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 Fujin 48MW Wind Power Project
Version number of the document: 2.1
Date: Jan 15, 2009

A.2. Description of the project activity:

>>
The Heilongjiang Fujin 48MW Wind Power Project (hereafter, the Project), is sited in the Bielayinshan of Fujin city, Heilongjiang Province, P.R.China. Totally 32 sets of FL1500 turbines with a unit capacity of 1500 kW were selected for the Project, providing a total installed capacity of 48MW. The estimated electricity delivered to the Northeast China Power Grid by the Project is 111044MWh[1] per year.

As a grid-connected renewable power project, the Project activity will achieve the greenhouse gas (GHG) emission reductions by avoiding CO_2 emissions from the business-as-usual scenario, the electricity generation of those fossil fuel-fired power plants connected into the Northeast China Power Grid. The estimated annual emission reductions are 126667 tCO_2e.

The Project clearly fits into the development priority of China, and will support China in stimulating and accelerating the commercialization of grid-connected renewable energy technologies and the development of green-power market. The Project will also contribute to the sustainable development of the host country and the local community mainly by:

- Reducing GHG emissions in China compared to the business-as-usual scenario;
- Reducing other pollutants resulting from the power generation industry in China, compared to a business-as-usual scenario;
- Helping to stimulate the growth of wind power industry in China;
- Creating local employment opportunities during the project construction and operation(about 20 persons);
- Increasing the tax income for local government.

A.3. Project participants:

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The parties involved in the Project are listed as following:

Name of Party involved(*)((host) indicates a host Party)	Private and/or public entity(ies) project participants (*) (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
P.R.China (host)	Heilongjiang Huafu Wind Power Fujin Co., Ltd.	No
Japan	The Tokyo Electric Power Co., Inc.	No
(*) In accordance with the CDM modalities and procedures, at the time of making the CDM-PDD public at the stage of validation, a Party involved may or may not have provided its approval. At the time of requesting registration, the approval by the Party (ies) involved is required.		

Annex 1 lists the complete contact information on participants in the project activity.

[1] Data from Feasibility Study Report

A.4. Technical description of the project activity:

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A.4.1. Location of the project activity:

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A.4.1.1. Host Party(ies):

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People's Republic of China

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

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Heilongjiang Province

A.4.1.3. City/Town/Community etc:

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Jinshan Town, Fujin City

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

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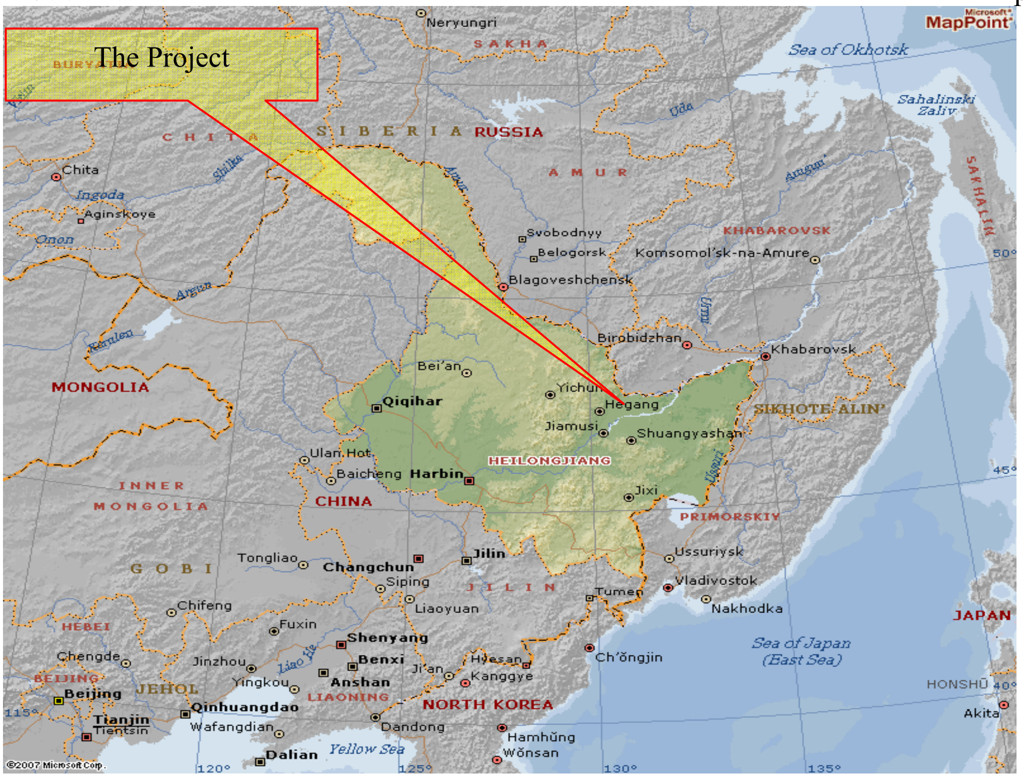
The Project is sited in the Bielayinshan of Fujin city, Heilongjiang Province, P.R.China. The Project has geographical coordinates with east longitude of 129˚11´33.9″ and north latitude of 46˚ 44´ 02.3″.Figure 1, Figure2 and Figure3 show the location of the Project.

Figure 1. Location of the project

Figure 2. Location of the project



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

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Sectoral scope 1: energy industries (renewable sources)

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

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The Project is to generate zero-emission wind power project and deliver it to Northeast China Power Grid (Hereafter, NEPG). For the Project,

(a) The scenario existing prior to the start of the implementation of the project activity is NEPG providing the same electricity service as the Project;
(b) The project scenario is the implementation of the Project, the installation and operation of 32 sets of turbines with a total capacity of 48MW which will supply an average annual generation of 111044MWh to NEPG and replace the same amount of electricity generated by fossil fuel fired power plants connected to NEPG;
(c) The baseline scenario is the same as the scenario existing prior to the start of implementation of the project activity.

The main parts of the Project include wind turbine, transformer, and substation. Totally 32 sets of FL1500 turbines with a unit capacity of 1500 kW were selected for the Project, providing a total installed capacity of 48MW. The FL1500 turbines are manufactured by local supplier Sinovel Wind Co. Ltd. According to the turbine layout, each turbine will have a 690V-to-10.5kV transformer. The electricity generated by the Project will be delivered to the Heilongjiang Power Grid through the Huama 220kV substation, the Heilongjiang Power Gird is a part of the NEPG. So the Project can replace electricity generated from fossil fuel fired power plant connected to the Grid and reduce GHG emissions.

It is estimated that the annual generation of the Project will be 111044MWh. As a result, 126667 tCO2

emission reductions will be generated annually

In order to be normal operation of the Project, the Project owner and local suppliers together will train all the relative staffs before the operation of the generators.

Key technical parameters of FL1500 turbines are listed in the following Table A-1.

Table 1. Technology parameters of FL-1500 Turbines

Item	Unit	Index
Nominal capacity	kW	1500
Number of blades	piece	3
Rotor diameter	m	77.4
Swept area	m^2	4657
Cut-in speed	m/s	3
Rated wind speed	m/s	11
Cut-out speed	m/s	20
Rated voltage of generator	V	690
Frequency	Hz	50
Efficiency	%	≥95

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

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It is expected that the Project activity will generate emission reductions for about 126667 tCO_2e annually over the first 7-year crediting period from 2009 to 2016.

Years	Annual estimation of emission reductions in tones of CO_2e
2009.08-2009.12	52778
2010.01-2010.12	126667
2011.01-2011.12	126667
2012.01-2012.12	126667
2013.01-2013.12	126667
2014.01-2014.12	126667
2015.01-2015.12	126667
2016.01-2016.07	73889
Total estimated reductions (tones of CO_2e)	886669
Total number of crediting years	7
Annual average over the crediting period of estimated reductions (tones of CO_2e)	126667

A.4.5. Public funding of the project activity:

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

SECTION B. Application of a baseline and monitoring methodology

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

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Methodology used for the Project is the approved ACM0002"Consolidated baseline methodology for grid-connected electricity generation from renewable sources" (Version 07).

This methodology adopts the "Tool for the demonstration and assessment of additionality" (version 05.2) and "Tool to calculate the emission factor for an electricity system" (version 01.1)

For more information regarding the methodology please refer to Website of Executive Board: http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html.

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

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Wind power generation technology is a renewable electricity generation technology which displaces fossil fuel-fired power generation technology to supply electricity to the grid. Therefore the methodology used to determine the Project baseline is the approved consolidated baseline methodology ACM0002. The methodology can be used to calculate GHG emission reductions achieved by wind power generation.

The project meets all applicability conditions of baseline methodology ACM0002 as follows:

1) The Project involves an electricity capacity addition from wind power;
2) The Project does not involve switching from fossil fuel-fired to renewable energy at the site of the Project activity.
3) The geographic and system boundaries for the Northeast China Power Grid can be clearly identified and information on the characteristics of the grid is available.

Therefore, the approved consolidated baseline methodology ACM0002 "Consolidated Baseline and Monitoring Methodology for Grid-connected Electricity Generation from Renewable Sources." is applicable to the Project.

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

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The spatial extent of the Project boundary includes the Project site and all power plants connected physically to the NEPG which is the electricity system that the Project is connected to. The project site includes 32 sets of FL-1500 turbines and auxiliary electric equipments. The NEPG includes Liaoning Power Grid, Jilin Power Grid and Heilongjiang Power Grid.

	Source	Gas	Included?	Justification / Explanation
Baseline	Electricity generation of those fossil fuel-fired power plants connected into the Northeast China Power Grid	CO_2	Yes	Main emission sources.
		CH_4	No	Excluded for simplification. This is conservative.
		N_2O	No	Excluded for simplification. This is conservative.
Project Activity	Project emission	CO_2	No	The Project is a wind power project, so the project emissions should not be considered as per ACM0002.
		CH_4	No	
		N_2O	No	

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

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According to the description in the approved baseline methodology ACM0002 (version 07), for the project activities that do not modify or retrofit an existing electricity generation facility, the baseline scenario is the following:

> *Electricity delivered to the grid by the project 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) calculated described latter.*

Under the condition that the additionality of the Project activity is demonstrated (see B.5).

The Project is connected to the Heilongjiang Grid, an integrated part of the Northeast China Power Grid. So Northeast China Power Grid is considered as the "connected electricity system", which is defined as the "project boundary" of the Project. Therefore, being a project with the boundary of Northeast China Power Grid that does not modify or retrofit an existing electricity generation facility, the baseline scenario of the Project can be identified as the following:

> Electricity delivered to the grid by the Project would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources within the Northeast China Power Grid, as reflected in the combined margin (CM) calculated described latter.

According to ACM0002, baseline emissions are equal to the power generated by the Project that is delivered to the Northeast China Power Grid, multiplied by the baseline emission factor. The baseline emission factor (EF_y) is calculated as a Combined Margin (CM), which consists of the weighted average of Operating Margin (OM) emission factor and Build Margin (BM) factor. An ex-ante 3 years data vintage for the Northeast China Power Grid is used. The key parameters[2] used for emission reductions calculation are as follow:

Parameter	Unit	Value
EF_{OM}	tCO_2e/MWh	1.2561
EF_{BM}	tCO_2e/MWh	0.7946
EF_y	tCO_2e/MWh	1.1407

The emission reductions calculations are specified in B.6 and Annex 3.

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

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Since the Project is not financially attractive, the incentive from the CDM was seriously considered by the Project owner. The Feasibility Study Report (hereafter, FSR) of the Project was completed by China Fulin Wind Energy Development Co., Ltd in Oct 2007 and was approved by Heilongjiang Development and Reform Commission. However the financial indicator such as total investment IRR of the Project is lower than the financial benchmark. The Project is not financially attractive. At that time, CDM under Kyoto Protocol had already been well known by the energy industry in China and even some CDM projects had been registered in EB. In order to improve the financial attractiveness of the Project, the FSR pointed out that if the revenues from CDM could be considered, the financial disadvantage could be alleviated. So the CDM was seriously considered by the Project owner. Before long, the Project owner

[2] http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File1875.pdf

entrusted the CDM consulting company for CDM development on 1st Nov 2007. After the CDM was seriously considered, the Project owner started to prepare other work for construction of the Project. The Construction Contract was signed on 19 Dec 2007, and the Equipment Purchase Agreement was signed on 31 Dec 2007. The Project was permitted to started construction on the 1st Jan 2008.

The date of signing the Construction Contract was selected as the Starting Date of the Project since it was the earliest date at which the implementation of the Project began, according to definition in EB41 Meeting Report[3].

The timeline of milestone of the Project is shown in the table below:

Table B-1 timeline of milestone of the Project

Time	**Milestones**
05/2007	Environmental Impact Assessment (EIA)
9/08/2007	EIA approved
10/2007	FSR
29/10/2007	Board Meeting
1/11/2007	CDM consultancy Agreement
19/12/2007	Signature of Construction Contract
29/12/2007	FSR approved
31/12/2007	Signature of Equipment Purchase Agreement
1/1/2008	Construction started

The additionality of the Project is demonstrated and assessed by using the *Tool for the Demonstration and Assessment of Additionality* approved by EB (version 05.2). It includes the following steps:

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

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

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

Realistic and credible alternatives that provide outputs or services comparable to the Project activity include:

Alternative 1**:** Construction of a fossil fuel-fired power plant with equivalent amount of annual electricity generation;
Alternative 2: The Project activity not undertaken as a CDM project activity;
Alternative 3: Construction of a power plant using other sources of renewable energy with equivalent amount of annual electricity generation;
Alternative 4: Equivalent electricity service provided by the Northeast China Power Grid.

In China, water resources are so unevenly distributed that 90% of exploitable installed capacity of hydropower project are concentrated in the western China. In the northeast China, hydro resources are relatively limited. In 2006, hydropower project accounted for only 0.06%[4] of the total installed capacity

[3]In this context, it has always been the Board's view that the start date of a CDM project activity is the earliest of the dates at which the implementation or construction or real action of the project activity begins.

[4] *China Electric Power Yearbook 2007*

of the Heilongjiang province and 0.02%[5] of the total installed capacity of the Northeast China Power Grid. It clearly shows that water resources are limited in local area. For solar PV, installed capacity of the largest solar PV farm in China is only 8 MW[6]. Since the installed capacity of the Project is 48MW, to construct a solar PV farm instead of the Project to provide outputs or services comparable to the Project is not feasible. For these reasons, ***Alternative 3*** is not feasible as an alternative scenario.

Outcome of Sub-step 1a:
Four realistic and credible alternatives to the Project activity are selected and ***Alternative 3*** is excluded.

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

For ***Alternative 1***, in generally speaking, the annual operating hours of a fossil fuel-fired power plant are about at least twice the annual operating hours of a wind power project. The annual operating hours of the Project are 2313 hours. However, alternative fossil fuel-fired power plants that can provide the equivalent generation capacity with a comparable annual utilization rate of 5,612 hours[7]. So a fossil fuel-fired power plant which provides equivalent annual electricity generation would require an installed capacity lower than 24MW. However, according to Chinese regulations, construction of fossil fuel-fired power plants with the installed capacity less than 135MW is prohibited to be built in the areas covered by large grids such as provincial grids[8]. For the above reasons, the possible alternative baseline scenario of building a 24MW fossil fuel-fired power plant conflicts with China's current regulations. So, ***Alternative 1*** is not feasible as an alternative scenario.

For ***Alternative 2***, is consistent with current laws and regulations. Therefore, ***Alternative 2*** is feasible.

For ***Alternative 4***, is consistent with current laws and regulations also. Therefore, ***Alternative 4*** is feasible.

Outcome of Sub-step 1b:
Therefore ***Alternative 2***_and ***Alternative 4***_are analyzed in **Step 2 Investment Analysis** as potential baseline alternatives.

Step 2. Investment Analysis

Sub-step 2a. Determine appropriate analysis method

The *Tools for the Demonstration and Assessment of Additionality* recommends three analysis methods which are simple cost analysis (option I), investment comparison analysis (option II) and benchmark analysis (option III). Since the Project will earn the revenues from not only the CDM but also the electricity output, the simple cost analysis method (option I) is not appropriate. Investment comparative analysis method is applicable to the alternatives similar to the Projects. Only on such basis, comparative analysis can be conducted. The ***Alternative 4*** of the Project is the Northeast China Power Grid rather than new investment projects. Therefore option II is not an appropriate method. Therefore, the Project will use benchmark analysis method (Option III) to assess the financial viability of the Project activity.

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

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[5] *China Electric Power Yearbook 2007*
[6] http://market.ccidnet.com/pub/article/c1798_a135747_p1.html

[7] *China Electric Power Yearbook 2007*

[8] *Notice on Strictly Prohibiting the installation of Fuel-fired Generators with the Capacity of 135 MW or Below* issued by the General Office of the State Council, decree no. 2002-6.

According to the *Interim Rules on Economic Assessment of Electrical Engineering Retrofit Projects*, a project will be financially acceptable when the total investment Internal Return Rate (IRR) is higher than 8% for investments in power industry. On the basis of the benchmark 8%, calculation and comparison of financial indicators are carried out in ***sub-step 2c***.

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

(1) Basic parameters for calculation of financial indicators

The basic parameters for calculation of financial indicators of the Project are shown in Table B-2 as follows:

Table B-2 Parameters for calculation of key financial indicators

		Source
Installed capacity:	48MW	Feasibility Study Report
Annual output:	111044 MWh	Feasibility Study Report
Project lifetime:	20years	Feasibility Study Report
Total investment:	RMB 454.69 million	Feasibility Study Report
Tariff:	0.56 RMB/KWh[9] (not including VAT)	The tariff approval was issued by the Heilongjiang Development and Reform Commission.
Rate of income tax	25%	Feasibility Study Report
Rate of value added tax	8.5%	Feasibility Study Report
Rate of city construction tax	5%	Feasibility Study Report
Rate of additional education fee	3%	Feasibility Study Report
Annual O&M costs	RMB 19 million	Feasibility Study Report

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

In accordance with benchmark analysis (Option III), if the financial indicators (such as IRR) of a project are lower than the benchmark, it is not considered to be financially attractive.

Table B-2 shows the total investment IRR of the Project with and without the CDM revenues. Without the CDM revenues, the IRR of total investment is 6.81%, which is lower than the financial benchmark

[9]In the FSR which was completed in Oct 2007, the tariff is 0.52 RMB/KWh (excluding VAT). In July 2008, the tariff approval of the Project was issued by the Heilongjiang Development and Reform Commission (Fagaijiage [2008] NO.1876). The actual tariff is 0.56 RMB/KWh (excluding VAT). The higher tariff was adopted that it is conservative.

8%. Thus the Project is not financially attractive. While taking into account the CDM revenues (calculated with 8 Euro/t CO2e, 7×3 years crediting period), the total investment IRR of the Project will be 9.95%, which is higher than the financial benchmark 8%.

Table B-3 Total Investment IRR of the Project

	Total Investment IRR
Without CDM revenues	6.81%
With CDM revenues	9.95%

Sub-step 2d. Sensitivity analysis

The sensitivity analysis shall show whether the conclusion regarding the financial attractiveness is robust to reasonable variations in the critical assumptions.

According to *Economical Assessment and Parameters for Construction Project*[10], the fluctuation of sensitivity analysis in construction projects could be in ±10% which is same as FSR. Besides the Project, similar wind power projects in China always adopt ±10% as the fluctuation of sensitivity analysis, which is the common practice in China. So, the sensitivity analysis conducted by altering from -10% to +10% respectively is commonly acknowledged and used in China.

For the Project, four parameters were selected as sensitive factors to assess the financial attractiveness:

1) Total investment
2) Annual O&M cost
3) Annual electricity output
4) Feed-in-Tariff

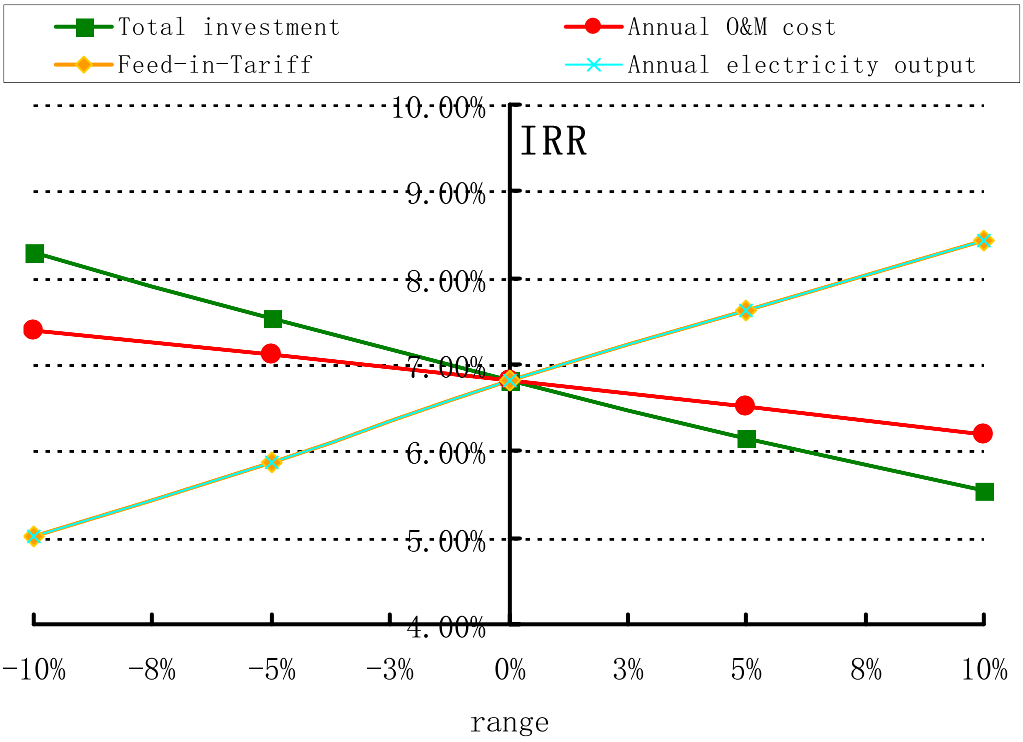
The results of sensitivity analysis (without CDM revenues) are shown in Table B-4 and Figure B-2 below.

TableB-4. Sensitivity of total investment IRR to different financial parameters

	-10%	-5%	0%	+5%	+10%
Total investment	8.30%	7.52%	6.81%	6.15%	5.54%
Annual O&M cost	7.40%	7.11%	6.81%	6.51%	6.19%
Annual electricity output	5.02%	5.88%	6.81%	7.63%	8.42%
Feed-in-Tariff	5.02%	5.88%	6.81%	7.63%	8.42%

Figure B-2. Sensitivity of total investment IRR to different financial parameters

[10] *Economical Assessment and Parameters for Construction Project* issued by National Planning Committee and Ministry of Construction and Published by China Planning Press.



It could be found that the total investment IRR of the Project will reach the benchmark IRR when the total investment decreases 9.19 percent. In 2006, approval of *Renewable Energy Law of the People's Republic of China* by Chinese government boosted the development of wind power in China and the total installed capacity of wind farm increased sharply since then[11]. The increase of wind farm construction caused the shortage of wind turbine and price increase occurred when wind turbine can't meet the need of the market[12]. The prices of construction materials are continuously increasing[13] in these years. So it is unlikely that the total investment of the Project decreases over 9.19 percent.

When the annual O&M cost varies from negative 10 percent to positive 10 percent, the total investment IRR of the Project is lower than the benchmark IRR also. Since the wind turbines operate in the hill of the Bielayinshan, and the operating maintenance is very difficult, such reduction of O&M cost is lack of possibility for the Project. Therefore, it is unlikely that the O&M cost of the Project decreases over 10 percent.

It could be found that the total investment IRR of the Project will reach the benchmark IRR when the annual electricity output increase 7.3 percent. According to the FSR of the Project, the annual output is estimated basing on the ten years 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. Further more, the annual electricity output value is positive correlation with the wind speed, the annual average wind speed of the project site tends to be stable over the past 10 years for which data are available recently as shown in figure B-3. The average wind speed is 3.65m/s which is adopted in the

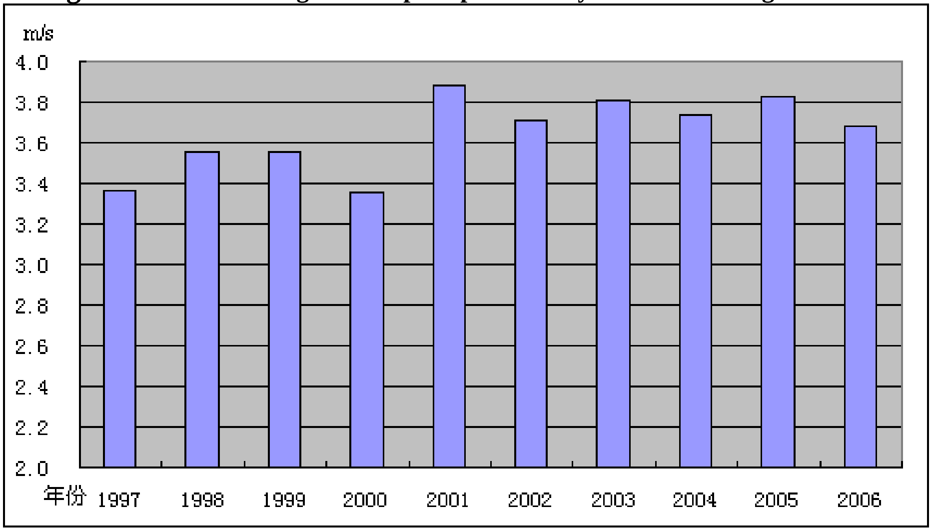
[11] http://www.sdpc.gov.cn/zjgx/t20070105_109006.htm

[12] http://www.cs.com.cn/jrbznew/html/2008-07/17/content_16499157.htm

[13] http://energy.people.com.cn/GB/5720709.html

FSR and the data was provided by local meteorological station (Fujin meteorological station). According to the statistic of the average wind speed was recorded by Fujin meteorological station for latest ten years, the average wind speed is 3.68m/s, higher than the 3.65m/s (only higher 0.8%). In addition, if machine run long time, and the malfunction rate of the machine will tend to increase. The generate electricity efficiency of wind turbines will tend to decrease year after year. Therefore, the probability that annual electricity output is 7.3% higher than the estimated value is very small.

Figure B-3 The Average Wind speed provided by local meteorological station



It could be found that the total investment IRR of the Project will reach the benchmark IRR when the feed-in-tariff increases 7.3 percent. There is no mature electric power market in China, and the tariffs of power plants are decided by the government. Furthermore, once the tariff is decided, it won't be changed in a fairly long time. The tariff was issued by the Heilongjiang Development and Reform Commission[14], it will be strictly regulated by the government, neither the Project owner nor the grid company can change it. Hence, it is very unlikely that the tariff of the Project increases over 7.3 percent for a long time.

To sum up, it can be concluded that without CDM revenues, the Project is not financially attractive.

Outcome of Step2:

In conclusion, the realistic and credible alternatives to the Project activity are selected and ***Alternative 2*** is excluded. The realistic and credible baseline scenario is ***Alternative 4*** Equivalent electricity service provided by the Northeast China Power Grid.

Step 4. Common practice analysis

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

The wind power projects involved in the common practice analysis are sourced from *Chinese Wind Energy Association* statistics[15]. The installation capacity of the Project is 48MW. The analysis scope 12MW-72MW was chosen because the analysis scope covered the Project capacity. According to the guidelines from EB the additionality tool version 5, "Projects are considered similar if they are in the

[14] The tariff approval of the Project was issued by the Heilongjiang Development and Reform Commission (Fagaijiage [2008] NO.1876).

[15] *Chinese Wind Energy Association* statistics 2004-2007

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. Other CDM project activities are not to be included in this analysis.", we chose the hydropower plants with the installed capacity from 12MW to 72MW of the Project as the similar projects in Heilongjiang province. There are nine wind power projects with similar installed capacity (12MW-72MW) as the Project in Heilongjiang province. But among them, seven projects have been developed as CDM project or are being developed as CDM project (Daqingshan[16], Shiwenzi[17], Wuerguli[18], Shimaodingzi[19], Erduoyan[20], Xiaochengshan[21], Fuyu[22]). According to *Tool for the demonstration and assessment of additionality*, the seven projects shall not be included in common practice analysis. Table B-5 shows the other two similar project activities comparing with the Project activity:

Table B-5 Activities similar to the Project in Heilongjiang province (12MW-72MW)

Name	Installed Capacity (MW)	Year	Tariff (RMB/kWh)	Unit Investment (RMB/kW)
Fujin Phase I[23]	24.3	2004	0.70	8493
Mulan Menggushan[24]	12	2004	0.77	11210
The propose project	48	2007	0.56	9473

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

From Table B-5, we can see that the tariff of the Mulan Menggushan Wind Farm is much higher than that of the Project (over 37.5%). However the unit investment (RMB/KW) of the Mulan Menggushan Wind Farm is a little higher than the Project (only 18%). Therefore, the Mulan Menggushan Wind Farm is much more economically attractive than the Project.

From Table B-5, we can see that Fujin Phase I Wind Farm enjoys higher tariff than the Project (over 25%). But the unit investment (RMB/KW) of the Fujin Phase I Wind Farm is a little lower than the Project (only 11%). Therefore, the Fujin Phase I Wind Farm is much more economically attractive than the Project.

[16] http://cdm.unfccc.int/Projects/DB/DNV-CUK1167140122.7/view

[17] http://cdm.unfccc.int/Projects/DB/BVQI1207772996.31/view

[18] http://cdm.unfccc.int/Projects/DB/BVQI1182384587.37/view

[19] http://cdm.unfccc.int/Projects/DB/DNV-CUK1180509799.76/view

[20] http://cdm.unfccc.int/Projects/DB/DNV-CUK1172484180.34/view

[21] http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File1347.pdf

[22] http://www.cdmasia.org/fuyu.html

[23] http://fujin.mofcom.gov.cn/aarticle/dongtai/200508/20050800238518.html

[24] http://www.chinapower.com.cn/newsarticle/1005/new1005504.asp
http://www.newenergy.org.cn/html/00412/20041605.html

Moreover, both of Mulan Menggushan Wind Farm and Fujin Phase I Wind Farm are funded by international low interest loan or national soft loan.

The other seven wind power projects in Heilongjiang province have been developed as CDM projects or are being developed as CDM projects to alleviate the financial disadvantages.

According to the common practice analysis, we conclude that there are essential distinctions between the Project and existing similar projects.

Outcome of Step 4:

To summarize, it can be proved that the Project activity is additional and not (part of) baseline scenario. Without the CDM revenues, the Project activity would not be implemented. The above additionality analysis provides sufficient evidence that the CDM revenues can alleviate the financial disadvantages of the Project.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

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Emission reductions from the Project can be calculated based on "Tool to calculate the emission factor for an electricity system" (version 01.1). It has an option to estimate the Operating Margin (OM) and the Build Margin (BM) emission factor ex-ante, and through weighted average of OM and BM, the Combined Margin baseline emission factor of the Northeast China Power Grid can be obtained and then the emission reductions from the CDM project activity can be estimated.

The details are shown following steps:

STEP 1. Identify the relevant electric power system

According to the definition of the Northeast China Power Grid by National Development and Reform Commission of China (hereafter referred to as NDRC), it covers three provinces (Liaoning, Jilin, Heilongjiang), and its geographic and system boundaries can be clearly identified. The power to be generated from the Project will be delivered to the Northeast China Power Grid.

The methodology provides two options to settle the emission factors based on ex ante or ex post calculation. The PDD selects the ex ante calculation method with fixed emission factors (for OM and BM) for 7-years crediting period.

STEP 2. 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
(c) Dispatch data analysis OM, or
(d) Average OM.

The Simple OM method (a) was chose on the Project.

The Simple OM method (a) is applicable if low-cost/must run resources constitute less than 50% of the total amount of power generation in the grid of the five most recent years. According to the data from *China Electric Power Yearbook (2003-2007)* cost/must run resources constitute only 5.44% (2002), 4.72% (2003), 6.24% (2004), 8.28% (2005) and 5.64%(2006)among total electric power generation of the Northeast China Power Grid in 2002-2006. Therefore, it is reasonable to select the method (a) to calculate the OM emission factor.

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

According to *Tool to Calculate the Emission Factor for an Electricity System,* there are three options for the calculating the Simple OM.

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

Option A should be preferred and must be used if fuel consumption data is available for each power plant/unit. As the fuel consumption data for each power plant/unit is not available in China, neither Option A nor Option B is reasonable. At the same time, the nuclear and renewable power generations are considered as low-cost/must-run power sources and the quantity of electricity supplied to the grid by these sources is known in China, so the project uses Option C for calculating the simple OM emission factor, as follows:

$$EF_{grid,OMsimple,y} = \frac{\sum_{i,j} FC_{i,y} \times NCV_{i,y} \times EF_{CO2,i,y}}{EG_y} \quad (1)$$

where:

$EF_{grid,OMsimple,y}$ = Simple operating margin CO_2 emission factor in year *y* (tCO_2/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)

$EF_{CO2,i,y}$ = CO_2 emission factor of fossil fuel type *i* in year *y* (tCO_2/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 = Either 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) or the applicable year during monitoring (ex post option), following the guidance on data vintage in step 2.

Following above, the Operating Margin emission factor (EF_{OM}) of the Northeast China Power Grid is calculated ex ante as 1.2561 tCO_2e/MWh[25]. The details calculation and data were listed in the annex 3.

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

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[25] http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File1875.pdf

According to *Tool to calculate the emission factor for an electricity system*, the sample group of power units *m* used to calculate the build margin consists of either:

(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

Due to data availability, the latest clarification from CDM EB is applied. And option (b) is used to calculate build margin.

In terms of vintage of data, there are also two options:

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, expost, 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.

And option 1 is used for the proposed project.

STEP 5. Calculate the build margin emission factor

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

$$EF_{grid,BM,y} = \frac{\sum_m EG_{m,y} \times EF_{EL,m,y}}{\sum_m EG_{m,y}} \qquad (2)$$

where:

$EF_{grid,BM,y}$ = Build margin CO_2 emission factor in year *y* (tCO_2/MWh)

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

$EF_{EL,m,y}$ = CO_2 emission factor of power unit *m* in year *y* (tCO_2/MWh)

m = Power units included in the build margin

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

Sub-step 1: Calculate the proportion of CO_2 emissions related to consumption of coal, oil and gas fuel used for power generation as compared to total CO_2 emissions from the total fossil fuelled electricity generation (sum of CO_2 emissions from coal, oil and gas).

$$\lambda_{Coal} = \frac{\sum_{i \in COAL, j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO2,i,y}}{\sum_{i,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO2,i,y}} \quad (3)$$

$$\lambda_{Oil} = \frac{\sum_{i \in OIL, j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO2,i,y}}{\sum_{i,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO2,i,y}} \quad (4)$$

$$\lambda_{Gas} = \frac{\sum_{i \in OIL, j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO2,i,y}}{\sum_{i,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO2,i,y}} \quad (5)$$

Where:

$F_{i,j,y}$ = The amount of fuel *i* (in a mass or volume unit) consumed by relevant power sources *j* in year(s) *y*;

$NCV_{i,y}$ = The net caloric value of fossil fuel *i* (GJ/mass or volume unit);

$EF_{CO2,i,y}$ = The CO_2 emission factor of fossil fuel *i* in year *y*;

Sub-step 2: Calculate the emission factor of fuel-based generation:

$$EF_{Thermal} = \lambda_{Coal} \times EF_{Coal,Adv} + \lambda_{Oil} \times EF_{Oil,Adv} + \lambda_{Gas} \times EF_{Gas,Adv} \quad (6)$$

Where:

$EF_{Coal,Adv}$, $EF_{Oil,Adv}$, $EF_{Gas,Adv}$ are the emission factors for coal-fired, oil-fired and gas-fired generation technology according to commercially available best practice technology in terms of efficiency. (See details in Annex 3 Table A10)

To be conservative, the best commercially available technology for coal fired power generation is identified as domestically produced 600MW sub-critical power unit. The coal consumption per kWh electricity supplied to grid by domestically produced 600MW sub-critical power unit is estimated as 329.94 gce/kWh, equivalent to 37.28% as power supply efficiency[26]. For gas and oil power plants a 200MW combined cycle power plant with a specific fuel consumption of 252 gce/kWh, which

[26] http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File1875.pdf

corresponds to an efficiency of 48.81% for electricity generation, is selected as commercially available best practice technology in terms of efficiency[27].

Sub-step 3: Calculate the building Margin emission factor

$$EF_{grid,BM,y} = \frac{CAP_{Thermal}}{CAP_{Total}} \times EF_{Thermal} \qquad (7)$$

Where:

CAP_{Total} = The total capacity addition

$CAP_{Thermal}$ = The total thermal (coal, oil and gas) power capacity addition.

Following these steps above, the Build Margin emission factor ($EF_{grid,BM,y}$) of the Northeast China Power Grid is calculated ex ante as 0.7946 tCO_2e/MWh[28]. The details calculation and data were listed in the annex 3.

STEP 6. Calculate the combined margin emissions factor

The combined margin emissions factor is calculated as follows:

$$EF_{grid,CM,y} = EF_{grid,OM,y} \times w_{OM} \times + EF_{grid,BM,y} \times w_{BM} \qquad (8)$$

Where:

$EF_{grid,BM,y}$ = Build margin CO_2 emission factor in year y (tCO_2/MWh)

$EF_{grid,OM,y}$ = Operating margin CO_2 emission factor in year y (tCO_2/MWh)

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

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

According to the "Tool to calculate the emission factor for an electricity system" (version 01.1), wind power generation project activities: w_{OM} = 0.75 and w_{BM} = 0.25 for the first crediting period and for subsequent crediting periods.

The $EF_{grid,OM,y}$ and $EF_{grid,BM,y}$ are calculated as described in Step 3 and 5. The baseline emission factor $EF_{grid,CM,y}$ for the Project is 1.1407tCO2e/MWh.

Calculate the baseline emissions (BE_y)

Baseline emissions are calculated with the combined baseline emission factor and the electricity delivered to the grid by the Project as follows:

[27] http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File1875.pdf

[28] http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File1875.pdf

$$BE_y = EG_y \times EF_y \quad (9)$$

$$EG_y = EG_{out} - EG_{in}$$

Where:
BE_y = Baseline emissions in year y (tCO2/yr)
EG_y = Net electricity supplied by the project activity to the grid (MWh)
EG_{out} = Electricity exported by the project activity to the grid (MWh)
EG_{in} = Electricity inported by the project activity to the grid (MWh)
$EF_{,y} = EF_{grid,CM,y}$, 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".

1. Project emissions (PE_y)

As described before, the emissions of the proposed project activity is zero, PE_y=0

2. Leakage (L_y)

According to the ACM0002 methodology, the leakage in the construction period of the proposed project is neglected. So the GHG emission within the project boundary is zero, i.e. L_y =0.

3. Emission reductions (ER_y)

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

$$ER_y = BE_y - PE_y - LE_y \quad (10)$$

Where:
ER_y = Emission reductions in year *y* (t CO_2e/yr)
BE_y = Baseline emissions in year *y* (t CO_2e/yr)
PE_y = Project emissions in year *y* (t CO_2/yr)
LE_y = Leakage emissions in year *y* (t CO_2/yr)

Since PE_y and L_y are zero as described before, ER_y can be calculated as follows:

$$ER_y = BE_y = EG_y \times EF_y \quad (11)$$

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

>>

Data / Parameter:	**$FC_{i,m,y}$**
Data unit:	tonnes or m^3
Description:	Amount of fossil fuel *i* consumed by power plant / unit *m* in year *y*
Source of data used:	China Energy Statistical Yearbook
Value applied:	See Annex 3 for details
Justification of the choice of data or description of measurement methods and procedures actually	Official statistical data

applied :	
Any comment:	-

Data / Parameter:	**$NCV_{i,y}$**
Data unit:	kJ/kg, or kJ/m^3
Description:	Net calorific value of fossil fuel type *i* in year *y*
Source of data used:	China Energy Statistical Yearbook
Value applied:	See Annex 3 for details
Justification of the choice of data or description of measurement methods and procedures actually applied :	According to the latest version of ACM0002, the Project uses the national values
Any comment:	-

Data / Parameter:	**$EF_{CO2, i,y}$**
Data unit:	tC/TJ
Description:	CO_2 emission factor of fossil fuel type *i* in year *y*
Source of data used:	2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value applied:	See Annex 3 for details
Justification of the choice of data or description of measurement methods and procedures actually applied :	According to the latest version of ACM0002, the Project uses the IPCC default values.
Any comment:	-

Data / Parameter:	**Carbon Oxidation Factor**
Data unit:	%
Description:	Carbon Oxidation Factor of fossil fuel type *I* consumed by the power plants in the grid
Source of data used:	2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value applied:	See Annex 3 for details
Justification of the choice of data or description of measurement methods and procedures actually applied :	IPCC default value
Any comment:	-

Data / Parameter:	**CAP_y**
Data unit:	MW
Description:	The Installed Capacity of the power plants in the grid in the year y
Source of data used:	China Electric Power Yearbook
Value applied:	See Annex 3 for details
Justification of the choice of data or	Official statistical data

description of measurement methods and procedures actually applied :	
Any comment:	-

Data / Parameter:	$\mathbf{F_{i,j,y}}$
Data unit:	mass or volume unit of the fuel i
Description:	The total amount of fuel *i* (in a mass or volume unit) consumed by all the relevant power sources *j* in year(s) *y*
Source of data used:	China Energy Statistical Yearbook
Value applied:	See Annex 3 for details
Justification of the choice of data or description of measurement methods and procedures actually applied :	This kind of data accords with the latest version of ACM0002
Any comment:	-

Data / Parameter:	$\mathbf{GEN_{j,y}}$
Data unit:	MWh
Description:	the electricity (MWh) delivered to the grid by source j
Source of data used:	China Electric Power Yearbook
Value applied:	See Annex 3 for details
Justification of the choice of data or description of measurement methods and procedures actually applied :	Official statistical data
Any comment:	-

Data / Parameter:	**Electricity self-consumption ratio**
Data unit:	%
Description:	The ratio of electricity self-consumption to the total electricity generation of the power plants
Source of data used:	China Electric Power Yearbook
Value applied:	See Annex 3 for details
Justification of the choice of data or description of measurement methods and procedures actually applied :	Official statistical data
Any comment:	-

B.6.3 Ex-ante calculation of emission reductions:

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1. Estimated anthropogenic emissions by source of greenhouse gas of the baseline:

According to the Feasibility Study Report of the Project, the annual power generation is estimated to be 111044MWh. According to the *Notification on Determining Baseline Emission Factor of China's Grid*[29], the baseline emission factor for the Project is 1.1407tCO2e/MWh and the annual baseline emission of the Project is 126667 tCO_2e.

2. Estimated project activity emissions:

The Project is a wind power project that the project emissions should not be considered as per ACM0002, i.e. $PE_y = 0$ tCO_2e.

3. Estimated project leakage emissions:

As above ACM0002, the leakage of the Project is not considered, i.e. $L_y = 0$ tCO_2e.

4. Estimated emission reductions

As the formula (6) and (7), the annual emission reductions of the Project are 126667 tCO_2e.

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

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It is expected that the Project activities will generate emission reductions for about 126667 tCO_2e annually over the first 7-year period from 2009 to 2016.

Year	Estimation of baseline emission reductions (tCO_2e)	Estimation of emission reductions generated by the Project Activity(tCO_2e)	Estimation of leakage (tCO_2e)	Estimation of emission reduction (tCO_2e)
2009.08-2009.12	0	52778	0	52778
2010.01-2010.12	0	126667	0	126667
2011.01-2011.12	0	126667	0	126667
2012.01-2012.12	0	126667	0	126667
2013.01-2013.12	0	126667	0	126667
2014.01-2014.12	0	126667	0	126667
2015.01-2015.12	0	126667	0	126667
2016.01-2016.07	0	73889	0	73889
Total (tCO_2e)	0	886669	0	886669

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

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B.7.1 Data and parameters monitored:

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Data / Parameter:	$EG_{out,y}$
Data unit:	MWh
Description:	Electricity delivered to grid in year *y*

[29]http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File1875.pdf

Source of data to be used:	Electricity meter: A, B, C, D, E, F, G, H, I, J, K L, M, N, O
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Estimation of annual electricity generation delivered to grid: 111044 MWh
Description of measurement methods and procedures to be applied:	The readings of the 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. The accuracy of electricity meter is less than 0.5s. The national Calibration standard (DL/T 448-2000) will be applied in the project. The calibration frequency is one time/year.
QA/QC procedures to be applied:	Data measured by meters will be cross checked by electricity sales receipt.
Any comment:	

Data / Parameter:	$EG_{in,y}$
Data unit:	MWh
Description:	Electricity imported from grid in year *y*
Source of data to be used:	Electricity meter: R
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Estimation of annual electricity generation imported from grid: 0MWh
Description of measurement methods and procedures to be applied:	The readings of the 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. The accuracy of electricity meter is less than 0.5s. The national Calibration standard (DL/T 448-2000) will be applied in the project. The calibration frequency is one time/year.
QA/QC procedures to be applied:	Data measured by meters will be cross checked by electricity purchase receipt.
Any comment:	

Data / Parameter:	EG_y
Data unit:	MWh
Description:	Estimation net electricity supplied to the Grid by the project activity in year y.
Source of data to be used:	Calculated from $EG_{out,y}$ and $EG_{in,y}$
Value of data applied for the purpose of calculating expected emission reductions in section B.5	In this PDD, the estimation net electricity delivered to the Grid 111044MWh is applied.
Description of measurement methods and procedures to be applied:	The estimation net electricity supplied to the Grid by the Project will be calculated through electricity supplied by the Project to the grid ($EG_{out,y}$) minus electricity purchased from the Grid ($EG_{in,y}$) at the Project site.
QA/QC procedures to	Estimation net electricity supplied to the Grid by the project activity is calculated

be applied:	from $EG_{out,y}$ and $EG_{in,y}$.
Any comment:	-

B.7.2 Description of the monitoring plan:

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Baseline emission factor of the Project is determined ex ante. Therefore the electricity delivered by the Project to the Northeast China Power Grid is defined as a key data to be monitored. The monitoring plan is drafted to focus on monitoring the electricity delivered by the Project to the Northeast China Power Grid.

1. Introduction

The Heilongjiang Fujin 48MW Wind Power Project adopts the approved consolidated monitoring methodology ACM0002 (version 07) "Consolidated monitoring methodology for zero-emissions grid-connected electricity generation from renewable sources" to determine and monitor the emission reductions from the net electricity generation from the Project.

2. Meters and Calibration

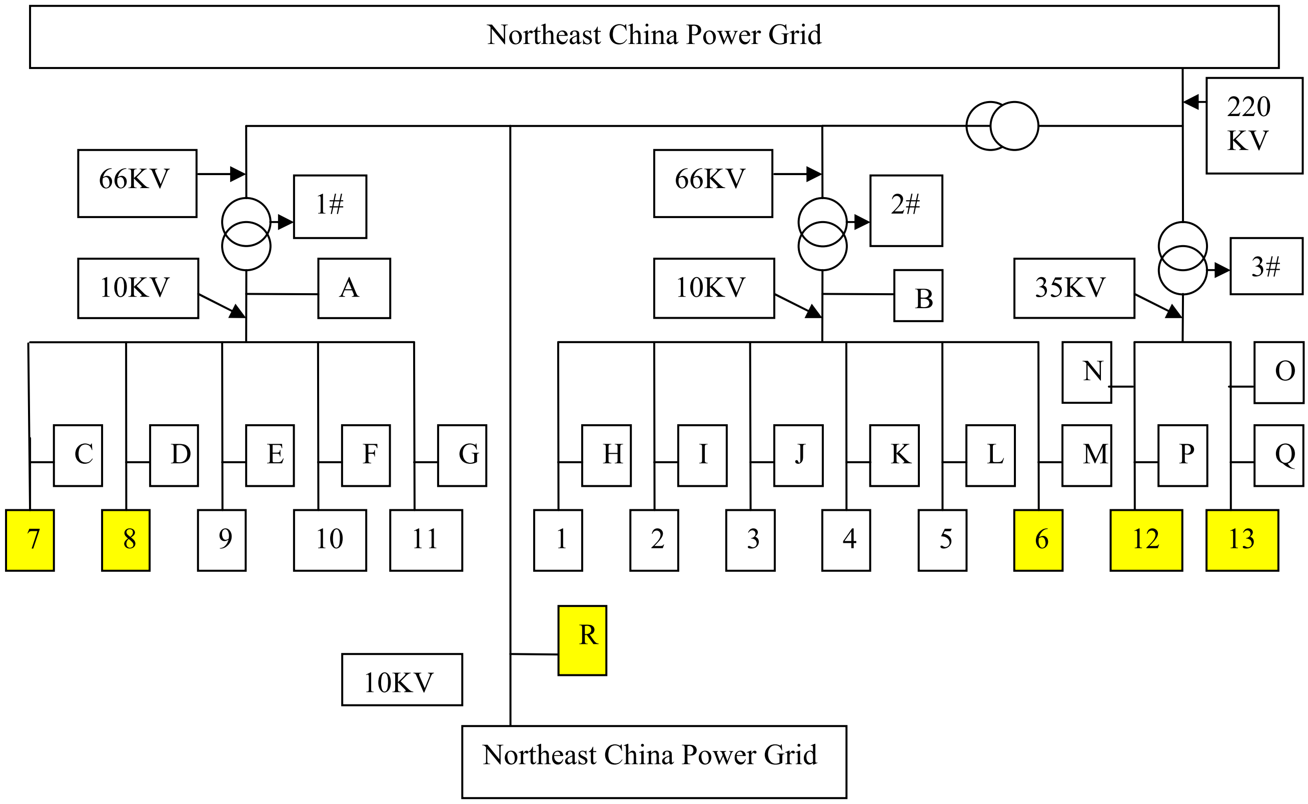
The meters will be installed in accordance with *Technical administrative code of electric energy metering (DL/T448 －2000)*, also the accuracy of the meters shall accord with the national standard. The net electricity delivered to the Northeast China Power Grid by the Project will be monitored through the metering equipments.

There are totally 18 meters involved, which are Meter A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q and R. Meter A, which is owned by the power company and is sited at 10kV low voltage side of the 10kV-to-66kV substation 1#, will monitor the electricity exported to the grid. Meter B, which is owned by the power company and is sited at 10kV low voltage side of the 10kV-to-66kV substation 2#, will monitor the electricity exported to the grid. Meter R which is owned by the power company and is sited at the incoming line of external power supply, monitoring the electricity imported from grid through the backup line. At the site of the Project, totally 32 turbines with a unit capacity of 1500 kW are installed, providing a total installed capacity of 48MW. There are 5 separate meters (Meter C, D, M, N, O) monitoring the electricity from the Project. Meter C, Meter D, and Meter M, each meter monitors and measures four turbines of the Project. Meter C, Meter D, and Meter M, which are owned by the Project owner, are sited at 10kV low voltage side of the substation. Meter N and Meter O, each of them monitoring and measuring ten turbines' the electricity supplied from the Project. Meter N and Meter O, which are owned by the power company, are sited at 35kV low voltage side of the 35kV-to-220kV substation 3#. Meter P and Meter Q, which are owned by the Project owner, are the assistant meter for the Meter N and Meter O. Meter E, F, G, H, I, J, K, L, which are owned by the Project company, are all sited at 10kV low voltage side of the substation and monitoring the electricity from other project.

The net electricity exported to the grid by the Project should be record by the Project owner and will be checked by the power company. The net electricity should be cross-checked by the Electricity Receipts of the Project. The metering diagram is presented as follows, giving an overview of these meters.

Metering diagram[30]

[30]According to the PPA of the Heilongjiang Fujin Phase I Wind Farm, the Phase I wind farm is owned by the same project owner with the proposed project and the turbines of number are 1, 2, 3, 4 and 5. (Showed on the *Metering diagram*)



The net electricity is calculated as export electricity minus import electricity. All the Meters are used to calculate the share of the net electricity supplied to the grid by the Project. The net electricity from the Project ($EG._y$) can be calculated as following:

$EG._y = A \times (C+D)/(C+D+E+F+G) + B \times M/(H+I+J+K+L+M) + N + O - R$[31]

Where:
$EG._y$ is the calculated net electricity from the wind farm (the Project);
A, B, C, D, E, F, G, H, I, J, K, L, M, N, O are the net electricity supplied to the grid measured by the Meter A, B, C, D, E, F, G, H, I, J, K, L, M, N, O;
R is the electricity imported from the grid measured by the Meter R;

The calibration of meters shall comply with national standards and regulations to ensure the accuracy.

- The metering equipments will be properly calibrated and checked annually for accuracy.
- The accuracy degree of the metering equipments is less than 0.5s.

According to the PPA of the Heilongjiang Fujin Phase II Wind Farm, the Phase II wind farm is owned by the same project owner with the proposed project and the turbines of number are 9, 10 and 11. (Showed on the *Metering diagram*)

The proposed project is the Heilongjiang Fujin Phase III Wind Farm and the turbines of number are 6, 7, 8, 12 and 13. (Showed on the *Metering diagram*)

[31] Refer to the Saihanba project: http://cdm.unfccc.int/Projects/DB/DNV-CUK1173680185.45

- When the following situations occurred, all the meters should be tested in 10 days:

  (a) The detection of a difference larger than the allowable error in the reading of both meters;
  (b) The meters have any malfunctions and are repaired or replaced;
  (c) If any errors are detected, the party who owns the meter shall be responsible for the repair, recalibration or replacement of the meter and shall give the other party (Project owner or power company) sufficient notice to allow a representative to attend any corrective activity.

- If the previous reading of the meter is beyond the allowable error or the meter operate improperly, the electricity generated by the Project shall be determined by:

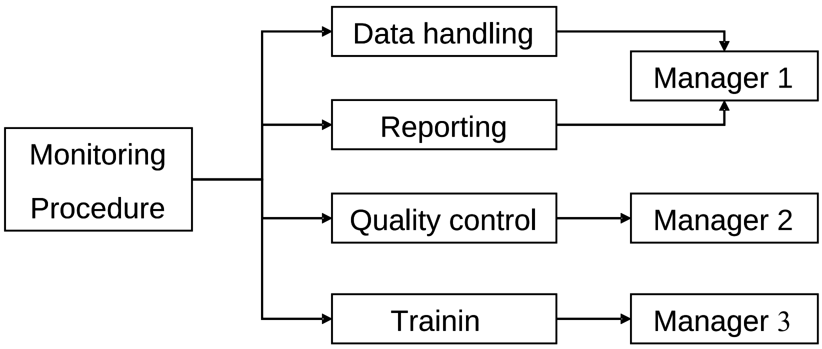
  If the Project owner and the local grid company fail to agree the estimate of the correct reading, then the matter will be referred for arbitration according to the agreed procedures.

Calibration is carried out by an independent body with the records being provided to the Project owner, and these records will be maintained by the Project owner.

All the records should be documented and maintained by the Project owner for DOE's verification.

3. Quality control

Monthly net generation data (monitored by the Meter A, B, C, D, E, F, G, H, I, J, K, L, M, N, O and R) should be record by the personnel and approved and signed off by the Project Manager before it is accepted and stored. The internal audit will be carried out to check if this monitoring plan has been executed. The audit will also identify potential improvements on procedures to improve monitoring and reporting in future years. If such improvements are proposed, these improvements should be reported to the DOE and could be operated after approval from the DOE.



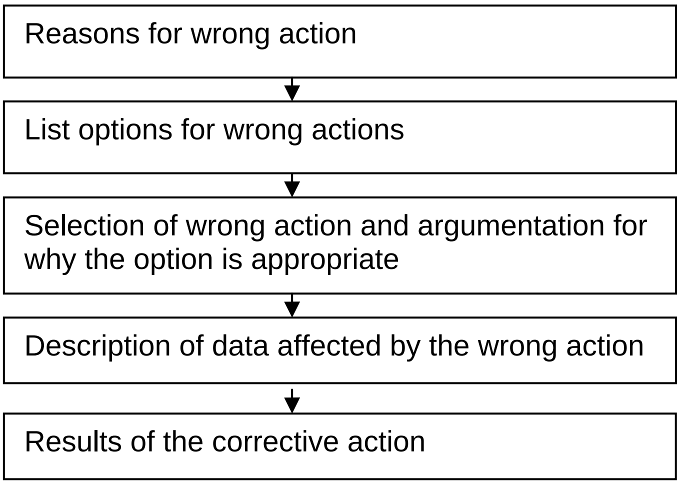
4. Data Management System

Specific staff will be appointed by the Project owner to take the overall responsibility for monitoring of greenhouse gas emission reductions and keeping all the data and information for emission reductions verification. The first crediting period starts from 0:00 AM of the registration date. The net electricity (monitored by the Meter A, B, C, D, E, F, G, H, I, J, K, L, M, N, O and R) supplied and delivered to the grid by the Project will be hourly measured and recorded by the project owner. And the project owner will prepare the monitoring reports of the Project activity, which records the daily operation of the Project, including operating periods, power generation, power delivered to the grid, equipment defects, etc.

Finally, the monitoring reports will be reviewed by the General Manager. And all the data including calibration records should be kept for 2 years after the whole crediting period of the Project.

5. Corrective actions

Specific staff will log all wrong actions and will report the monitoring report. In case corrective actions are considered necessary, these actions will be implemented according to the procedures outlined below.



6. Training

The Project owner and Beijing RuiChi Electric Power Information Technology Co., Ltd. together will train all the relative staffs before the operation of the generators. The training will include the following:

- CDM knowledge
- Contents of PDD and monitoring plan (including monitoring procedures)
- Practical requirements for monitoring (including metering, calibration)
- Audit procedures / project performance review / corrective actions
- Worksheet (excel) containing monitoring data and calculations
- Monitoring report template
- Practical training exercise

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

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The baseline and monitoring study of the Project was completed on Jan 15, 2009 by Beijing Ruichi Electric Power Information Technology Co. Ltd. The key persons are following. The persons and Beijing Ruichi Electric Power Information Technology Co. Ltd are not the project participants listed in Annex 1.

1. *Mr. Gu Naiyan, naiyan.gu@richserc.com.cn* , Beijing Ruichi Electric Power Information Technology Co. Ltd., Floor7, Ruichi Grand Hotel, No.1 Xinhua South Street, Beijing, China, tel: (8610) 5876 8246
2. *Ms. Guo Hongyan , Hongyang.guo@richserc.com.cn* , Beijing Ruichi Electric Power Information Technology Co. Ltd., Floor7, Ruichi Grand Hotel, No.1 Xinhua South Street, Beijing, China, tel: (8610) 5876 8246
3. *Mr. Chen Yifei Yifei.chen@richserc.com.cn* , Beijing Ruichi Electric Power Information Technology Co. Ltd., Floor7, Ruichi Grand Hotel, No.1 Xinhua South Street, Beijing, China, tel: (8610) 5876 8246
4. *Ms. Yang Lusi , lucy.yang@richserc.com.cn* , Beijing Ruichi Electric Power Information Technology Co. Ltd., Floor7, Ruichi Grand Hotel, No.1 Xinhua South Street, Beijing, China, tel: (8610) 5876 8246

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:

>>

19/12/2007 (the date of signing the Construction Contract)[32]

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:

>>

01/08/2009 or the registration date, whichever is the latest

C.2.1.2. Length of the first crediting period:

>>

7 years

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

>>

Not applicable.

C.2.2.2. Length:

>>

Not applicable.

[32] The date of signing the Construction Contract was selected as the Starting Date of the Project since it was the earliest date at which the implementation of the Project began, according to definition in EB41 Meeting Report.

SECTION D. Environmental impacts

>>

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

>>

The Environmental Impact Assessment Report of the Project was approved by the Environment Protection Administration of Heilongjiang Province on 9 Aug 2007.

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

Construction Phase

Noise

The running noise of mechanical facilities and the traffic noise are the main source of noise in the construction process. The project owner will control and manage the noise pollution source during the construction by means of selecting low-noise construction machinery, arranging appropriate working time and vehicle route and strengthening the workers' protection equipments. Since the project site is about 2000m to the nearest residential area, the impact on local residents is insignificant.

Dust and exhaust gas

Due to the earthwork excavation and the running of construction vehicles dust, reentrainment of dust and tail gas are generated around. The Project owner will take measure, by means of dust wetting, adoption of advanced environment friendly equipments, strengthening the workers' protection devices and so on, to control and minimize the air pollution of dust and exhaust gas.

Waste water

Because the wastewater produced by the construction machines is very little, it is no need to treat this little wastewater. The construction workers will live in the city, which is about 2000 km from the Project site. The wastewater produced by the workers will be treated by the facilities in the city. Therefore, the impact of wastewater of the Project will be insignificant.

Solid waste

The most excavated earthwork during the construction period will be directly used, whose impact on the environment is insignificant. As to the municipal waste, the Project owner will arrange garbage cans classified by areas and types of garbage and dispose uniformly.

Operation Phase

Noise

The operating noise of wind power turbine generator system comes from the friction between wind and blades and the running mechanical parts inside it. The wind farm is located in the Bielayinshan, which is 2km away from the nearest local residents. The noise level at 2km from the tower foundation of the generator system is estimated to be 37dB, which is much lower than the relative standard. As a result, the operating noise from the wind power turbines produces little impact on the surrounding residents.

Sanitary wastewater

The sanitary wastewater from the staff of the wind farm will be discharged into waste water treatment facilities, which are located in the substation of the Project. Because the Project is highly automatic wind farm plant, there are only 20 operation and management staff. Therefore, the sanitary wastewater the wind farm will be very little, and it can be used to irrigate plants in the wind farm.

Impacts on wild animals

The operating noise of wind power turbine generator system will change the living range of wild animals. However, the Project only occupies very little part of the Bielayinshan. So the impact on wild animals is insignificant.

Consulting with the experts of birds in Heilongjiang province, we got to know that the migration route of birds lived in forest are not fixed. Therefore, construction of the Project will have little impact on the migration route of birds lived in the Bielayinshan.

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

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

>>

Impacts are not considered significant.

SECTION E. Stakeholders' comments

>>

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

>>

Investigate Form: Questionnaires.

On 5 Nov 2007, the Project owner conducted a survey among the local residents possibly affected by the Project. The survey was conducted through distributing questionnaires and collecting responses. During the process, the announcement on introducing the project and survey was broadcasted in the nearest village. Meanwhile, the announcement was published on the village billboard by the village commission. Totally 30 questionnaires were distributed to the villagers and returned. The investigation had taken full account into the public advice of different ages, civilizations and occupations. The brief summary of the survey was circulated to all of the local stakeholders. The opinions expressed by the stakeholders were recorded and are available on request.

E.2. Summary of the comments received:

>>

The survey was conducted through distributing questionnaires and collecting responses to the questionnaire. Totally 30 questionnaires returned with 100% response rate. The following is a summary of the key comments based on 30 returned questionnaires. Education level of the respondents: primary level (30%), middle level (30%), higher level (40%).

Questions and topics for discussion are as follows:

– Are they satisfied with their surrounding environment?
– Do they know the wind power?
– Will the project improve the local development or increase job opportunities?
– Will the project have negative impacts on their livelihood?
– What impacts on environment should be considered?
– Will they support the construction of the project?

Statistic of the comments:

– Most respondents (100%) are satisfied with their living conditions and surrounding environment.
– 24 (80%) persons of the respondents know well about wind power, and 6 (20%) persons know a little.
– 30(97%) persons of the respondents support the local constructed wind farm.
– The respondents consider construction and operation of the Project may improve living level (57%), increase employment opportunities (27%) and income (10%), mitigate air pollution (30%), and decrease local electricity price (6%).
– Among the negative impacts mentioned, the main issues concerned are garbage (50%).
– All of the 30 respondents support the construction of the Project.

This survey shows that people all agree the Project actively decrease environment pollution and mitigate local environmental quality. In addition, the construction of this Project will promote development of other industries, and partly address local employment pressure. All the stakeholders support the Project.

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

>>

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

Meanwhile the Project owner will actively take measures to control. (See Section D for details.)

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

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

Annex 3

BASELINE INFORMATION

The following tables summarize the numerical results from the equations listed in the ACM0002 Baseline methodology for grid-connected electricity generation from renewable sources. The information provided by the tables includes data, data resources and the underlying computation.

1. Calculation of EF_{OM}

Calculating the Operating Margin Emission Factor of Northwest China Power Grid in 2004									
Fuel	Unit	Liaoning	Jilin	Heilongjiang	Total	Emission Factor of the Fuel	Oxidation Factor	Calorific Value	Emission of CO_2（tCO_2e）
						（tc/TJ）	（%）	（MJ/t,km3）	H=D*E*F*G*44/12/10000 (for mass unit) H=D*E*F*G*44/12/1000 (for mass unit)
		A	B	C	D=A+B+C	E	F	G	
Raw coal	10^4t	4144.2	2310.9	3084.8	9539.9	25.8	100	20908	188689376.82
Cleaned coal	10^4t	84.75	1.09	4.88	90.72	25.8	100	26344	2260871.59
Other washed coal	10^4t	577.67	14.26	61	652.93	25.8	100	8363	5165589.10
Coke	10^4t				0	29.2	100	28435	0.00
Coke oven gas	10^8m^3	4.83	2.91		7.74	12.1	100	16726	574367.49
Other Coal Gas	10^8m^3	57.33	4.19		61.52	12.1	100	5227	1426676.89
Crude Oil	10^4t				0	20	100	41816	0.00
Gasline	10^4t				0	18.9	100	43070	0.00
Diesel	10^4t	2.04	1.16	0.24	3.44	20.2	100	42652	108672.75
Fuel oil	10^4t	12.81	1.78	2.86	17.45	21.1	100	41816	564536.21
Liquefied Petroleum	10^4t	2.19			2.19	17.2	100	50179	69305.23
Refinery gas	10^4t	9.79		1.14	10.93	15.7	100	46055	289779.75
Natural gas	10^8m^3		0.03	2.53	2.56	15.3	100	38931	559111.45
Other Petroleum Products	10^4t				0	20	100	38369	0.00
Other Coking Pruducts	10^4t				0	25.8	100	28435	0.00
Other Energy	10^4	26.97	5.07		32.04	0	100	0	0.00

	tce								
								Total	199708287.28

Data source: *China Energy statistical Yearbook 2005*

Fossil Fuel-fired Power Generation of Northeast China Power Grid in 2004				
Regions	Electricity Generation	Electricity Generation	Rate of Electricity Consumption	Electricity Supply of Grid
	10^8MWh	（MWh)	（%）	（MWh)
Liaoning	845.43	84543000	7.21	78,447,450
Jilin	332.42	33242000	7.68	30,689,014
Heilongjiang	534.82	53482000	7.84	49,289,011
Total				158,425,475

Data source: *China Electric Power Yearbook 2005*

Calculating the Operating Margin Emission Factor of Northwest China Power Grid in 2005									
Fuel	Unit	Liaoning	Jilin	Heilongjiang	Total	Emission Factor of the Fuel	Oxidation Factor	Calorific Value	Emission of CO_2 （tCO_2e）
						（tc/TJ）	（%）	（MJ/t,km3）	H=D*E*F*G*44/12/10000 (for mass unit) H=D*E*F*G*44/12/1000 (for mass unit)
		A	B	C	D=A+B+C	E	F	G	
Raw coal	10^4t	4305.41	2446.13	3383.21	10134.75	25.8	100	20908	200454895.94
Cleaned coal	10^4t				0	25.8	100	26344	0.00
Other washed coal	10^4t	524.74	19.26	24.16	568.16	25.8	100	8363	4494939.89
Coke	10^4t				0	29.2	100	28435	0.00
Coke oven gas	10^8m^3	1.03	3.57	0.68	5.28	12.1	100	16726	391816.59
Other Coal Gas	10^8m^3	12.62	8.37		20.99	12.1	100	5227	486767.69
Crude Oil	10^4t	1.16			1.16	20	100	41816	35571.48

Gasline	10^4t				0	18.9	100	43070	0.00
Diesel	10^4t	1.18	1.48	0.57	3.23	20.2	100	42652	102038.65
Fuel oil	10^4t	9.32	2.46	1.55	13.33	21.1	100	41816	431247.43
Liquefied Petroleum	10^4t	0.12			0.12	17.2	100	50179	3797.55
Refinery gas	10^4t	5.48		1.32	6.8	15.7	100	46055	180283.83
Natural gas	10^8m^3		0.84	2.24	3.08	15.3	100	38931	672680.96
Other Petroleum Products	10^4t				0	20	100	38369	0.00
Other Coking Pruducts	10^4t				0	25.8	100	28435	0.00
Other Energy	10^4 tce	16.18			16.18	0	100	0	0.00
								Total	207254040.00

Data source: *China Energy statistical Yearbook 2006*

Fossil Fuel-fired Power Generation of Northeast China Power Grid in 2005				
Regions	Electricity Generation	Electricity Generation	Rate of Electricity Consumption	Electricity Supply of Grid
	10^8MWh	（MWh)	（%）	（MWh)
Liaoning	836.97	83697000	7.03	77,813,101
Jilin	352.94	35294000	6.59	32,968,125
Heilongjiang	580	58000000	7.96	53,383,200
Total				164,164,426

Data source: *China Electric Power Yearbook 2006*

Calculating the Operating Margin Emission Factor of Northwest China Power Grid in 2006									
Fuel	Unit	Liaoning	Jilin	Heilongjiang	Total	Emission Factor of the Fuel	Oxidation Factor	Calorific Value	Emission of CO_2 （tCO_2e）
						（tc/TJ）	（%）	（MJ/t,km3）	H=D*E*F*G*44/12/10000

		A	B	C	D=A+B+C	E	F	G	(for mass unit) H=D*E*F*G*44/12/1000 (for mass unit)
Raw coal	10^4t	4681.99	2738.24	3698.29	11118.52	25.8	100	20908	219912851.29
Cleaned coal	10^4t	0.03			0.03	25.8	100	26344	747.64
Other washed coal	10^4t	674.74	17.83	96	788.57	25.8	100	8363	6238691.12
Coke	10^4t	3.32			3.32	29.2	100	28435	101075.43
Coke oven gas	10^8m^3	2.68	0.16	1.44	4.28	12.1	100	16726	317608.90
Other Coal Gas	10^8m^3	55.26	1.43		56.69	12.1	100	5227	1314666.99
Crude Oil	10^4t	0.49			0.49	20	100	41816	15025.88
Gasline	10^4t				0	18.9	100	43070	0.00
Diesel	10^4t	0.75	0.39	0.3	1.44	20.2	100	42652	45490.92
Fuel oil	10^4t	11.73	0.45	1.44	13.62	21.1	100	41816	440629.41
Liquefied Petroleum	10^4t				0	17.2	100	50179	0.00
Refinery gas	10^4t	8.55		4.27	12.82	15.7	100	46055	339888.05
Natural gas	10^8m^3		0.19	2.1	2.29	15.3	100	38931	500142.66
Other Petroleum Products	10^4t				0	20	100	38369	0.00
Other Coking Pruducts	10^4t				0	25.8	100	28435	0.00
Other Energy	10^4 tce	12.16	17.6	82.77	112.53	0	100	0	0.00
								Total	229226818.29

Data source: *China Energy statistical Yearbook 2007*

Fossil Fuel-fired Power Generation of Northeast China Power Grid in 2006				
Regions	Electricity Generation	Electricity Generation	Rate of Electricity Consumption	Electricity Supply of Grid

	10^8MWh	（MWh)	（%）	（MWh)
Liaoning	962.82	96282000	6.62	89,908,132
Jilin	385.76	38576000	6.78	35,960,547
Heilongjiang	629.64	62964000	7.85	58,021,326
Total				183,890,005

Data source: *China Electric Power Yearbook 2007*

Table A7 The Operating Margin Emission Factor of Northeast China Power Grid in 2003-2006

Year	***2004***	***2005***	***2006***	EF_{OM}
CO2 emission (tCO2e)	*199,708,287*	*207,254,040*	*229226818.29*	*1.2561*
Fuel-fired power generation of Northeast China Power Grid (MWh)	*158,425,475*	*164,164,426*	*183,890,005*	

Data source: *Table A1~A6*

2. Calculation of EF_{BM}

Table A8 The Oxidation Factor, Emission Factors and Average Low Calorific Value of the Fuel i

		Liaoning	***Jilin***	***Heilongjiang***	***Total***	***Calorific Value***	***Emission Factor of the Fuel***	***Oxidation Factor***	***Emission of CO_2***
Fuel i	***Unit***	***A***	***B***	***C***	***D=A+B+C***	***E***	***F***	***G***	***H=D*E*F*G*44/12/100***
Raw coal	10^4t	4681.99	2738.24	3698.29	11118.52	20908	25.8	1	219,912,851
Cleaned coal	10^4t	0.03			0.03	26344	25.8	1	748
Other washed coal	10^4t	674.74	17.83	96	788.57	8363	25.8	1	6,238,691
Coke	10^4t	3.32			3.32	28435	29.2	1	101,075
					0				226,253,365
Crude oil	10^4t	0.49			0.49	41816	20	1	15,026

Gasoline	***10^4t***				0	43070	18.9	1	0
Kerosene	***10^4t***	0	0	0	0	43070	19.6	1	0
Diesel	***10^4t***	0.75	0.39	0.3	1.44	42652	20.2	1	45,491
Fuel oil	***10^4t***	11.73	0.45	1.44	13.62	41816	21.1	1	440,629
Other Petroleum Products	***10^4t***	0	0	0	0	38369	20	1	0
					0				501,146
Natural gas	***10^7m^3***		1.9	21	22.9	38931	15.3	1	500,143
Coke oven gas	***10^7m^3***	26.8	1.6	14.4	42.8	16726	12.1	1	317,609
Other coal gas	***10^7m^3***	552.6	14.3		566.9	5227	12.1	1	1,314,667
Liquefied Petroleum	***10^4t***				0	50179	17.2	1	0
Refinery gas	***10^4t***	8.55		4.27	12.82	46055	15.7	1	339,888
									2,472,307
								Total	229,226,818

Data source: *China Energy statistical Yearbook 2007*

Table A9 CO_2 emission from the coal ,oil and gas in Northeast China Power Grid

λ_{Coal}	λ_{Oil}	λ_{Gas}
98.7%	*0.22%*	*1.08%*

Table A10 The Emission Factor of the unit applying best commercially available technology

	Variable	***Efficiency of Power Supply***	***Emission Factor of the Fuel (tc/TJ)***	***Oxidation Factor***	***Emission Factor (tCO_2/MWh)***
		A	***B***	***C***	***D=3.6/A/1000*B*C*44/12***
Coal-fired power plant	$EF_{Coal,adv}$	*37.28%*	*25.8*	*1*	*0.9135*
Gas-fired power plant	$EF_{Gas,adv}$	*48.81%*	*15.3*	*1*	*0.4138*
Oil-fired power plant	$EF_{Oil,adv}$	*48.81%*	*21.1*	*1*	*0.5706*

Table A11 Change in Installed Capacity of Northeast China Power Grid in 1999-2006

	1999	*2000*	*2006*	*Change in Installed Capacity from 2000 to 2006*	*The Proportion of the Total Change Capacity*
	A	*B*	*C*	*D＝C-B*	
Fuel-fired Power	*27136.9*	*28932.5*	*36216*	*7283.5*	*87.57%*
Hydropower	*5522.7*	*5600*	*6126*	*526*	*6.32%*
Nucleus power	*0*	*0*	*0*	*0*	*0.00%*
Wind power	*22.9*	*43.9*	*552*	*508.1*	*6.11%*
Total	*32682.5*	*34576.4*	*42894*	*8317.6*	*100.00%*
Percentage of the Installed Capacity of 2006	*76.19%*	*80.61%*	*100.00%*		

Data source: *China Electric Power Yearbook 2000-2007*

According to the data, the EF_{BM} of the Northeast China Gird is equal to $\frac{CAP_{Thermal,addition}}{CAP_{Total,addition}} \times EF_{Thermal,adv}$ = 0.9074×87.57% =0.7946 tCO_2/MWh.

Table A12 Calculation the baseline emission factor EF_y of Northeast China Power Gird

OM(tCO_2e/MWh) *A*	*BM(tCO_2e/MWh)* *B*	*CM(tCO_2e/MWh)* *C=0.75×A+0.25*B*
1.2561	*0.7946*	*1.1407*

Annex 4
MONITORING PLAN

The calibration of meters & metering, the QA/QC procedure and others of the monitoring plan should be carried out with reference to the Power Purchase Agreement of the Project, the Agreement of the Project Accessing to the Grid and the checking and testing standard and the specification of the monitoring equipments. No other information.