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:

Heilongjiang Yilan Hezuolinchang Phase Ⅱ Wind Power Project
Version: 3.0
Date: 01/12/2008

A.2. Description of the project activity:

Heilongjiang Yilan Hezuolinchang Phase Ⅱ Wind Power Project (hereafter referred as the proposed project) is located on the west side of Jinbu East Hill in Yilan County, Harbin City, Heilongjiang Province, Northeast China. Totally 29 sets of Gamesa G52-850kW wind turbines will be installed, providing a total capacity of 24.65MW. With an average annual generation of 56,040MWh, the proposed project will achieve CO_2 emission reduction by replacing electricity generated by fossil fuel fired power plant connected into Northeast China Power Grid. The proposed project is estimated to deliver 64,098 tonnes CO_2 emission reduction annually.

The purpose of the proposed project is to generate zero-emission wind power and supply it to Northeast China Power Grid. For the proposed project,

(a) The scenario existing prior to the start of the implementation of the project activity is Northeast China Power Grid providing the same electricity supply as the proposed project;
(b) The project scenario is the implementation of the proposed project (with CDM as an indispensible consideration), i.e., the installation and operation of 29 G52-850kW wind turbines which will supply an average annual generation of 56,040 MWh to Northeast China Power Grid and replace the same amount of electricity generated by fossil fuel fired power plants connected into Northeast China Power Grid;
(c) The baseline scenario is the same as the scenario existing prior to the start of implementation of the project activity.

The proposed project reduces greenhouse gas emissions by supplying zero-emission wind power to Northeast China Power Grid, which replaces the same amount of electricity generated by fossil fuel fired power plants connected into Northeast China Power Grid, and therefore, avoids the CO2 emissions in generating the same amount of electricity provided by the fossil fuel fired power plants.

As an environmentally sound energy supply technology, wind power is a priority development project in China. The contributions of the proposed project to sustainable development are summarized as follows:

- Located in a power grid dominated by coal-fired power plants, development of the proposed project will not only reduce GHG emissions but also mitigate local environmental pollution caused by pollutant emissions from coal-fired power plants.
- Yilan County is an underdeveloped region in Heilongjiang province. The implementation of the proposed project would provide more than 20 employment opportunities.
- The operation of the proposed project will increase local revenues and promotes local economy.

A.3. Project participants:

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)
China (host)	Yilan Longyuan Wind Power Co., Ltd.	No
Switzerland	Essent Trading International S.A.	No

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

A.4.1.1. Host Party(ies):

China

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

Heilongjiang Province

A.4.1.3. City/Town/Community etc:

Yilan County, Harbin City

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

The proposed project is located in Yilan County, Harbin City, Heilongjiang Province of China, its geographical coordinates are north latitude 46°08′ and east longitude 129°47′, and its altitude is 200-300 m, and its area is about 5 km^2. The detailed location of the proposed project is shown in Figure 1.

Figure 1. Location of the proposed project

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

The project activity falls under the following scope and category.
Sectoral scope: 1. Energy industries
Category: Grid-connected electricity generation from renewable energy sources

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

The purpose of the proposed project is to generate zero-emission wind power and supply it to Northeast China Power Grid. For the proposed project,

(a) The scenario existing prior to the start of the implementation of the project activity is that Northeast China Power Grid providing the same electricity supply as the proposed project;
(b) The project scenario is the implementation of the proposed project (with CDM as an indispensible consideration), i.e., the installation and operation of 29 G52-850kW wind turbines which will supply an average annual generation of 56,040 MWh to Northeast China Power Grid and replace the same amount of electricity generated by fossil fuel fired power plants connected into Northeast China Power Grid; Specifically,

Totally 29 wind turbines with a nominal capacity of 850 kW (Gamesa G52-850kW) will be installed, providing a total capacity of 24.65MW. The load factor for the proposed project is 26%. All wind turbines are produced in Tianjin factories which are invested by Gamesa corporation from Spain. The main technical specifications are as follows:

Summary	
Type	G52
Manufacture	Gamesa corporation
Nominal Capacity	850 kW
Lifetime	20 years
Rotor	
Type	3 blades, horizontal axis, up wind
Diameter（m）	52
Swept area（m^2）	2124
Rotational speed（r.p.m）	14.6 ~ 30.8 (towers 55 and 65m) 16.2 ~ 30.8 (tower 44m)
Cut-in / Cut-out wind speed（m/s）	4 / 25
Rated wind speed（m/s）	14
Extreme wind speed（m/s）	70 (IEC)
Blades	
Length（m）	25.3
Material	Epoxy reinforced glass fibre
Generator	
Type	Doubly-fed machine
Rated power（kW）	850

Rotational speed (r.p.m)	1620
Control System	
Wind turbine Control	Ingecon-W Control System
Remote Control	Internet

Each turbine will have a 690V-to-35kV transformer, from which a 35kV line will link into the on-site 220kV switchgear at the substation which will be constructed for the proposed project. By the 220 kV line, the electricity generated by the proposed project are delivered to the power grid. The wind turbines and transmission facility could be monitored and controlled either by onsite central control room or by control room of Local Dispatch Center remotely. The electricity supplied to the power grid will be measured by bidirectional electronic meters installed at the substation.

It is noted that the proposed project generates electricity from wind energy, thus involves no greenhouse gas emissions and no emission resources.

(c) The baseline scenario is the same as the scenario existing prior to the start of implementation of the project activity. In the absence of the proposed project, the same types and levels of services, i.e., an average annual generation of 56,040 MWh, would have been easily provided by Northeast China Power Grid, as it meets the requirements of China's mandatory regulations and laws and has no economic barriers.

The wind turbine finally adopted by the proposed project is Gamesa G52-850KW. Due to its advantage on fully utilizing wind resources and improving efficiency, Gamesa G52-850KW has been adopted worldwide. The development of the proposed project will contribute to promoting application of such type of wind turbine, accelerating the accumulation of experiences and absorption of the kind of technology and advancement of domestic wind power technology.

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

It is estimated that 448,686 tCO2e emission reductions will be generated during the first crediting period (from 1st July 2009 to 30th June 2016) of the proposed project, as shown in the following table.

Years	**Annual estimation of emission reductions in tonnes of CO_2 e**
2009.07.01-2009.12.31	32,049
2010	64,098
2011	64,098
2012	64,098
2013	64,098
2014	64,098
2015	64,098
2016.01.01-2016.06.30	32,049
Total estimated reductions (tonnes of CO_2e)	448,686
Total number of crediting years	7
Annual average over the crediting period of estimated reductions (tonnes of CO_2e)	64,098

A.4.5. Public funding of the project activity:

No public funds from Annex I countries is involved in the proposed 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:

Approved consolidated baseline and monitoring methodology ACM0002 "Consolidated baseline methodology for grid-connected electricity generation from renewable sources"- ACM 0002 (Version 08)

The methodology also refers to the latest approved versions of the following tools:

- Tool to calculate the emission factor for an electricity system (Version 1.1);
- Tool for the demonstration and assessment of additionality (Version 5.2).

For more information regarding the methodology and the tools as well as their consideration by the Executive Board please refer to http://cdm.unfccc.int/goto/MPappmeth.

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

The proposed project can meet the applicability criteria of the baseline methodology (ACM0002 version08); therefore, the methodology is applicable to the proposed project.

- The proposed project is the installation of a new grid-connected zero-emission renewable power generation activity from wind source;
- The proposed project is not an activity that involves switching from fossil fuels to renewable energy sources at the site of the project activity;
- The geographic and system boundaries for the relevant electricity grid (Northeast Power Grid) can be clearly identified and information on the characteristics of the grid is available;
- The proposed project is not a biomass fired power project.

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

The proposed project is the installation of a new grid-connected renewable power plant, and the baseline scenario is the following:

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

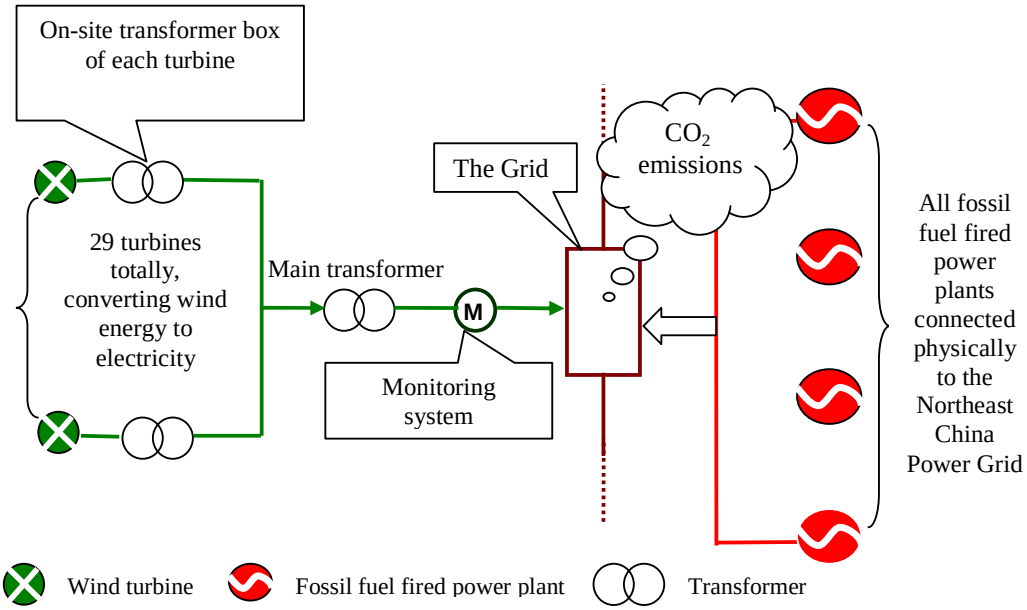
The spatial extent of the project boundary includes the proposed project and all power plants connected physically to the Northeast Power Grid that the CDM project power plant is connected to. Northeast Power Grid is defined as the project electricity system. In accordance with the boundary definitions of the Chinese DNA [1], Northeast Power Grid consists of independent province-level electricity systems including Liaoning, Jilin and Heilongjiang province that can be dispatched without significant transmission constraints. The Northeast China Power Grid is net electricity export grid.

[1] http://cdm.ccchina.gov.cn/web/index.asp

The greenhouse gases and emission sources included in or excluded from the project boundary are shown in the following table:

	Source	Gas	Included?	Justification / Explanation
Baseline	Fossil fuel-fired power plants connected into the Northeast China Power Grid	CO2	Yes	Major emission sources
		CH4	No	Minor emission source
		N2O	No	Minor emission source
Project Activity	The project is a zero-emissions renewable power source	CO2	No	Minor emission source
		CH4	No	Minor emission source
		N2O	No	Minor emission source

Below is a flow diagram of the project boundary.



The flow diagram of the project boundary

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

The proposed project is the installation of a new grid-connected renewable power plant and the baseline scenario is the following as per ACM0002 (Version 08):

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

The proposed project is connected to Heilongjiang Grid, which is an integrated part of Northeast China Power Grid. Therefore, the baseline scenario of the proposed project is provision of equivalent amount of annual power output by the NCPG where the proposed project is connected into, which is the continued operation of the existing power plants and the addition of new generation sources on the NCPG to meet the electricity demand.
According to ACM0002, baseline emissions are equal to power generated by the project that delivered to the NCPG, multiplied by the baseline emission factor. The baseline emission factor (EF_y) is calculated as a Combined Margin (CM).
The analysis and description in B.5 and B.6 will support the baseline scenario selected above.

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):

The project activity is not the baseline scenario and possesses additionality, which is demonstrated below in a step-wise manner using the latest version (5.2) of "Tool for demonstration and assessment of additionality".

The CDM had been taken into serious consideration by the project owner during the investment decision of the proposed project, as can be clearly shown in the following Timeline of the Proposed Project.

Timeline of the Proposed Project

No.	Time	Item
1	22/05/2006	EIA of the proposed project was approved by the Environmental Protection Administration of Heilongjiang Province.
2	01/2008	The Feasibility Study Report (FSR) of the proposed project was completed, in which Project IRR=6.94% without CDM, lower than sectoral benchmark 8%. The CDM incentive was seriously considered in the FSR of the proposed project, which clearly states that "To ensure a successful implementation of the proposed project, the project developer should apply the CDM instrument according to the related regulation of the State, and improve the project return through GHG emission reduction trading".
3	11/01/2008	According to the FSR, the project is financially unattractive without CDM revenue. In order to increase the IRR of the proposed project, the project owner held a board meeting to decide starting CDM development.
4	19/02//2008	The FSR was approved by DRC of Heilongjiang province.
5	26/02/2008	Date of the wind turbine purchasing contract was signed.
6	03/03/2008	According to the FSR, the project is financially unattractive without CDM. In order to increase the IRR of the proposed project, the project owner signed a

		consultancy contract to start CDM development.
7	15/04/2008	Date of the project construction started.

Step 1. Identification of alternatives to the project activity consistent with mandatory laws and Regulations

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

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

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

a) The proposed project not undertaken as a CDM project activity
b) The thermal power plant with the same annual electricity output as the proposed project.
c) Other renewable energy project with the same annual electricity output as the proposed project.
d) To provide the same electricity output by Northeast Power Grid.

For the alternative c), besides wind energy, other kinds of energy like solar PV, geothermal, biomass and hydro are the possible grid-connected renewable energy technologies that could be applied in the Northeast China Power Grid. However, the exploitable hydro resource in Northeast China is relatively limited[2]. Furthermore, the proposed project is located in Heilongjiang province, Northeast China, where winter is very long and rivers ice up from November to March the next year, which lead to long construction period and high cost. The annual runoff of rivers which suits building hydropower station is also low, which leads to low electric power generation and low revenue. Moreover, due to the restrictions of local weak economy, scarce financing, poor infrastructure, and unsound policy, hydro power development lacks good investment conditions in Heilongjiang province.[3] As a result, the installed hydropower capacities stay very low and increased by less than 20 MW from the year 2003 to 2006 (834.6 MW in 2003, 844.6 MW in 2004, 846.7 MW in 2005 and 853 MW in 2006 respectively[4]). Therefore, it is not suitable to invest hydropower project in Heilongjiang province. In China, solar PV, biomass and geothermal 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[5-6]. Moreover, the proposed project owner is only dedicated to wind power development in Heilongjiang Province, and has no experience and ability to develop other renewable energy power plants. Therefore, though the alternative c) is in compliance with all mandatory laws and regulations, is not a realistic alternative.

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

[2] http://www.agro-labs.ac.cn/21c/jpg/2-1-5.jpg

[3] http://www.studa.net/shuili/060223/16432147-2.html

[4] China Electric Power Yearbook 2004-2007

5 http://jjckb.xinhuanet.com/cjxw/2007-11/27/content_75467.htm
http://finance.people.com.cn/GB/1038/59942/59949/6294546.html

6Tentative Management Measures for Price and Sharing of Expenses for Electricity Generation from Renewable Energy, Document No. NDRC Energy [2006]7 (http://www.sdpc.gov.cn/jggl/jggs/t20060120_129595.htm)

The mandatory laws and regulations for the proposed project include laws, central government regulations, local regulations, departmental rules and disciplines related to electricity and environment protection.

The related laws and regulations can be found and downloaded on the website of State Electricity Regulatory Commission (SERC) and National Development and Reform Commission (NDRC): http://www.serc.gov.cn/opencms/export/serc/laws/index.html and http://nyj.ndrc.gov.cn .

According to the applicable laws and regulations, the alternative b) should be eliminated from the following consideration because it does not comply with the national regulation for controlling small scale thermal power plant. Based on the latest national power statistic, the operational hour of a thermal power plant (5612 hours)[7] is about 2.5 times more than that of the proposed project (2273 hours)[8] with the same capacity. Therefore, to provide the same output as the proposed project, the alternative thermal power plant will has the capacity about 10 MW then will be categorized as the small scale thermal power plant and should be shut down according to the regulations from NDRC (*Opinions on Accelerating Closure of Small Thermal Power Units,* National Development and Reform Commission, National Energy Office)[9]. According to the regulation from General Office of the State Council of China, the thermal power plant under 50 MW should be shut down and the construction of thermal power plant under 135 MW will be forbidden within the grid connected area (*On Prohibition of 135MW and Smaller-scale Thermal Power Plants*, General Office of State Council)[10].

The other alternatives described in sub-step 1a are all in compliance with mandatory laws and regulations as required by the methodology used.

Outcome of Step 1: as illustrated above, the realistic and creditable alternatives that can provide the same output or services as the proposed project are a) and d).

The alternative a) is unrealistic and should be eliminated from the following consideration because the investment analysis in Step 2 will show the proposed project not undertaken as a CDM project and without CERs income is lack of the attraction for the potential investors. The financial internal rate of return (IRR) of total investment of this project activity is 6.94%, lower than the benchmark IRR (8%)[11] without the income from CERs and thus the project not undertaken as CDM project is not financially feasible.

Step2. Investment analysis.

Sub-step 2a. Determine appropriate analysis method.

Three options can be applied for the investment analysis: the simple cost analysis, the investment comparison analysis and the benchmark analysis.

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[7] China Electric Power Yearbook 2007, page626

[8] The feasibility study report of the proposed project

[9] http://www.gov.cn/zwgk/2007-01/26/content_509911.htm

[10] http://www.gov.cn/gongbao/content/2002/content_61480.htm

[11] State Power Corporation of China. Interim Rules on Economic Assessment of Electrical Engineering Retrofit Projects. Beijing: China Electric Power Press, 2003

The simple cost analysis is not applicable for the proposed project because the project activity will produce economic benefit (from electricity sale) other than CDM related income. The investment comparison analysis is also not applicable for the proposed project because the baseline scenario, providing the same electricity output by the Northeast Power Grid, is not a new investment project.

To conclude, the benchmark analysis will be used to identify whether the financial indicators of the proposed project is better than relevant benchmark value.

Sub-step 2b Apply benchmark analysis.

According to the "Economical assessment and parameters for construction project, 3rd edition", a project will be financially acceptable when the Internal Return Rate (IRR) is better than the benchmark IRR.

The financial benchmark Internal Return Rate (after tax) on total investment of Chinese power industry is 8%, which has been used widely for Feasibility Studies of the power project investments[12].

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

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

(1) Basic parameters for calculation of financial indicators

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

Table 1 Main parameters for calculation of financial indicators

Items	Unit	Amount	Note
Capacity	MW	24.65	Feasibility Study Report(FSR) P86
Static total investment	Million Yuan	222.14	FSR P86
Annually output	MWh/year	56040	FSR P86
Electricity Tariff (Excluding VAT)	Yuan/kWh	0.5717 before accumulative operation 30000 hours, 0.4209 after accumulative operation 30000 hours	FSR P88
Annual O & M costs	Million Yuan	6.969	FSR P87-P88
Value Added Tax (VAT)	%	8.5	FSR P88
Income tax	%	25	FSR P89
Expected CERs Price	EUR /tCO_2	10	
Project calculation time	Year	21	FSR P86

[12] State Power Corporation of China. Interim Rules on Economic Assessment of Electrical Engineering Retrofit Projects. Beijing: China Electric Power Press, 2003

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

The financial indicators (IRR) with and without income from selling CERs are listed in the following table. Without income from selling CERs, the IRR on total investment of the proposed project is lower than the benchmark IRR and the proposed project is financially unacceptable because of its low profitability. While considering such income, the financial acceptance will be changed, the IRR of the proposed project is better than the benchmark and the proposed project is financially acceptable.

Table 2 Comparison of financial indicators with and without income from CERs

Items	Unit	Without income from CERs	Benchmark	With income from CERs
IRR	%	6.94	8	9.78

Sub-step 2d. Sensitivity analysis.

The objective of this sub step is to show the conclusion regarding the financial attractiveness is robust to reasonable variations of the critical assumptions.

Four factors are considered in following sensitivity analysis:

1) Static total investment.
2) Tariff.
3) PLF.
4) Annual O & M costs.

With the above four factors varying, the FIRR of the proposed project (without income from selling CERs) varies to different extent, as shown in Table 3- Table 6.

Table 3 The impact of the static total investment on IRR

Fluctuation	**-10%**	**-7.13%**	**-5%**	**-2.5%**	**0**	**+2.5%**	**+5%**	**+7.5%**	**+10%**
IRR	**8.47%**	**8.00%**	**7.67%**	**7.30%**	**6.94%**	**6.60%**	**6.27%**	**5.95%**	**5.64%**

Table 4 The impact of tariff on IRR

Fluctuation	**-10%**	**-7.5%**	**-5%**	**-2.5%**	**0**	**+2.5%**	**+5%**	**+7.04%**	**+10%**
IRR	**5.37%**	**5.77%**	**6.17%**	**6.56%**	**6.94%**	**7.32%**	**7.70%**	**8.00%**	**8.44%**

Table 5 The impact of PLF on IRR

Fluctuation	**-7.5%**	**-5%**	**-2.5%**	**0**	**+2.5%**	**+5%**	**+7.5%**	**+8.57%**	**+10%**
IRR	**5.99%**	**6.31%**	**6.63%**	**6.94%**	**7.26%**	**7.56%**	**7.87%**	**8.00%**	**8.18%**

Table 6 The impact of the annual O & M costs on IRR

Fluctuation	**-40%**	**-34.84%**	**-30%**	**-20%**	**-10%**	**0**	**+10%**	**+20%**	**+30%**

IRR	**8.16%**	**8.00%**	**7.86%**	**7.56%**	**7.26%**	**6.94%**	**6.62%**	**6.30%**	**5.96%**

The total investment is an important factor affecting the financial attractiveness of the proposed project. In the case that the total investment decreases by 7.13%, the IRR of the proposed project begins to exceed the benchmark. Considering 79% of total investment is used to the purchase and installation of wind turbine system[13]. Moreover, the wind turbines demand exceeds supply in the whole world that leads the price of wind turbines gradually increasing[14]. Hence, it is impossible to lower the expected total investment of the project by 7.13%, and within the reasonable range of total investment, the proposed project is always lack of financial attractiveness.

The tariff is also an important factor affecting the financial attractiveness of the proposed project. In the case that the tariff increases by 7.04%, the IRR of the proposed project begins to exceed the benchmark. According to the market rules of Northeast China power market, the proposed project is an un-tendering project while the tariff is regulated by the regulating entities. According to China's Management Rules on Tariff issued by NDRC[15], the tariff of the un-tendering projects should be determined by the government with reference to the tariff of tendering wind projects. As a whole, the tariff for newly built project is generally not allowed to be higher than the tariff provided in the latest guiding price of the government. By this pricing principle, China government is gradually lowering down the wind power in-grid tariff[16]. Moreover, the trend of tariff for wind power projects in China is fleetly decreasing during the recent 10 years[17]. The tariff of the proposed project was approved by National Development and Reform Commission of China on 23rd July 2008 as 0.5622 Yuan/kWh (Excluding VAT) before accumulative operation 30000 hours and average tariff of Heilongjiang Grid after accumulative operation 30000 hours[18]. Since Heilongjiang power grid is dominated by thermal power plants, where thermal power generation accounts for more than 97.5% of the total power generation[19], the average tariff in the grid should also be dominated by thermal power tariff. The benchmark thermal power tariff in Heilongjiang grid is only 0.30 Yuan/kWh (Excluding VAT)[20]. The tariff 0.5717 Yuan/kWh (Excluding VAT) before accumulative operation 30000 hours, 0.4209 Yuan/kWh (Excluding VAT) after accumulative operation 30000 hours was used for IRR calculation, which is more conservative. Therefore it is impossible that the tariff used for IRR calculation of the proposed project could increase 7.04%, so the proposed project is always lack of financial attractiveness.

The PLF is also an important factor affecting the financial attractiveness of the proposed project. In the case that the PLF increases by 8.57%, the IRR of the proposed project begins to exceed the benchmark. According to the Chinese Renewable Energy Law enacted on January 1st 2006, wind power generation

[13] The feasibility study report of Heilongjiang Yilan Hezuolinchang Phase Ⅱ Wind Power Project (Appendix B)

[14] http://info.electric.hc360.com/2007/06/28101158551-6.shtml

[15] Trial Measures for the Administration of the Pricing of, and the Sharing of Costs in Connection with, the Generation of Electricity Using Renewable Energy Resources, FAGAIJIAGE(2006) No.7

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

[17] http://www.2008red.com/member_pic_461/files/qiangweinengyuan/html/article_2757_1.shtml

[18] http://jgs.ndrc.gov.cn/zcfg/t20080813_230722.htm

[19] China Electric Power Yearbook 2007

[20] Notice on adjustment o f the tariff in NEPG issued by NDRC in 2006
(http://china.findlaw.cn/fagui/jj/26/104270.html)

should be purchased fully by the grid[21]. Therefore, the PLF reflects the annual generation output of the proposed project, which depends on the average wind speed at the project site for a specific wind turbine. According to the feasibility study report of the proposed project, the annual output is estimated basing on the long term weather statistic data provided by local meteorological station and wind resources measurement, which first using professional software WAsP to select the rich wind source area, then using software WindFarmer to optimize the location of each turbine for maximize power generation. Moreover, the PLF value is positive correlation with the wind speed, the annual average wind speed of the project site tends to decrease over the past 15 years for which data are available recently[22] as shown in figure 2. Therefore, the probability that PLF is 8.57% higher than the estimated value is very small.

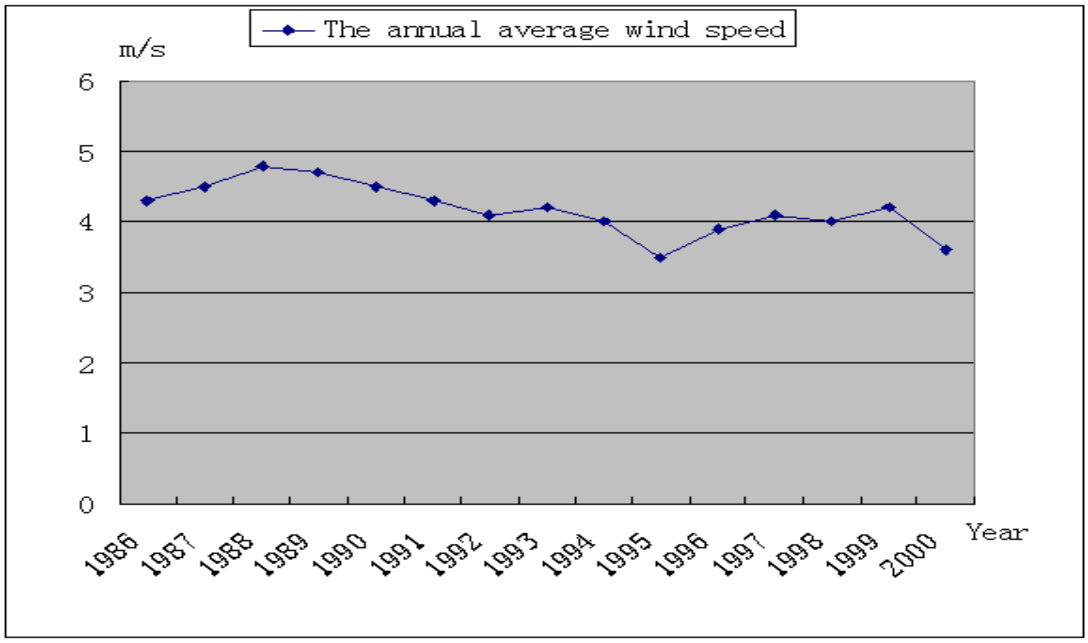


Figure 2 The annual average wind speed provided by local meteorological station

The impact of the annual O&M cost is the slightest. The IRR of the proposed project could reach the benchmark when the annual O&M cost decreases by 34.84%. However, according to the Feasibility Study Report of the proposed project, the detailed operation costs is composed of four kinds of costs - maintenance costs, annual salaries for the employees, insurance premium of fixed assets and other costs. The Average Annual O&M Cost listed in Table 1 is the sum of the four kinds of costs and is the same as that in the cash flow table of the electronic spreadsheet which has been provided to DOE for validation. Moreover, the price of material and salaries of the employees are gradually increasing in China, which leads annual O&M cost gradually increasing[23]. Therefore, it is impossible that the annual O&M cost could decrease 34.84%, so the proposed project is always lack of financial attractiveness within the reasonable range of annual O&M cost.

[21] http://www.gov.cn/ziliao/flfg/2005-06/21/content_8275.htm

[22] The feasibility study report of the proposed project

[23] http://www.china.com.cn/chinese/EC-c/1246238.htm

http://www.chinadaily.com.cn/hqcj/2007-09/03/content_6075777.htm

Outcome of Step 2: as illustrated above, under the reasonable variations in the critical assumptions, the conclusion regarding the financial additionality is robust and supported by sensitivity analysis. So the proposed CDM project activity is unlikely to be financially attractive.

To summarize, the only realistic and creditable alternative is d) No construction of the proposed project, and the local power grid as the provider for the same electricity output as the proposed project, which is considered as the baseline scenario of the proposed project. The installed capacity of Northeast China Power Grid keeps increasing for many years. The Northeast China Power Grid is dominated by thermal power plants, which will not likely to change in a short time. From 2002 to 2006, thermal power constituted 94.56%, 95.28%, 93.55%, 91.72% and 94.31% of total generation of Northeast China Power Grid, respectively (China Electric Power Yearbooks 2003-2007).

Step 3. Barrier analysis

Investment analysis has argued that the project is the economically less attractive than other alternatives without the revenue from the sale of CERs. According to "Tool for the Demonstration and Assessment of Additionality (version 5.2)", this PDD skips the barrier analysis and argues the additionality.

Step 4. Common practice analysis

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

Before 2002, China wind farm often received high tariffs and favorable government policy support as no bidding process was required and power companies and grid companies share the same interests[24]. So the wind power plants were demonstration projects and enjoyed higher price than the present project[25], which are essential distinctions between the present project and the parts of existing similar projects. Thus they had no restrictions in power grid connection. After 2002, wider power sector reforms[26] in China happened leading to the separation of power generation from transmission and distribution and diversification in the ownership of generation capacity. As a result, new generation, including wind power, was expected to compete under more commercial conditions. The high tariff and favourable policy are difficult to obtain for wind farm developers.

According to the definitions of other activities similar to the proposed project activity in "Tool for the Demonstration and Assessment of Additionality (version 5.2)", the similar projects are considered similar if they are in the same country/region and/or rely on a broadly similar technology, are of a similar scale, and take place in a comparable environment with respect to regulatory framework, investment climate, access to technology, access to financing, etc.

Due to the Northeast China Power Grid is the baseline scenario for the proposed project, the similar projects should been considered in the scope of the Northeast China Power Grid, which consists of three provinces including Heilongjiang, Jilin and Liaoning. However, Heilongjiang province is a region large

[24] http://www.chinabaike.com/law/zy/xz/gwy/1333796.html

http://www.nwtc.cn/Article/ShowArticle.asp?ArticleID=422

[25] http://www.nwtc.cn/Article/ShowArticle.asp?ArticleID=422

http://www.grchina.com/gb/greenpower/advise-0-5.htm

[26] http://www.chinabaike.com/law/zy/xz/gwy/1333796.html

enough to do the common practice analysis, with an area of 473000 km^2 [27]. Furthermore, in Heilongjiang Province there are many enough power plants (e.g.13424.7 MW of installed capacity in 2006) which generate large enough amount of electricity annually (e.g.64625 GWh in 2006)[28]. More importantly, there are enough wind farms to be compared with the proposed project in Heilongjiang Province[29]. According to the above analyses and the definitions of other activities similar to the proposed project activity in "Tool for the Demonstration and Assessment of Additionality (version 5.2)", the scope of the similar projects should limited in the Heilongjiang Province Power grid and the similar projects determinated in this scope are more representational with the same region and similar construction conditions and same geographical environments (wind recourses and climate)[30].

A comparable size to the project activity is defined as an installed capacity bigger than 10 MW because the projects below 10MW is too small to be comparable with the proposed project, which are small-scale projects and thus are essentially different from the proposed project as a large-scale project.

The proposed project is a newly built 24.65 MW wind farm sited in Heilongjiang province, therefore activities similar to the proposed project should be wind farms sited in Heilongjiang province with a starting date of operation later than 1st January, 2002 and with an installed capacity bigger than 10 MW. Similar activities identified with such criteria are listed in Table 7 below.

Table 7 Wind Farms with capacity above 10MW in Heilongjiang Province

Project Title	**Commissioning Date**	**Capacity (MW)**	**On-grid Tariff (RMB Yuan/kWh, excl.VAT)**	**Note**
Huafu Mulan Wind Farm	2003.12	12 MW	0.78	Demonstration Project
Haufu Fujin Wind Farm	2004.09	24.3 MW	0.78	Demonstration Project

Data source: Shi Pengfei (Deputy Director, Chinese Wind Energy Association), Statistics on China Wind Farm Installed Capacity in 2007. (http://www.cwea.org.cn/download/display_info.asp?id=25)
http://www.newenergy.org.cn/Html/00412/20041605.html
http://cdm.unfccc.int/index.html
http://cdm.ccchina.gov.cn/web/index.asp

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

The existing wind farm projects do not call into question the claim that the proposed project is financially unattractive as discussed in Step 2. The two wind farms in Table 7 benefited from more favorable tariff and were funded by international low interest loan[31] or national soft loan[32], while the proposed project does not enjoy these favourable policies. The other projects similar to the proposed project activity in Heilongjiang province have been applied for being as CDM projects; some of them have been registered,

[27] http://news.sohu.com/20070604/n250389688.shtml

[28] China Electric Power Yearbook 2007

[29] Shi Pengfei (Deputy Director, Chinese Wind Energy Association), Statistics on China Wind Farm Installed Capacity in 2007. (http://www.cwea.org.cn/download/display_info.asp?id=25)

[30] http://www.wp-forum.cn/ArticleShow.asp?nid=91CCBC4B-8583-4139-AED1-75A87CFC673B

[31] http://www.newenergy.org.cn/Html/9991/19991799.html

[32] http://www.chinapower.com.cn/newsarticle/1005/new1005504.asp

the rest have been approved by Chinese government and are under validation[33]. So they do not contradict the claim that the proposed project is financially unattractive.

In conclusion, the proposed project activity passed all criteria of "Tool for the demonstration and assessment of additionality (Version 5.2)". The proposed project is additional.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

The proposed project is the installation of a new grid-connected renewable power plant, and the baseline scenario is the following:

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

Baseline emissions

Baseline emissions include only CO2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity, calculated as follows:

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

Where:

BE_y = Baseline emissions in year *y* (tCO2/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.

$EF_{grid,CM,y}$ = Combined margin CO2 emission factor for grid connected power generation in year *y* calculated using the latest version of the "Tool to calculate the emission factor for an electricity system" (version 1.1).

The methodological tool "Tool to calculate the emission factor for an electricity system" (version 1.1) determines the CO2 emission factor for the displacement of electricity generated by power plants in an electricity system, by calculating the "operating margin" (OM) and "build margin" (BM) as well as the "combined margin" (CM). The operating margin refers to a cohort of power plants that reflect the existing power plants whose electricity generation would be affected by the proposed CDM project activity. The build margin refers to a cohort of power units that reflect the type of power units whose construction would be affected by the proposed CDM project activity.

The methodological tool "Tool to calculate the emission factor for an electricity system" (version 1.1)

[33] http://cdm.ccchina.gov.cn/web/index.asp

provides procedures to determine the following parameters:

Parameter	SI Unit	Description
$EF_{grid,CM,y}$	tCO2/MWh	Combined margin CO2 emission factor for grid connected power generation in year y
$EF_{grid,BM,y}$	tCO2/MWh	Build margin CO2 emission factor for grid connected power generation in year y
$EF_{grid,OM,y}$	tCO2/MWh	Operating margin CO2 emission factor for grid connected power generation in year y

The following six steps are applied to calculate the emission factor for an electricity system:

STEP 1: Identify the relevant electric power system.
STEP 2: Select an operating margin (OM) method.
STEP 3: Calculate the operating margin emission factor according to the selected method.
STEP 4: Identify the cohort of power units to be included in the build margin (BM).
STEP 5: Calculate the build margin emission factor.
STEP 6: Calculate the combined margin (CM) emissions factor.

Step1: Identify the relevant electric power system.

Using the boundary definitions of the Chinese DNA[34], the spatial extent of the project boundary includes Heilongjiang Yilan Hezuolinchang Phase Ⅱ Wind Power Project and all power plants connected physically to the Northeast Power Grid that the CDM project power plant is connected to. Northeast Power Grid is defined as the **project electricity system**, which consists of independent province-level electricity systems including Liaoning, Jilin and Heilongjiang province that can be dispatched without significant transmission constraints. The **connected electricity system** is North China Power Grid, which is connected by transmission lines to the project electricity system. Power plants within the connected electricity system can be dispatched without significant transmission constraints but transmission to the project electricity system has significant transmission constraint.

Electricity transfers from connected electricity systems to the project electricity system are defined as **electricity imports** and electricity transfers to connected electricity systems are defined as **electricity exports**.

Since the Northeast Power Grid has the electricity exports to the North China Power Grid, the spatial extent is limited to the project electricity system (Northeast Power Grid).

Step2: Select an operating margin (OM) method

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

(a) Simple OM, or
(b) Simple adjusted OM, or

[34] http://cdm.ccchina.gov.cn/web/index.asp.

(c) Dispatch data analysis OM, or
(d) Average OM

The simple OM method (option a) can only be used if low-cost/must-run resources [35] constitute less than 50% of total grid generation in: 1) average of the five most recent years, or 2) based on long-term averages for hydroelectricity production.

For the simple OM, the simple adjusted OM and the average OM, the emissions factor can be calculated using either of the two following data vintages:

- 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, or
- Ex post option: The year in which the project activity displaces grid electricity, requiring the emissions factor to be updated annually during monitoring. If the data required calculating the emission factor for year *y* is usually only available later than six months after the end of year *y*, alternatively the emission factor of the previous year (y-1) may be used. If the data is usually only available 18 months after the end of year *y*, the emission factor of the year proceeding the previous year (y-2) may be used. The same data vintage (y, y-1 or y-2) should be used throughout all crediting periods.

For the dispatch data analysis OM, use the year in which the project activity displaces grid electricity and update the emission factor annually during monitoring.

The data vintage chosen should be documented in the CDM-PDD and not be changed during the crediting periods.

Power plants registered as CDM project activities should be included in the sample group that is used to calculate the operating margin if the criteria for including the power source in the sample group apply.

The justifications of the choice of method to calculate OM emission factor are as follows.

Method (c): The dispatch data analysis OM emission factor is determined based on the power units that are actually dispatched at the margin during each hour *h* where the project is displacing electricity. This method requires the dispatch order of each power plant and the dispatched electricity generation of all the power plants in the power grid during each hour. Since the dispatch data, power plants operation data are considered as confidential materials and only for internal usage and are not available publicly. Thus, method (c) is not applicable for the proposed project.

Method (b): Method (b) requires the annual load duration curve of the power grid and the load data of every hour data during the whole year on the basis of the time order. As mentioned above, the dispatch data and detailed load curve data are not available publicly. Therefore, method (b) is not applicable for the proposed project as well.

In terms of Method (d) and Method (a): The average OM emission factor (option d) is calculated as the average emission rate of all power plants serving the grid, using the methodological guidance as

[35] Low-cost/must-run resources are defined as power plants with low marginal generation costs or power plants that are dispatched independently of the daily or seasonal load of the grid. They typically include hydro, geothermal, wind, low-cost biomass, nuclear and solar generation. If coal is obviously used as must-run, it should also be included in this list, i.e. excluded from the set of plants.

described under (a) above for the simple OM, but including in all equations also low-cost/must-run power plants. The simple OM method (option a) can only be used if low-cost/must-run resources constitute less than 50% of total grid generation in: 1) average of the five most recent years, or 2) based on long-term averages for hydroelectricity production. Low operating cost and must run resources typically include hydro, geothermal, wind, low-cost biomass, nuclear and solar generation. If coal is obviously used as must-run, it should also be included in this list, i.e. excluded from the set of plants. Considering the low-cost/ must run resources only constitute 5.44%, 4.72%, 6.45%, 8.28% and 5.69% of total generation of Northeast Power Grid from the year 2002 to 2006, respectively (China Electric Power Yearbooks 2003-2007). Therefore, method (a) is chosen to calculate OM emission factor for the proposed project.

In conclusion, the Ex ante option of the data vintages is chosen to calculate the emission factor of the Northeast Power Grid by using the simple OM method (option a) for the proposed project.

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

The simple OM emission factor is calculated as the generation-weighted average CO_2 emissions per unit net electricity generation (tCO2/MWh) of all generating power plants serving the system, not including low-cost / must-run power plants / units. It may be calculated:

- 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)

Option A should be preferred and must be used if fuel consumption data is available for each power plant / unit. In other cases, option B or option C can be used. For the purpose of calculating the simple OM, Option C should only be used if the necessary data for option A and option B is not available and can only be used if only nuclear and renewable power generation are considered as low-cost / must-run power sources and if the quantity of electricity supplied to the grid by these sources is known.

For the proposed project, the data on fuel consumption, net electricity generation and the average efficiency of each power unit are unavailable, thus option A and option B cannot be used. Nevertheless, the 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 are available, and, nuclear and renewable power generation are considered as low-cost / must-run power sources and the quantity of electricity supplied to the grid by these sources is known, therefore, Option C can be used.

On 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:

$$EF_{grid,OMsimple,y} = \frac{\sum FC_{i,y} \times NCV_{i,y} \times EF_{CO2,i,y}}{EG_y} \quad (2)$$

Where:

$EF_{grid,OMsimple,y}$ = Simple operating margin CO2 emission factor in year y (tCO2/MWh)

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

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

$EF_{CO2,i,y}$ = CO2 emission factor of fossil fuel type i in year y (tCO2/GJ)

EG_y = Net electricity generated and delivered to the grid by all power sources serving the system, not including low-cost / must-run power plants / units, in year y (MWh)

i = All fossil fuel types combusted in power sources in the project electricity system in year y

y = The three most recent years for which data is available at the time of submission of the CDM-PDD to the DOE for validation (ex ante option)

For this approach (simple OM) to calculate the operating margin, 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 including electricity imports to the grid[36]. Electricity imports should be treated as one power plant source.

Regarding parameter selection, local values of $NCV_{i,y}$ and $EF_{CO2,i,y}$ should be used where available. If no such values are available, IPCC world-wide default values are preferable. The Net Calorific Value ($NCV_{i,y}$) of each type of fossil fuel used in the calculation comes from China Energy Statistic Yearbook 2007. Emission factors ($EF_{CO2,i,y}$) of each type of fossil fuel come from IPCC 2006 default values.

As chosen in step 2, the simple OM emission factor is calculated by using Ex-ante option of data vintages, i.e. 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 data of installed capacity, electricity generation and fuel consumptions are all from China Energy Statistical Yearbooks 2005-2007 and China Electric Power Yearbooks 2005-2007.

Given the above, the simple operating margin CO2 emission factor ($EF_{grid,OMsimple,y}$) of Northeast Power Grid is **1.2561 tCO2/MWh.** The detailed calculations and data are listed in the annex 3 (The baseline emission factor OM is same as that provided by Chinese DNA, the website is http://cdm.ccchina.gov.cn/web/index.asp).

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 either:

[36] An import from a connected electricity system should be considered as one power source.

(a) The set of five power units that have been built most recently, or

(b) The set of power capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently[37].

The set of power units that comprises the larger annual generation should be used.

A power unit is considered to have been built at the date when it started to supply electricity to the grid.

Power plant registered as CDM project activities should be excluded from the sample group *m*. However, if group of power units, not registered as CDM project activity, identified for estimating the build margin emission factor includes power unit(s) that is (are) built more than 10 years ago then:

(i) Exclude power unit(s) that is (are) built more than 10 years ago from the group; and

(ii) Include grid connected power projects registered as CDM project activities, which are dispatched by dispatching authority to the electricity system.

Capacity additions from retrofits of power plants should not be included in the calculation of the build margin emission factor.

In terms of vintage of data, one of the following two options can be chosen:

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

Option 2: For the first crediting period, the build margin emission factor shall be updated annually, ex-post, including those units built up to the year of registration of the project activity or, if information up to the year of registration is not yet available, including those units built up to the latest year for which information is available. For the second crediting period, the build margin emissions factor shall be calculated ex-ante, as described in option 1 above. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used.

For the proposed project, option 1 is chosen to calculate Build Margin emission factor.

Step 5: Calculate the build margin emission factor

The build margin emissions factor is the generation-weighted average emission factor (tCO2/MWh) of all power units *m* during the most recent year *y* for which power generation data is available, calculated as follows:

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

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

Where:

$EF_{grid,BM,y}$ =Build margin CO2 emission factor in year y (tCO2/MWh)

$EG_{m,y}$ = Net quantity of electricity generated and delivered to the grid by power unit *m* in year y (MWh)

$EF_{EL,m,y}$ = CO2 emission factor of power unit *m* in year y (tCO2/MWh)

m = Power units included in the build margin

y = Most recent historical year for which power generation data is available

No matter which options for calculating BM factor mentioned in step 4 was adopted for the proposed project; the same issue on data availability must be addressed. Currently, it is very difficulty to get the capacity margin data of power plants in China, since these data as well as net quantity of electricity generated and delivered to the grid and fuel consumption data in power unit *m* are regarded as commercial secrets or only for internal usage. Then the following deviation was adopted to calculate the Build Margin emission factor.

1. The breakdown data by power plants are not while the aggregate data by different types of fuels are available. Considering this situation, the *m* sample group will consist of capacity addition by power sources with same fuel instead of by power plants. For the proposed project the *m* sample group will consist of fossil fuel fired capacity addition, hydropower capacity addition and other capacity addition;

2. Assuming that all the power plants with same fuel type have equal annual operation hours, and identify the starting year t_0 which the power capacity additions from t_0 to t (i.e. the recent year of which the latest data is available) in the electricity system that comprise 20% of the system generation (in MWh).

   The capacity addition belonging to *m* sample group thus could be identified. For the proposed project, the most recent year of which data is available is 2006, while t_0=1999, the total capacity addition during 1999 to 2006 consisting of 9079.1MW of fossil fuel fired capacity, 603.3MW of hydropower capacity and 0MW of nuclear power capacity, and 529.1MW of other capacity[38], the total capacity addition during 1999 to 2006 comprises 20% of the system generation in 2006.

3. To be conservative, zero emission factors were selected for hydropower capacity and other capacity. Moreover, since specific data on coal fired capacity, oil fired capacity, and gas fired capacity could not be separated from current statistical data on fossil fuel fired capacity, the following approach was adopted for calculating the emission factor of fossil fuel fired capacity addition:

[38] China Electric Power Yearbook 2001-2007

(1) With the energy balance sheet in China Energy Statistical Yearbook for the most recent year, calculating the respective percentages of CO2 emissions from coal fired power generation, oil fired power generation, and gas fired power generation against total CO2 emissions from fossil fuel fired power generation:

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

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

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

Where:

$FC_{i,j}$ = The amount of fuel i (in a mass or volume unit) consumed by province j;

$COEF_{i,j}$ =The CO2 emission coefficient of fuel i (tCO2/ mass or volume unit of the fuel), taking into account the carbon content of the fuels consumed by province,

$$COEF_i = NCV_i \times EF_{CO_2,i} \quad (7)$$

Where:

NCV_i =Net calorific value (energy content) of fossil fuel type i (GJ/ mass or volume unit) ;

$EF_{CO_2,i}$ = CO2 emission factor of fossil fuel type i in year y (tCO2/GJ)

$COAL, OIL, and\ GAS$ = The aggregation of various kinds of coal, oil, and gas as fossil fuels.

(2) Calculating the corresponding emission factor for fossil fuel fired power generation:

$$EF_{Thermal} = \lambda_{Coal} \times EF_{Coal,Adv} + \lambda_{Oil} \times EF_{Oil,Adv} + \lambda_{Gas} \times EF_{Gas,Adv} \quad (8)$$

Where:

$EF_{Coal,Adv}$, $EF_{Oil,Adv}$ and $EF_{Gas,Adv}$ are the emission factors for the best commercially available technology of coal fired power generation, oil fired power generation, and gas fired power generation, respectively (See Annex 3 for detailed calculation).

4. Using the share of different type of capacity in total capacity addition as weight, the weighted average of emission factors of different type capacity is calculated as the Build Margin emission factor $EF_{grid,BM,y}$ of Northeast Power Grid (See Annex 3 for detailed calculation):

$$EF_{grid,BM,y} = \frac{CAP_{Thermal}}{CAP_{Total}} \times EF_{Thermal} \quad (9)$$

Where:

CAP_{Total} = The total capacity addition

$CAP_{Thermal}$ =The fossil fuel fired capacity addition

Following the four steps above, the build margin emission factor $EF_{grid,BM,y}$ of the Northeast Power Grid is calculated to be **0.8068 tCO2/MWh.** The detailed calculations and data are listed in the annex 3 (The build margin emission factor BM is same as that provided by Chinese DNA, the website is http://cdm.ccchina.gov.cn/web/index.asp).

Step 6: Calculate the combined margin emissions factor

The combined margin emissions factor is calculated as follows:

$$EF_{grid,CM,y} = EF_{grid,OM,y} \times w_{OM} + EF_{grid,BM,y} \times w_{BM} \quad (10)$$

Where:

$EF_{grid,BM,y}$ =Build margin CO2 emission factor in year y (tCO2/MWh)

$EF_{grid,OM,y}$ =Operating margin CO2 emission factor in year y (tCO2/MWh)

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

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

Wind project activities: w_{OM} = 0.75 and w_{BM} = 0.25 (owing to their intermittent and non dispatchable nature) for the first crediting period and for subsequent crediting periods.

The default weights are adopted for the proposed project, the baseline emission factor is:

$$EF_{grid,CM,y} = EF_{grid,OM,y} \times w_{OM} + EF_{grid,BM,y} \times w_{BM} = \textbf{1.1438 tCO2/MWh}$$

Project emissions

For wind power project activities, $PE_y = 0$

Leakage

For wind power project activities, $LE_y = 0$

Emission reductions

Emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y - LE_y \quad (11)$$

Where:

ER_y = Emission reductions in year y (t CO2e/yr).

BE_y = Baseline emissions in year y (t CO2e/yr).

PE_y = Project emissions in year y (t CO2/yr).

LE_y = Leakage emissions in year y (t CO2/yr).

BE_y is calculated using the following formula:

$BE_y=(EG_y- EG_{self\text{-}using})\times EF_y$ (12)

where:

EG_y is the estimated annual electricity generation delivered to the power grid of the proposed project, according to the Feasibility Study Report of the proposed project, which will be 56,040 MWh.

$EG_{self\text{-}using}$ is electricity used by the proposed project from the Power Grid, which is assumed to be 0 in the PDD and the actual value adopts the meter reading in monitoring.
EF_y is the baseline emission factor.

The annual emission reduction of the proposed project is:

$\boldsymbol{ER_y=BE_y-PE_y-L_y= BE_y =(EG_y- EG_{self\text{-}using})\times EF_y}$

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

Data / Parameter:	$FC_{i,y}, FC_{i,j}$
Data unit:	Mass or volume unit
Description:	Amount of fossil fuel type i (in a mass or volume unit) consumed by power plant/unit (or in the project electricity system in case of $FC_{i,y}$) in year y, or the amount of fuel type i (in a mass or volume unit) consumed by province j
Source of data used:	China Energy Statistical Yearbook 2005-2007
Value applied:	See Annex 3
Justification of the choice of data or description of measurement methods	Simple OM: For each crediting period using the most recent three historical years for which data is available at the time of submission of the CDM-PDD to the DOE for validation (ex-ante option).

and procedures actually applied :	BM: For the first crediting period, following the EB guidance. For the second and third crediting period, only once ex-ante at the start of the second crediting period.
Any comment:	

Data / Parameter:	$EG_{m,y}, EG_y$
Data unit:	MWh
Description:	Net electricity generated and delivered to the grid by power plant / unit *m* (or in the project electricity system in case of EG_y) in year y
Source of data used:	China Electric Power Yearbook 2005-2007
Value applied:	See Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Simple OM: For each crediting period using the most recent three historical years for which data is available at the time of submission of the CDM-PDD to the DOE for validation (ex-ante option) BM: For the first crediting period, following the EB guidance. For the second and third crediting period, only once ex-ante at the start of the second crediting period.
Any comment:	

Data / Parameter:	$NCV_{i,y}$
Data unit:	GJ/ mass or volume unit
Description:	Net calorific value (energy content) of fossil fuel type i in year y
Source of data used:	China Energy Statistical Yearbook 2007
Value applied:	See Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Simple OM: For each crediting period using the most recent three historical years for which data is available at the time of submission of the CDM-PDD to the DOE for validation (ex-ante option) BM: For the first crediting period, following the EB guidance. For the second and third crediting period, only once ex-ante at the start of the second crediting period.
Any comment:	

Data / Parameter:	$EF_{CO_2,i,y}$
Data unit:	tCO2/GJ
Description:	CO2 emission factor of fossil fuel type i in year y
Source of data used:	2006 IPCC default values
Value applied:	See Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	2006 IPCC values have been used for fuel types since no country specific CO2 emission factors are available. Simple OM: For each crediting period using the most recent three historical years for which data is available at the time of submission of the CDM-PDD to the DOE for validation (ex-ante option) BM: For the first crediting period, following the EB guidance. For the second and third crediting period, only once ex-ante at the start of the second crediting period.

Any comment:	

Data / Parameter:	$CAP_{j,y}$
Data unit:	MW
Description:	Installed capacity of relevant power source *j* connected to the grid in year *y*
Source of data used:	China Electric Power Yearbook 2000-2007
Value applied:	See Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Following the EB guidance regarding application of AM0005 in China, the capacity weighted is used instead of generation weighted in calculation of BM emission factor.
Any comment:	

Data / Parameter:	$\eta_{coal,adv}$
Data unit:	%
Description:	Best electricity supply efficiency for coal fired plant
Source of data used:	http://cdm.ccchina.gov.cn/web/index.asp
Value applied:	37.28
Justification of the choice of data or description of measurement methods and procedures actually applied :	Country specific value
Any comment:	

Data / Parameter:	$\eta_{oil,adv}$
Data unit:	%
Description:	Best electricity supply efficiency for oil fired plant
Source of data used:	http://cdm.ccchina.gov.cn/web/index.asp
Value applied:	48.81
Justification of the choice of data or description of measurement methods and procedures actually applied :	Country specific value
Any comment:	

Data / Parameter:	$\eta_{gas,adv}$
Data unit:	%
Description:	Best electricity supply efficiency for gas fired plant
Source of data used:	http://cdm.ccchina.gov.cn/web/index.asp
Value applied:	48.81
Justification of the choice of data or description of measurement methods	Country specific value

and procedures actually applied :	
Any comment:	

Data / Parameter:	$EF_{grid,CM,y}$
Data unit:	tCO2/MWh
Description:	Combined margin CO2 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" (version1.1)
Source of data used:	http://cdm.ccchina.gov.cn/web/index.asp
Value applied:	1.1438 (Chinese DNA)
Justification of the choice of data or description of measurement methods and procedures actually applied :	As per the "Tool to calculate the emission factor for an electricity system" (version1.1)
Any comment:	

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

According to the baseline methodology ACM0002, the GHG emission of the proposed project within the project boundary is zero, i.e. PE_y=0.

According to the baseline methodology ACM0002, the leakage of the proposed project is not considered, i.e. LE_y=0.

Therefore, the proposed project activity emissions are zero, i.e. $PE_y + LE_y$=0.

According to the descriptions and calculation in section B. 6.1, the combined baseline emission factor of the Northeast Power Grid is:

$EF_{grid,CM,y}$=1.1438 tCO_2/MWh.

According to the Feasibility Study Report of the proposed project, the estimated annual electricity generation delivered to the power grid will be:

EG_y=56,040 MWh.

$EG_{self\text{-}using}$ is electricity used by the proposed project from the Power Grid, which is assumed to be 0 in the PDD and the actual value adopts the meter reading in monitoring.

The annual emissions of the baseline scenario will be:

$BE_y=(EG_y - EG_{self\text{-}using})\times EF_{grid,CM,y}$=64,098 tCO_2

The annual emission reductions of the proposed project will be:

$$ER_y = BE_y - PE_y - LE_y = 64{,}098 \text{ tCO}_2$$

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

Year	Estimation of Project activity Emission (tonnes of CO2e)	Estimation of baseline emission (tonnes of CO2e)	Estimation of leakage (tonnes of CO2e)	Estimation of Emission reductions (tonnes of CO2e)
2009.07.01-2009.12.31	0	32,049	0	32,049
2010	0	64,098	0	64,098
2011	0	64,098	0	64,098
2012	0	64,098	0	64,098
2013	0	64,098	0	64,098
2014	0	64,098	0	64,098
2015	0	64,098	0	64,098
2016.01.01-2016.06.30	0	32,049	0	32,049
Total (t CO2e)	**0**	**448,686**	**0**	**448,686**

Note: The starting date of the first crediting period is on 1st July 2009, the finishing date is on 30th June 2016.

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

B.7.1. Data and parameters monitored:

Data / Parameter:	EG_y
Data unit:	MWh
Description:	Electricity supplied by the project activity to the grid during the year *y*
Source of data to be used:	Electricity meter reading at project boundary
Value of data applied for the purpose of calculating expected emission reductions in section B.6	56040
Description of measurement methods and procedures to be applied:	The readings of electricity meter will be hourly measured and monthly recorded. Data will be archived for 2 years following the end of the crediting period by means of electronic and paper backup.
QA/QC procedures to be applied:	The Meters used for reading will be calibrated as per industry standards of host country. Double check by receipt of sales.
Any comment:	

Data / Parameter:	$EG_{self\text{-}using}$

Data unit:	MWh
Description:	Electricity used by the proposed project from the grid.
Source of data to be used:	Electricity meter to measure self-using electricity at project boundary
Value of data applied for the purpose of calculating expected emission reductions in section B.6	0
Description of measurement methods and procedures to be applied:	The readings of electricity meter will be hourly measured and monthly recorded. Data will be archived for 2 years following the end of the crediting period by means of electronic and paper backup.
QA/QC procedures to be applied:	The project operator is responsible for recording this set of data. Electricity sales invoices will also be obtained for double check.
Any comment:	

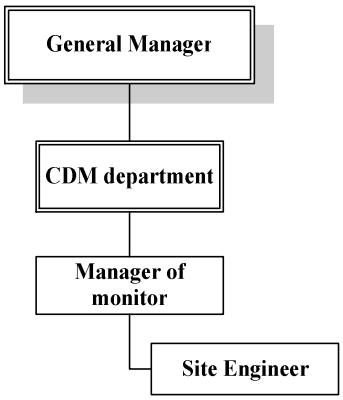
Data / Parameter:	TEG_y
Data unit:	MWh
Description:	Total electricity produced by the project activity, including the electricity supplied to the grid and the electricity supplied to internal loads, in year *y*.
Source of data to be used:	Electricity meter reading at project boundary
Value of data applied for the purpose of calculating expected emission reductions in section B.6	
Description of measurement methods and procedures to be applied:	The readings of electricity meter will be hourly measured and monthly recorded. Data will be archived for 2 years following the end of the crediting period by means of electronic and paper backup.
QA/QC procedures to be applied:	The Meters used for reading will be calibrated as per industry standards of host country.
Any comment:	

B.7.2. Description of the monitoring plan:

Monitoring plan is a division and schedule of a series of monitoring tasks. Monitoring tasks must be implemented according to the monitoring plan in order to ensure that the real, measurable and long-term greenhouse gas (GHG) emission reduction for the proposed project is monitored and reported.

1. Management Structure

The management structure is as follows:



The general manager is in charge of decision-making on major CDM issues, the CDM department is responsible for the concrete implementation of the Monitoring Plan. The monitor manager is responsible for supervising and checking the whole date record process and the calibration of meters. Another main task of the monitor manager is facilitating the verification through providing the DOE with all required necessary information. The site engineers will collect monitoring data (e.g. electric meter data) and keep invoices of sales, etc.

2. Calibration and Arrangement of Meters

□An agreement should be signed between the project owner (i.e.Yilan Longyuan Wind Power Co., Ltd.) and Power Grid Company that defines the metering arrangements and the required quality control procedures to ensure accuracy.

□The metering equipment for electricity is installed at the 220kV transformer station. The metering equipment will be properly configured and calibrated annually. The metering equipment will be checked by the project owner and Power Grid Company before operation.

□The verification of electric energy meter should be periodically carried out according to relevant national electric industry standards or regulations. After verification, meters should be sealed. Both meters shall be jointly inspected and sealed on behalf of the parties concerned and shall not be accessible by either party except in the presence of the other party or its accredited representatives.

□All the meters installed shall be tested by the qualified metrical agency co-authorized by the project owner and Power Grid Company, after:

1) The detection of a difference larger than the allowable error in the reading of the meter, when considering the reactive loss of electrical wire,
2) The repair of all or part of the meter caused by the failure of one or more parts to operate in accordance with the specifications.

□The project owner and Power Grid Company should have a remedial measure for the estimation of the correct reading according to agreed procedures under the signed agreement.

3. Monitoring parameters

All relevant parameters listed in Section B 7.1 will be monitored according to the methodology requirements and description of measurement methods and procedures to be applied. The net electricity supplied the grid should be measured continuously and recorded monthly as required by the methodology applied. The data and meter reading will be well documented and be readily accessible for DOE.

4. Data recording

The specific steps to monitoring are listed below:

- The project owner reads the meters and records data on the same day of every month (which day to be determined).
- The project owner supplies readings to Power Grid Company.
- The project owner provides electricity sales invoice to Power Grid Company.
- The project owner carries out an internal audit on and reports the readings to the DOE for verification.

The meter reading will be readily accessible for DOE. Calibration test records will be maintained for verification.

Should any previous months reading of the meter be inaccurate by more than the allowable error, or otherwise functioned improperly, the electricity generation supplied to the grid by the proposed project shall be determined by:

1) The project owner and Power Grid Company shall jointly prepare an estimate of the correct reading; and, provide ample evidence to DOE that the method is reasonable;
2) If the project owner and Power Grid Company fail to agree the estimate of the correct reading, then the matter will be referred for arbitration according to agreed procedures.

5. Quality Assurance and Quality Control

The project activities will use high-precision monitoring equipment to monitor the electricity to the grid. All meters will be calibrated and sealed as per the industry practices at regular intervals. Hence, high quality is ensured. Electricity sales invoices will be used to test the consistency of the recorded data.

6. Data Management System

All parameters monitored under the monitoring plan will be archived electronically and be kept at least for 2 years after the end of last crediting period. The monitored data will be presented to the verification agency or DOE to whom verification of emission reductions is assigned.

The documents in paper format, such as maps, tables, and the EIA report, will be used in conjunction with the monitoring plan to check the authenticity of the information, and be kept at least one copy by the project owner.

7. Verification

The main objective of the verification is to independently verify that the project has achieved the emission reductions as reported.

The responsibilities for verification of the project are as follows:

- Sign a service agreement about verification with specific DOE and agree to a time framework for carrying out verification activities. The project owner will make the arrangements for the verification and will prepare for the audit and verification process to the best of its abilities.

- The project owner will facilitate the verification through providing the DOE with all required necessary information, before, during and, in the event of queries, after the verification.

- The project owner will fully cooperate with the DOE for interviews and respond honestly to all questions from the DOE.

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)

The baseline study and monitoring methodology of the proposed project was completed on 01/12/2008.

The persons involved in baseline study are listed as follows:

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Telephone: +8610-66091317
Email: zhangnianwu@clypg.com.cn

(Not the project participants 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:

26/02/2008. (Date of the wind turbine purchasing contract was signed.)

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

20 years.

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

C.2.1. Renewable crediting period

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

01/07/2009.

C.2.1.2. Length of the first crediting period:

7 years.

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

N/A

C.2.2.2. Length:

N/A.

SECTION D. Environmental impacts

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

The Environmental Assessment Report of the proposed project has been approved by the Environmental Protection Administration of Heilongjiang Province, referred as "Heilongjiang Environment Construction (Table) [2006] No.54".

The proposed project is likely to cause the following main potential environmental impacts during the construction period and operation period:

- Impacts from the construction of the wind farm include construction noise, dust as well as water and soil loss etc;
- Impacts from noise and the electromagnetism pollutions of the wind turbines during the operation period;
- Impacts on native vegetation and environment as a result of construction activities for windmill towers, transformers and access roads;
- Impacts on socio-economy from the construction and operation of the proposed project.

- **Impacts on Air Environment**

Wind power plants are known to contribute to zero atmospheric pollution as no fuel combustion is involved during any stage of the operation. However, the sources of air pollution are mainly due to the construction activities including the transportation of construction material, road construction and improvement and cadre construction etc. The impacts on air environment are temporal that will be ended when the construction is completed. It is suggested that several measures shall be taken into account, such as prohibiting the construction under strong wind weather, reducing as much as possible the area of construction, spraying water as undertake construction, and reducing the speed of vehicles in the field. Hence, air pollution caused by the proposed project is not significant to the surrounding environment.

- **Impacts on Noise Environment**

The noise of the proposed project in construction phase is from vehicles and machines on-site. Based on the formula of declining of sound emitted from a non-directional source, it is estimated that the noise meets Class I of China Environmental Noise Standard in Urban Area (GB3096-93) at 100m away from the sound source on daytime and at 200m away from the sound source on nighttime. Moreover, the impacts during the construction period will only exist temporarily, and disappear with the completing of the construction period. However, operational noise from the rotating blades is expected to be minimal due to the higher background noise caused by strong winds. The noise from the running of the wind power unit will have impacts on the area 200m around the wind farm, and have no impacts on the area 500m away. The proposed project site is located on the top of Hezuolinchang Mountain, and the closest residential area to the site of the proposed project is over 3 km away. Therefore, the noise of the proposed project will not have impact on nearby residents.

- **Impacts on Water and Solid Waste**

The wind-farm does not consume any water, nor does it generate any wastewater in the operation phase. The possible negative impacts are the household wastewater and solid waste produced by builders and staff, and the waste earth from digging of the foundation in the construction phase. Under normal conditions with highly automated monitoring and control system, the household wastewater will be first treated in a septic tank, and then be disinfected to discharge for circumjacent virescence. Moreover, the

amount of household solid waste will be very little, which will not have impact on the environment. Besides, the solid waste will be collected and moved to the landfill site of the nearest city. The waste earth from the digging should be firstly used for refilling. The rest of the waste earth should be placed in the low area of the site which should be replanted with grass and tree. Following the suggestion, the water and solid waste should have no significant impact on the environment.

- **Impacts on telecommunications and television transmissions**

Since set of 220kV substation will be constructed in the proposed project, the electromagnetism impact of the proposed project should be evaluated. Based on the analogies of the built wind-farms, the result concludes that the operation of wind farm will not have electromagnetism impact on the nearby enterprises and residential areas that are over 3 km away from the wind farm. Therefore, the electromagnetism of the proposed project in the operation phase doesn't impact the production and daily life of nearby enterprises and residents.

- **Impacts on Ecosystem Environment**

A serious potential concern for wind farms is their impact on vegetation, animals and migrating birds. The occupation of ground will destroy some surface vegetation during the proposed project construction period, but the vegetation destroyed by temporary ground occupation will be recovered through replanting tree and grass after the completion of the construction. So the minor quantity of soil erosion generated during the construction phase has no noticeable impact on soil use and the proposed project proponent has made arrangements to dispose them in an environmentally acceptable manner. Moreover, there are no migratory birds / endangered species in the region of the proposed project activity. Therefore, the activities to be carried out will not generate any negative impact on the ecological environment.

- **Socio-Economic Impacts**

The electricity generated by the proposed project will replace electricity generated by fossil fuels, so the proposed project could reduce the fossil fuel consumptions in connected power grid and as a result reduce GHG and contamination emissions. The proposed project is estimated to supply annually 56,040 MWh of power to the Heilongjiang Power Grid and to save 19,600 tce. Therefore, the proposed project generates eco-friendly, GHG free power that contributes to sustainable development of the region. Moreover, the locals have benefited economically through land sales and revenues. The proposed project activity not only helps the uplift of skilled and unskilled manpower in the region, but also improves employment rate and livelihood of local population in the vicinity of the proposed project.

- **Conclusion**

Being as a typical type of clean renewable energy, the proposed project has no significant impacts on local environment during its construction and operational phase, and will greatly contribute to achievement of sustainable development objective and promote local environmental 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:

Not applicable, since the construction and operation of the proposed project have no significant environmental impacts.

SECTION E. Stakeholders' comments

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

The comments on the project activity by the local stakeholders have been invited and complied in two ways:

1) Symposium

On 15th January 2008, under the support of local government, the project owner successfully held a stakeholder symposium in Yilan County. Totally 12 stakeholder representatives participated the symposium, respectively from the Development and Reform Bureau of Yilan County, the Environmental Protection Bureau of Yilan County, the Yilan Power Supply Corporation, and the villagers from Wujiazi village where the proposed project is located. The project participants informed them about the project, asked for their comments on the project concerning socio-economic and environmental aspects, namely as follows,

1) Impact on the economic aspect, including the local economy, income and employment, etc;
2) Impact on the environmental aspect, including the ecological environment, air, noise and the impact of soil erosion, etc;
3) Impact on sustainable development;
4) Suggestions and recommendations on the proposed project;
5) Attitude to the implementation of the proposed project, whether or not to support.

2) Questionnaire

The project owner have also carried out a public survey on the project in the format of questionnaires from 15th January 2008 to 20th January 2008. To make sure the results more representative, all these informants came from nearby areas and covered different ages and occupations.

A one page questionnaire was designed to be easily filled in with the following sections:

1) Respondent's basic information and education level
2) Questions on:
- Do they have any knowledge or understanding about the wind farm project?
- How far are their living or working places from the proposed project?
- What is their opinion on their living environment?
- Will the proposed project promote development of local economy?
- Will the proposed project increase local employment?
- Will the proposed project bring improvements to their livelihoods?
- Will the proposed project bring improvement to local environment?
- Will the proposed project have impacts on local ecological environment?
- What special issues should be considered to reduce the negative impacts during construction and operation of the proposed project?
- Whether do they satisfy the endeavour done by the project owner to reduce the negative impacts on local environment?
- Whether do they satisfy the compensation for the land occupied?
- Will the proposed project have impacts on their livelihoods?

● Do they agree with the construction of the proposed project?
● What other comments and suggestions do the respondents have for the project owner regarding the proposed project?
4) Space for the respondents' signature and date

E.2. Summary of the comments received:

1) Summary of the comments received in the symposium:

- The proposed project has been approved by the Development and Reform Commission and Environmental Protection Bureau of Heilongjiang Province, which shows that the construction and operation of the proposed project will have little impacts on the local environment.
- All the stakeholder representatives believe that the proposed project will achieve CO2 emission reduction by replacing electricity generated by fossil fuel fired power plants connected into Northeast Power Grid, and the proposed project will contribute to the mitigation of the GHG emissions.
- All the stakeholder representatives believe that the proposed project will have positive impacts on economy, environment and social in local region.
- The local government highly supports the proposed project, and expects the increase of local financial incoming, which can provide more public health services and rebuild schools, etc.
- All stakeholders think that the proposed project will improve the life quality of local residents, such as, providing more employment opportunities for local residents, increasing incomes of the local residents, increasing revenues from tourism with the wind farm as a beautiful landscape, accelerate the development of local service industry, and tourism.
- All stakeholders think that the proposed project activity has no significant negative influence on local environment.
- All the stakeholder representatives support and welcome the proposed project.

2) Public survey results:

The survey had a 100% response rate (40 questionnaires returned out of 40) and the following is a summary of the key findings:

Education level of the respondents: primary level (37.5%), middle level (45%), high level (12.5%), others (5%).
100% of the respondents are satisfied with their life conditions and surrounding environment.
92.5% of the respondents have some knowledge and understandings about the wind power project.
100% of the respondents agree with the development of the project, and 100% of them believe that the project will have overall positive impacts, such as "increase of job opportunities", "improvement of living standard", on their livelihoods.

The major concerns about the project are impacts during construction period, such as trash, wastewater noise and ecosystem environment damage.

Conclusion

The survey shows that the proposed project receives strong support from local people, which is closely linked to the fact that the majority of local villagers have some understandings with the wind power project. Most of the respondents believe that the project will have overall positive impacts on their livelihoods with better standard of living. To the major concerns about the project, the main issues concerned are environmental pollution and biological impact. However, as the environmental impact assessment demonstrates, the impacts only occur during construction period, and accompanied by mitigating measures such as enclosed operation, waste landfill, and restored vegetation, and the impacts will be minimized after the construction. The proposed project owner has adopted measures to strengthen environment protection, with which the local villagers are satisfied.

In conclusion, being as a typical type of clean renewable energy, the proposed project has no significant impacts on local environment and will greatly contribute to achievement of sustainable development objective, thus all the stakeholder representatives give no negative comments and support and welcome the proposed project.

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

Since there is no negative comment received, it's no need to make adjustment on design, construction and operation of the proposed project.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No public funding from Annex I countries is involved in the proposed project.

Annex 3

BASELINE INFORMATION

1. OM emission factor calculation of NEPG (Northeast Power Grid)

Table A-1, A-2, and A-3 provide annual thermal power electricity generation in NEPG from 2004 to 2006. The main data sources come from China Electric Power Yearbook 2005, 2006 and 2007.

Table A- 1 Annual thermal power electricity generation in NEPG in 2004

Province	Electricity generation (MWh)	Self usage rate (%)	Electricity delivered to the grid (MWh)
Liaoning	84543000	7.21	78447450
Jilin	33242000	7.68	30689014
Heilongjiang	53482000	7.84	49289011
Total			**158425475**

Data source：China Electric Power Yearbook 2005.

Table A- 2 Annual thermal power electricity generation in NEPG in 2005

Province	Electricity generation (MWh)	Self usage rate (%)	Electricity delivered to the grid (MWh)
Liaoning	83697000	7.03	77813101
Jilin	35294000	6.59	32968125
Heilongjiang	58000000	7.96	53383200
Total			**164164426**

Data source：China Electric Power Yearbook 2006.

Table A- 3 Annual thermal power electricity generation in NEPG in 2006

Province	Electricity generation (MWh)	Self usage rate (%)	Electricity delivered to the grid (MWh)
Liaoning	96282000	6.62	89908132
Jilin	38576000	6.78	35960547
Heilongjiang	62964000	7.85	58021326
Total			**183890005**

Data source：China Electric Power Yearbook 2007.

The key parameters in OM and BM calculation include the net caloric values (NCV_s) and CO2 emission factor per unit of energy (EF_{CO2s}) of various types of fuels, which are shown in the table below:

Table A-4: NCV_s and EF_{CO2s} of various types of fuels

Fuel	NCV_s	EF_{CO2s} (tc/TJ)
Coal	20908 kJ/kg	25.80
Washed coal	26344 kJ/kg	25.80
Other Washed Coal[39]	8363 kJ/kg	25.80
Coke	28435 kJ/kg	29.20
Crude oil	41816 kJ/kg	20.00
Gasoline	43070 kJ/kg	18.90
Kerosene	43070 kJ/kg	19.60
Diesel	42652 kJ/kg	20.20
Fuel oil	41816 kJ/kg	21.10
Other petroleum products[40]	38369 kJ/kg	20.00
Other coked product	28435 kJ/kg	25.80
Natural gas	38931 kJ/m3	15.30
Coke oven gas[41]	16726 kJ/m3	12.10
Other gas[42]	5227 kJ/m3	12.10
LPG	50179 kJ/kg	17.20
Refinery gas	46055 kJ/kg	15.70

Data sources:

NCV_s are from China Energy Statistical Yearbook 2007

EF_{CO2s} are from 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2, Chapter 1, table 1-3.

[39] Other washed coal includes middlings and slimes. The NCV value of middlings is adopted here, which is conservative because the NCV value of slimes is higher than that of middlings.

[40] The NCV value of other petroleum products are not provided in China Energy Statistical Yearbooks. This Annex calculates it as 38369 kJ/kg, i.e., 1.3108 tce/t, on the basis of Energy Balance Sheets (physical quantity) and conversion factor against SCE.

[41] The NCV value here adopts the lower limit of the NCV value range, i.e., 16726-17981 kJ/m^3, for coke oven gas provided in China Energy Statistical Yearbook 2007, P 287.

[42] The NCV value here adopts the lowest NCV value among those for gas by furnace, gas by heavy oil catalytic cracking, gas by heavy oil catalytic thermal cracking, gas by pressure gasification, and water coal gas, which are provided in China Energy Statistical Yearbook 2007.

Table A-5: The fuel consumption and total emissions of Northeast Power Grid in 2004

Fuel types	unit	Liaoning	Jilin	Heilongjiang	Sub-Total	EF_{co2}	Net caloric value	CO_2 emission（tCO_2e）
						（tc/TJ）	（MJ/t,km3）	G=D*E*F*44/12/100(quantity)
		A	B	C	D=A+B+C	E	F	G=D*E*F*44/12/10(volume)
Coal	10^4t	4144.2	2310.9	3084.8	9539.9	25.8	20908	188689376.8
Washed coal	10^4t	84.75	1.09	4.88	90.72	25.8	26344	2260871.585
Other Washed Coal	10^4t	577.67	14.26	61	652.93	25.8	8363	5165589.096
Coke	10^4t				0	25.8	28435	0
Coke oven gas	10^8M^3	4.83	2.91		7.74	12.1	16726	574367.4948
Other gas	10^8M^3	57.33	4.19		61.52	12.1	5227	1426676.894
Crude oil	10^4t				0	20	41816	0
Diesel	10^4t	2.04	1.16	0.24	3.44	20.2	42652	108672.7465
Fuel oil	10^4t	12.81	1.78	2.86	17.45	21.1	41816	564536.2111
LPG	10^4t	2.19			2.19	17.2	50179	69305.22764
Refinery gas	10^4t	9.79		1.14	10.93	18.2	46055	335923.0208
Natural gas	10^8M^3		0.03	2.53	2.56	15.3	38931	559111.4496
Other oil product	10^4t				0	20	38369	0
Other coked product	10^4t				0	25.8	28435	0
Other energy	10^4t	26.97	5.07		32.04	0	0	0
Total								199754430.5

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Table A-6: The fuel consumption and total emissions of Northeast Power Grid in 2005

Fuel types	unit	Liaoning	Jilin	Heilongjiang	Sub-Total	EF_{co2}	Net caloric value	CO_2 emission（tCO_2e）
						（tc/TJ）	（MJ/t,km3）	G=D*E*F*44/12/100(quantity)
		A	B	C	D=A+B+C	E	F	G=D*E*F*44/12/10(volume)
Coal	10^4t	4305.41	2446.13	3383.21	10134.75	25.8	20908	200454895.9
Washed coal	10^4t					25.8	26344	0
Other Washed Coal	10^4t	524.74	19.26	24.16	568.16	25.8	8363	4494939.888
Coke	10^4t					25.8	28435	0
Coke oven gas	10^8M^3	1.03	3.57	0.68	5.28	12.1	16726	391816.5856
Other gas	10^8M^3	12.62	8.37		20.99	12.1	5227	486767.6854
Crude oil	10^4t	1.16			1.16	20	41816	35571.47733
Diesel	10^4t	1.18	1.48	0.57	3.23	20.2	42652	102038.6544
Fuel oil	10^4t	9.32	2.46	1.55	13.33	21.1	41816	431247.4323
LPG	10^4t	0.12			0.12	17.2	50179	3797.54672
Refinery gas	10^4t	5.48		1.32	6.8	18.2	46055	208991.4493
Natural gas	10^8M^3		0.84	2.24	3.08	15.3	38931	672680.9628
Other oil product	10^4t					20	38369	0
Other coked product	10^4t					25.8	28435	0
Other energy	10^4t	16.18			16.18	0	0	0
Total								207282747.6

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Table A-7: The fuel consumption and total emissions of Northeast Power Grid in 2006

Fuel types	unit	Liaoning	Jilin	Heilongjiang	Sub-Total	EF_{co2}	Net caloric value	CO_2 emission（tCO_2e）
						（tc/TJ）	（MJ/t,km3）	G=D*E*F*44/12/100(quantity)
		A	B	C	D=A+B+C	E	F	G=D*E*F*44/12/10(volume)
Coal	10^4t	4681.99	2738.24	3698.29	11118.52	25.8	20908	219912851
Washed coal	10^4t	0.03			0.03	25.8	26344	748
Other Washed Coal	10^4t	674.74	17.83	96	788.57	25.8	8363	6238691
Coke	10^4t	3.32			3.32	29.2	28435	101075
Coke oven gas	10^8M^3	2.68	0.16	1.44	4.28	12.1	16726	317609
Other gas	10^8M^3	55.26	1.43		56.69	12.1	5227	1314667
Crude oil	10^4t	0.49			0.49	20	41816	15026
Diesel	10^4t	0.75	0.39	0.3	1.44	20.2	42652	45491
Fuel oil	10^4t	11.73	0.45	1.44	13.62	21.1	41816	440629
LPG	10^4t				0	17.2	50179	0
Refinery gas	10^4t	8.55		4.27	12.82	15.7	46055	339888
Natural gas	10^8M^3		0.19	2.1	2.29	15.3	38931	500143
Other oil product	10^4t				0	20	38369	0
Other coked product	10^4t				0	25.8	28435	0
Other energy	10^4t	12.16	17.6	82.77	112.53	0	0	0
Total								229226818

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Table A-8: OM factor of Northeast Power Grid

Years	Thermal generation delivered to NEPG	The emissions from NEPG	OM
	A	B	C=B/A
2004	158425475	199708287	1.260582
2005	164164426	207254040	1.262478
2006	183890005	229226818	1.246543
Average OM	506479906	636189145	**1.256099**

2. BM emission factor calculation of NEPG.

Table A-9 Emission factor of the unit applying best commercially available technology

Technology	Electricity supply efficiency	EF_{co2} (tc/TJ)	Emission factor (tCO2/MWh)
	A	B	C=3.6/A/1000*B*44/12
Coal fired plant	37.28%	25.8	$EF_{Coal,Adv}$ =**0.9135**
Gas fired plant	48.81%	15.3	$EF_{Gas,Adv}$ =**0.4138**
Oil fired plant	48.81%	21.1	$EF_{Oil,Adv}$ =**0.5706**

Table A-10 Calculation of the respective percentages of CO2 emissions from coal fired power generation, oil fired power generation, and gas fired power generation against total CO2 emissions from fossil fuel fired power generation

Fuel types	unit	Liaoning	Jilin	Heilongjiang	Sub-Total	EF_{co2}	Net caloric value	CO_2 emission
						(tc/TJ)	(MJ/t,km3)	(tCO_2e)
		A	B	C	D=A+B+C	E	F	G=D*E*F*44/12/100(quantity)
Coal	10^4t	4681.99	2738.24	3698.29	11118.52	25.8	20908	219912851
Washed coal	10^4t	0.03			0.03	25.8	26344	748
Other Washed Coal	10^4t	674.74	17.83	96	788.57	25.8	8363	6238691
Coke	10^4t	3.32			3.32	29.2	28435	101075
Sub-total								**226253365**
Crude oil	10^4t	0.49			0.49	20	41816	15026
Diesel	10^4t	0.75	0.39	0.3	1.44	20.2	42652	45491
Fuel oil	10^4t	11.73	0.45	1.44	13.62	21.1	41816	440629
Other oil product	10^4t					20	38369	0
Sub-total								**501146**
Natural gas	10^7M^3		1.9	21	22.9	15.3	38931	500143
Coke oven gas	10^7M^3	26.8	1.6	14.4	42.8	12.1	16726	317609
Other gas	10^7M^3	552.6	14.3		566.9	12.1	5227	1314667
LPG	10^4t				0	17.2	50179	0
Refinery gas	10^4t	8.55		4.27	12.82	15.7	46055	339888
Sub-total								**2472307**
Total								**229226818**

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With the above table and formula (4), (5), and (6), the following results are achieved:

λ_{coal} =98.70% λ_{oil} =0.22% λ_{gas} =1.08%

$EF_{Thermal}=\lambda_{Coal}\times EF_{Coal,Adv}+\lambda_{Oil}\times EF_{Oil,Adv}+\lambda_{Gas}\times EF_{Gas,Adv}$=**0.9074 tCO2/MWh**

Table A-11: Capacity addition from 1999 to 2006 in the Northeast Power Grid

	Installed capacity in 1999（MW）	**Installed capacity in 2000（MW）**	**Installed capacity in 2006（MW）**	**Addition capacity(1999-2006)（MW）**	**Addition share**
	A	**B**	**C**	**D=C-A**	**E**
Thermal Power	27136.9	28932.5	36216	9079.1	88.91%
Hydro Power	5522.7	5600	6126	603.3	5.91%
Nuclear power	0	0	0	0	0.00%
Wind Power	22.9	43.9	552	529.1	5.18%
Total	**32682.5**	**34576.4**	**42894**	**10211.5**	**100%**
Share of 2006 installed capacity	76.19%	80.61%	100.00%		

Data sources: China Electric Power Yearbook 2000-2007

$EF_{grid,BM,y}=EF_{Thermal,Adv}\times CAP_{Thermal,addition}/CAP_{Total,,addition}$ = 0.9074×88.91%=**0.8068 tCO2/MWh**

3. The combined emission factor calculation of the Northeast Power Grid

Table A-12: Combined emission factor of Northeast Power Grid

OM factor (tCO2/MWh)	1.2561
BM factor (tCO2/MWh)	0.8068
CM factor (tCO2/MWh) **CM**=0.75×**OM**+0.25×**BM**	**1.1438**

4. Emission reduction calculation of the proposed project

$ER_y = BE_y - PE_y - LE_y$ =56040MWh×1.1438 tCO2/MWh =**64098 tCO$_2$**

Annex 4

MONITORING PLAN

No appended information.