power (GWh)	**3,632.63**	**2,927**	**3,455**	**3,798**	**3,758**
Wind power and Other (GWh)	**115.16**	**126**	**171**	**181**	**274**
Total (GWh)	**331,074.82**	**361,119**	**407,545**	**461,653**	**530,804**
The Proportion of low-cost/must runs resources (%)	**1.13**	**0.85**	**0.89**	**0.86**	**0.76**

Data source: China Electric Power Yearbook 2001 (P667), 2002 (P617), 2003 (P585), 2004 (P709) and 2005 (P474).

Annex 4

MONITORING INFORMATION

>>

Emission factor of the Project is determined ex ante. Therefore the electricity supplied to the North China Grid by the Project is defined as the key data to be monitored. The monitoring plan is drafted to focus on monitoring of the electricity output of the Project, and a CDM Manual is designed as a guidance of the implementation of the monitoring plan which cover following information which provides more detail.

1. Monitoring of the Electricity Delivered to the North China Grid by the Project

Electricity delivered to the North China Grid by the Project will be monitored through metering equipment at the substation (interconnection facility connecting the facility to the grid). At least 2 ammeters are required to measure the feed-in electricity of the Project, one is the main ammeter, and others are the backup. When the main ammeter is working well, its readings should be taken, and when the main ammeter is in disorder, readings from the backup ammeters and the conservative calculations of the feed-in electricity stipulated in the Power Purchase Agreement should be taken; in the meanwhile, the main ammeter should be maintained and calibrated according to the Agreement. And the data should be cross-checked against relevant electricity sales receipts and/or records from the grid.

The Project owner will ensure that the meter readings be readily available for DOE's verification.

2. Calibration of Meters & Metering

Calibration of Meters & Metering should be implemented according to stipulated standards and rules required by the Power Purchase Agreement and the Parallel Operation Agreement. And all the records should be documented and archived by the Project owner for DOE's verification.

3. Quality Assurance and Quality Control

The quality assurance and quality control procedures for the electricity delivered to the grid by the Project is to cross-check the electricity delivered to the grid with the electricity sales receipts between the grid company and the project owner.

The quality assurance and quality control procedures for recording, maintaining and archiving data have been integrated into the CDM manual. shall be improved as part of this CDM project activity according to EB rules and real practice in terms of the need for verification of the emission reductions on an annual basis according to this PDD.