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

CONTENTS

SECTION A. General description of project activity

A.1 Title of the project activity:

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Heilongjiang Dongning Dajiazishan and Xidagang Wind Farm Project
Version: 2.4
Date: 11/02/2009

A.2. Description of the project activity:

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Heilongjiang Dongning Dajiazishan and Xidagang Wind Farm Project (hereinafter referred to as the "Project") is developed by Heilongjiang Dongning Huafu Wind Power Co., Ltd. The Project is located in the northwest of Dongning County in southeast Heilongjiang Province. The purpose of the Project is to generate electricity with the local wind resources. The installed power generation capacity of the Project is 49.5 MW (33 wind turbines with rated capacity of 1.5 MW each).

Prior to the implementation of the Project, equivalent amount of electricity was supplied by Northeast Power Grid of China (NEPG), which is fossil-fuel dominated. This scenario also represents the baseline scenario of the Project.

The implementation of the Project will involve the installation of 33 wind turbines, the construction of a 66 kV step-up substation and the building of 53 km overhead power transmission lines. The electricity generated by the Project will be sold to NEPG. The estimated annual power supply from the Project to NEPG is about 114 GWh. In the absence of the Project, equivalent amount of electricity would have otherwise been supplied by NEPG, which is fossil-fuel dominated. Through the replacement of the equivalent power supply from NEPG, the Project is expected to reduce GHG emissions by 130,569 tCO_2e per annum.

The Project will contribute to the sustainable development in the following aspects:

- The Project will reduce GHG emissions associated with the fossil-fuel power generation through replacement of the power supply from NEPG, and help to alleviate the global climate change caused by the GHG emissions;
- Emissions of other pollutants related to the fossil-fuel power generation will also be reduced due to the implementation of the Project;
- The Project will deliver clean renewable energy to the local grid and further improve the power structure of the grid;
- Temporary jobs will be created during the construction phase of the Project and some permanent jobs will be available after the Project is commissioned;
- The Project site can also serve as a tourist attraction, which can add momentum to the development of the local tourism industry.

A.3. Project participants:

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Name of Party involved (*) ((host) indicates a host Party)	Private and/or public entity(ies) project participants (*) (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)

P. R. China (Host)	Heilongjiang Dongning Huafu Wind Power Co., Ltd.	No
United Kingdom of Great Britain and Northern Ireland	Goldman Sachs International	No

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

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A.4.1.1. Host Party(ies):

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People's Republic of China

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

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Heilongjiang Province

A.4.1.3. City/Town/Community etc:

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Mudanjiang City, Dongning County

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 located in the northwest of Dongning County in southeast Heilongjiang Province. The Project site is about 19 km to the southeast of Maqiaohe Township and about 22 km to the northwest of Suiyang Township. The national highway G301 passes about 11.5 km to the south of the Project site. The wind turbines are to be installed at the top of Dajiazishan Mountain and Xidagang Mountain. The coordinates of Dajiazishan Mountain are north latitude 44°34′57″ and east longitude 130°44′55″, and the altitude at the ridge of the mountain ranges from 950m to 1,030m. The coordinates of Xidagang Mountain are north latitude 44°34′41″ and east longitude 130°48′38″, and the altitude at the ridge of the mountain ranges from 840m to 990m. The geographical location of the Project site is shown in Figure 1 below.

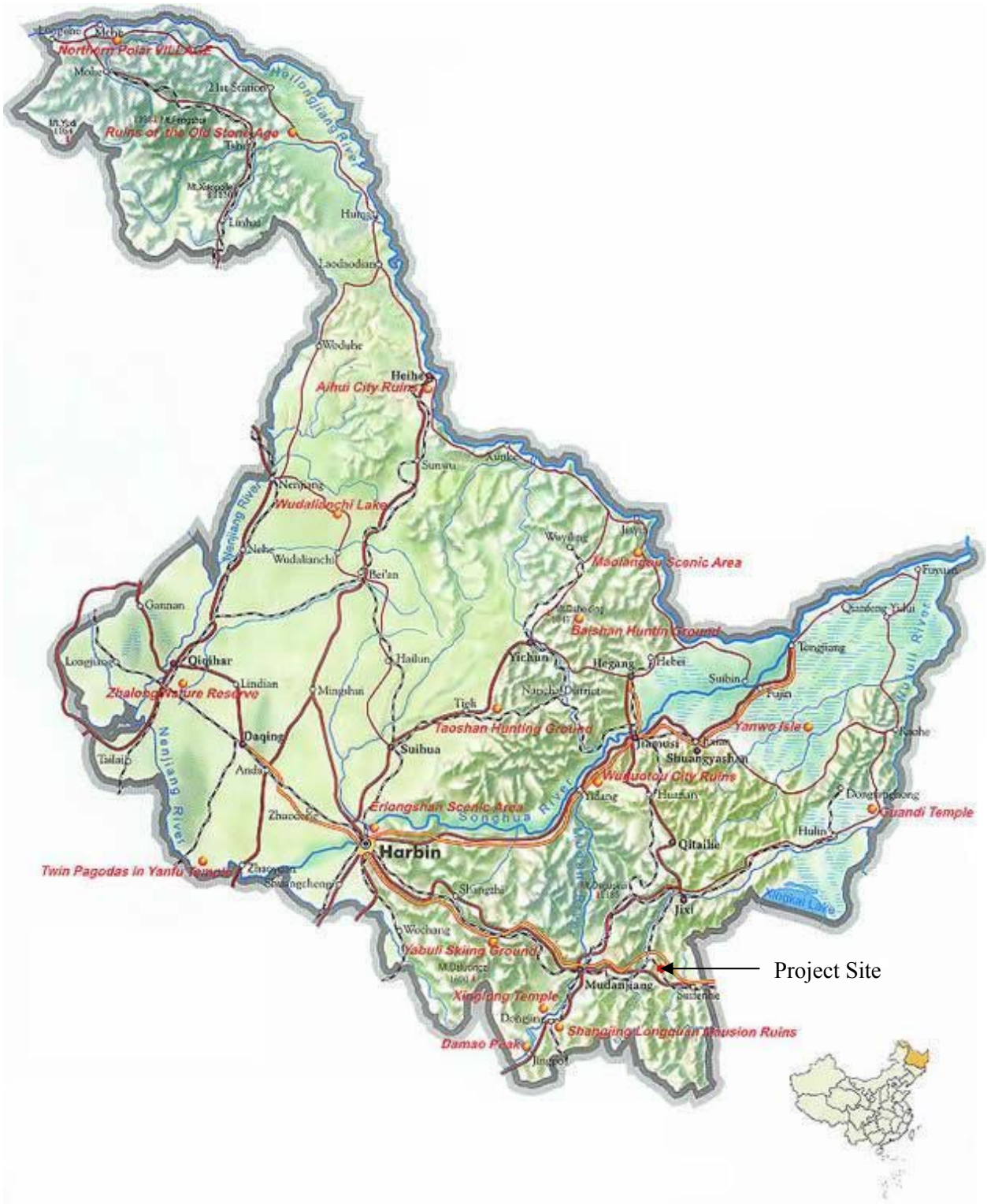

Figure 1: Location of the Project site

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

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Sectoral scope 01: Energy Industries

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

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Prior to the implementation of the Project, equivalent amount of electricity was supplied by NEPG and GHG emissions were generated at the fossil-fuel power plants connected with NEPG. This also represents the baseline scenario of the Project. Through the implementation of the Project, electricity generated at the wind farm will be supplied to NEPG and replace equivalent amount of electricity from NEPG. GHG emission reductions will therefore be realized.

The wind energy resources analysis for the Project site shows that the annual average wind speed at the Project site is 7.41m/s and the annual average wind power density is 435W/m^2. Based on the above information, the Project adopts the SL1500/70 wind turbine manufactured by Sinovel Wind Co., Ltd. The specifications of the wind turbine are listed below:

Number of blades:	3
Rated power per turbine:	1,500kW
Rated voltage:	690V
Rotor diameter:	70.4m
Cut-in wind speed:	3m/s
Cut-out wind speed:	25m/s
Rated wind speed:	12m/s
Survival wind speed:	59.5m/s
Height:	65m

Each wind turbine will be equipped with a 690V/10.5kV transformer, which will be connected to the 66kV step-up substation through direct-buried cable. The electricity generated by the Project will be delivered to the NEPG through a 53km overhead transmission line connecting the 66kV substation at the Project site and the 220kV substation at Muling.

The annual power generation of the Project is estimated to be 119,921 MWh and the net power supply from the Project to NEPG is about 113,925 MWh, which is based on the long-term forecast of the equivalent annual operating hours of 2423 hours or annual average capacity load factor of 0.277.

The technology adopted in the Project design reflects the current good practices in China.

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

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The renewable crediting period is chosen for the Project. The estimated total emission reductions during the first 7-year crediting period amount to 913,983 tons of CO_2e. The annual emission reductions within the first crediting period are listed below in Table 1:

Table 1: Emission reductions in the first crediting period

Years	**Annual estimation of emission reductions in tons of CO_2e**
2009(July-December)	65,284
2010	130,569

2011	130,569
2012	130,569
2013	130,569
2014	130,569
2015	130,569
2016 (January-June)	65,285
Total estimated reductions (tons of CO_2e)	**913,983**
Total number of crediting years	7 years
Annual average over the crediting period of estimated reductions (tons of CO_2e)	**130,569**

A.4.5. Public funding of the project activity:

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The Project does not involve any public funding from Annex I countries.

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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Applied baseline and monitoring methodology:

ACM0002, Version07, "Consolidated baseline and monitoring methodology for grid-connected electricity generation from renewable sources"

With references to:

"Tool to calculate the emission factor for an electricity system" Version 01.1, and
"Tool for the demonstration and assessment of additionality" Version 05.2.

Details about the above mentioned Methodology and tools are available on the following website:
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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The methodology ACM0002 is applicable to grid-connected renewable power generation project activities that involve electricity capacity additions. The Project involves the installation of new wind turbines which will generate electricity with wind energy and the power generated by the Project will be sold to NEPG. Therefore, the Project falls under the application scope of the applied methodology.

The Project meets all the applicability conditions of the applied methodology as discussed below.

- The proposed Project activity involves the installation of a wind power plant, which falls under the renewable energy;
- The DNA of the host country has published[1] a delineation of the power grids in the country and information on the characteristics of the grids is available from *China Electric Power Yearbook* and *China Energy Statistical Yearbook* published by relevant national authorities annually;
- The Project activity involves the installation of a new wind power plant and does not involve switching from fossil fuels.

According to ACM0002, the additionality of the Project shall be demonstrated and assessed using the latest version of the "Tool for the demonstration and assessment of additionality" agreed by the CDM EB. Therefore, the Version 05.2 of the "Tool for the demonstration and assessment of additionality" is applicable to the Project.

The applicability conditions included in the "Tool to calculate the emission factor for an electricity system" are also met since the Project activity supplies electricity to a grid, i.e. NEPG.

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

[1] *Bulletin on determining the baseline emission factors for regional power grids in China*, Office of National Coordination Committee on Climate Change, NDRC, http://cdm.ccchina.gov.cn/web/NewsInfo.asp?NewsId=2193

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According to the "Tool to calculate the emission factor for an electricity system", the delineation of the project electricity system and connected electricity systems published by the DNA of the host country is used to define the project electricity system. Since the Project is located in Heilongjiang Province, according to the *Bulletin on determining the baseline emission factors for regional power grids in China* published on 09 August 2007 by the National Development and Reform Commission (NDRC), the project electricity system shall be the Northeast Power Grid of China (NEPG).

Therefore, according to the methodology ACM0002, the spatial extent of the Project boundary includes the Project power plant and all power plants connected physically to NEPG.

The greenhouse gases and emission sources included in or excluded from the Project boundary are shown in Table 2 below.

Table 2: Emissions sources included in or excluded from the project boundary

Source		Gas	Included?	Justification/Explanation
Baseline	Emissions from electricity generation in fossil fuel fired power plants that are connected to NEPG	CO_2	Yes	Main emission source
		CH_4	No	Minor emission source. Excluded for simplification. This is conservative.
		N_2O	No	
Project activity	Emissions from the Project power plant	CO_2	No	As per the methodology ACM0002, the project emissions for wind energy project is considered to be zero.
		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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The Project activity is the installation of a new grid-connected wind power plant. Alternatives to the Project activity that provide outputs or services comparable with the Project include:

Alternative 1: The proposed Project undertaken without being registered as a CDM project;
Alternative 2: Construction of a grid-connected fossil-fuel fired power plant that can generate equivalent amount of electricity as the proposed Project;
Alternative 3: Construction of a grid-connected power plant using renewable energy other than wind energy that can generate equivalent amount of electricity as the proposed Project;
Alternative 4: Equivalent amount of electricity supplied by NEPG.

As discussed in detail in section B.5 below, if the Project is not undertaken as a CDM project, it will not be financially attractive and can not be implemented. Therefore, Alternative 1 can not be the baseline scenario.

According to the *Notice on Strictly Prohibiting the Installation of Fossil Fuel-fired Generators with the Capacity of 135 MW or below* issued by the General Office of the State Council on Apr 15th 2002[2], the construction of fossil fuel-fired power plants with capacity of less than 135 MW are strictly prohibited. As the proposed Project has a capacity of 49.5MW, if a fossil fuel-fired power plant is built to generate equivalent amount of electricity as the proposed Project, its installed capacity will be definitely below the

[2] Notice on Strictly Prohibiting the Installation of Fossil Fuel-fired Generators with the Capacity of 135 MW or Below, General Office of the State Council, http://www.gov.cn/gongbao/content/2002/content_61480.htm

regulation threshold 135MW. Therefore, Alternatives 2 is not consistent with the regulation and therefore can also not be the baseline scenario.

In the area where the Project is located, all the hydropower resources have been developed as hydro power stations. Meanwhile, the development of the biomass power generation industry is still in the early stage in China and the big capital investment and high operational cost make it economically less attractive in the market[3]. Solar energy power generation is also still far from a commercialized technology in China. Therefore, the above-mentioned Alternative 3 is practically not feasible and cannot be the baseline scenario.

Therefore, the baseline scenario of the Project is identified as Alternative 4, i.e., equivalent amount of electricity supplied by NEPG.

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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The starting date of the proposed project is before the date when the project was submitted for validation. However, the incentive from CDM was seriously considered in the decision to proceed with the Project activity. The feasibility study report of the Project was completed in November 2005. Since the approval of the wind farm project requires the confirmations from several government authorities, such as land and resources authority, water resources authority, pricing administration etc., the feasibility study report of the project was approved only in March 2007 after all the confirmations were available. By this time, one key assumption made in the feasibility study report, i.e. power tariff, was already not realistic based on the information available then. Detailed discussion on the assumption is included in Sub-step 2c below. When the newly assumed power tariff was applied, the project IRR became below the benchmark already. The project owner realized that the extra CDM revenue can improve the project IRR to overpass the benchmark and therefore they decided to proceed with the project with CDM development. The decision to proceed with the project was made at the board meeting of the major investor in April 2007. The meeting minutes showed that the CDM incentive was seriously considered when the decision was made to proceed with the project. Key milestones during the development of the Project are summarized below.

Time	Milestone
November 2005	Feasibility study report completed
February 2006	EIA of the project approved
March 2007	Feasibility study report approved by local authority
April 2007	Decision made at board meeting to proceed with the Project
May 2007	Equipment order placed
August 2007	CDM ERPA signed with Goldman Sachs International (GSI)
October 2007	Equipment installation and civil construction contract signed
December 2007	Due diligence by GSI completed
April 2008	Project submitted to DNA for approval
May 2008	DOE contracted for the validation of the Project

The additionality of the Project is demonstrated and assessed as follows by using the "Tool for the demonstration and assessment of additionality" (Version 05.2) approved by CDM EB.

[3] http://jjckb.xinhuanet.com/cjxw/2007-11/27/content_75467.htm

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

Sub-step 1a. Define alternatives to the project activity:
Alternatives to the Project activity that provide outputs or services comparable with the Project include:

Alternative 1: The proposed Project undertaken without being registered as a CDM project;
Alternative 2: Construction of a grid-connected fossil-fuel fired power plant that can generate equivalent amount of electricity as the proposed Project;
Alternative 3: Construction of a grid-connected power plant using renewable energy other than wind energy that can generate equivalent amount of electricity as the proposed Project;
Alternative 4: Equivalent amount of electricity supplied by NEPG.

In the area where the Project is located, all the hydropower resources have been developed as hydro power stations. Meanwhile, the development of the biomass power generation industry is still in the early stage in China and the big capital investment and high operational cost make it economically less attractive in the market[4]. Furthermore, solar energy power generation is still far from a commercialized technology in China. Therefore, the above-mentioned Alternative 3 is practically not feasible.

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

According to the *Notice on Strictly Prohibiting the Installation of Fossil Fuel-fired Generators with the Capacity of 135 MW or Below* issued by the General Office of the State Council on Apr 15th 2002[5], the construction of fossil fuel-fired power plants with capacity of less than 135 MW are strictly prohibited. As the proposed Project has a capacity of 49.5MW, if a fossil fuel-fired power plant is built to generate equivalent amount of electricity as the proposed Project, its installed capacity will be definitely below the regulation threshold 135MW. Therefore, Alternatives 2 is not consistent with the regulation and therefore not feasible.

Alternative 1 and 4 are consistent with all mandatory laws and regulation in the host country.

Step 2. Investment analysis

The Guidance on the Assessment of Investment Analysis approved by EB is followed in the following investment analysis.

Sub-step 2a. Determine appropriate analysis method

Since the proposed Project will bring economic benefits from the sale of electricity generated, the simple cost analysis (Option I) is not applicable. The benchmark analysis (Option III) is chosen to demonstrate that the proposed Project is not financially attractive without the revenue from the sale of certified emission reductions (CERs).

Sub-step 2b. Option III. Apply benchmark analysis

[4] http://jjckb.xinhuanet.com/cjxw/2007-11/27/content_75467.htm

[5] Notice on Strictly Prohibiting the Installation of Fossil Fuel-fired Generators with the Capacity of 135 MW or Below, General Office of the State Council, http://www.gov.cn/gongbao/content/2002/content_61480.htm

According to the *Interim Rules on Economic Assessment of Electrical Engineering Retrofit Projects* issued by former State Power Corporation of China in 2002, the benchmark of total investment financial internal rate of return (IRR) of electric power industry is 8%, and only if the total investment IRR of the Project is higher than this benchmark, will the proposed Project be financially feasible.

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

The project IRR is calculated on the basis of the information included in the Feasibility Study Report (FSR) of the Project, which was prepared by the Electrical Exploration and Engineering Institute of Heilongjiang Province, a class A engineering institute for electrical industry approved by the Ministry of Construction of P. R. China with the certificate number of 080007-sj. The power tariff assumed in the FSR was 0.664 RMB/kWh (excl. VAT), which was based on the actual approved power tariff[6] for wind project in Heilongjiang province at the time of FSR completion. However, when the FSR was approved in March 2007, the assumption was already not realistic any more. According to the "Trial Management Rules on the Power Tariff of Renewable Energy Power Generation and the Sharing of Costs thereof"[7] issued by the National Development and Reform Commission (NDRC) of China on 4 January 2006, the on-grid power tariff for wind energy power generation projects shall use the price recommended by the government, which is supposed to be determined by the pricing authority on the basis of the price generated through tendering. The final power tariffs agreed for the three wind energy power generation tendering projects in 2006 were between 0.4056 RMB/kWh and 0.5006 RMB/kWh[8], which was believed too low by some industry insiders[9]. The government also did not publish any recommended price for wind energy power generation project in 2006. Then rumors spread in the industry that the pricing policy for biomass energy power plants as stipulated in the "Trial Management Rules on the Power Tariff of Renewable Energy Power Generation and the Sharing of Costs thereof" would be also used for wind energy projects. According to the "Trial Management Rules on the Power Tariff of Renewable Energy Power Generation and the Sharing of Costs thereof", the power tariff for biomass energy projects shall be the local reference tariff for coal-fired generation units equipped with de-sulphurization system plus a subsidy of 0.25 RMB/kWh for the first 15 years of operation time. The reference tariff for coal-fired generation units equipped with de-sulphurization system was 0.3567 RMB/kWh[10] in Heilongjiang province in 2006, which would mean a power tariff of 0.6067 RMB/kWh for biomass energy projects. Based on the overall situation in the industry and the information available, an expected power tariff of 0.61 RMB/kWh was assumed by the project owner for the proposed Project at the time of decision making, which was perfectly justified by the later approvals on wind project tariffs issued by NDRC[11,12].Key parameters used for the calculation are listed in Table 3 below.

Table 3: Key parameters used for the IRR calculation

Parameters	Value	Data source
Total static investment	555,863,000 RMB	Feasibility study report
Depreciation period	15 years	Feasibility study report
Residue value ratio of fixed assets	5%	Feasibility study report

[6] Approval of the Pricing Administration of Heilongjiang Province on the on-grid power tariff of Heilongjiang Huafu Wind Power Muling Co., Ltd., Hei Jia Ge Zi [2005] No.267

[7] http://www.gov.cn/ztzl/2006-01/20/content_165910.htm

[8] http://www.windpower.org.cn:80/rule/fd4.jsp

[9] http://www.86ne.com/Wind/200802/Wind_112338.html

[10] http://jgs.ndrc.gov.cn/zcfg/t20060630_75068.htm

[11] http://jgs.ndrc.gov.cn/zcfg/t20080218_193011.htm

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

Expected operational lifetime	20 years	Feasibility study report
Estimated annual net power supply to the grid	113,925 MWh	Feasibility study report
Power tariff applied (excl. VAT)	0.562 RMB/kWh	Assumption
Annual average O&M costs	11,090,000 RMB	Feasibility study report
Income tax rate	33%	National taxation law
Added value tax rate	8.5%	National taxation law
Urban maintenance and construction tax rate	5%	National taxation law
Education additional tax rate	3%	National taxation law
CERs Price	9.9 Euro	

Based on the assumptions listed above, the project IRR of the Project is calculated to be 6.70%, which is lower than the 8% benchmark. If the CERs sales income is considered, the project IRR will be increased to 9.97%, which will make the project financially feasible.

Sub-step 2d. Sensitivity analysis:

A sensitivity analysis is done for the Project with ±10% variation of the key parameters such as total investment, annual O&M costs, power output and power tariff. Results of the sensitivity analysis are shown in Table 4 below.

Table 4: Results of sensitivity analysis

Range / Parameters	-10%	-5%	0	+5%	+10%
Power tariff	5.41%	6.08%	6.70%	7.27%	7.79%
Annual O&M costs	6.87%	6.78%	6.70%	6.62%	6.53%
Power Output	5.41%	6.08%	6.70%	7.27%	7.79%
Total investment	7.88%	7.29%	6.70%	6.12%	5.57%

From the above analysis, it can be seen that even if the key parameters fluctuate in the range of 10% to -10%, the project IRR is still below the benchmark. It can also be seen that the project IRR is not very sensitive to the fluctuation of the O&M costs. Further sensitivity tests show that if the power tariff or power output increases by 12%, or the total investment of the project decreases by 11%, the project IRR could reach the 8% benchmark. Howerver, these scenarios are highly impossible to happen due to the following reasons.

- Currently renewable energy power plants are enjoying some favorable policies in China, e.g. in terms of power tariff subsidy. But with the increase of the share of renewable energy in the total energy market, less and less favorable policies regarding wind projects are expected in the future. Actually according to the current policy in China, the power tariff subsidy for biomass power plants is only effective for the first 15 years of operation. The power tariff approved by NDRC for wind projects is only for the first 30,000 equivalent full load operation hours and the average power tariff will be used after that. Therefore, it can be reasonably seen that the power tariff can only become lower in the future and the possibility for the power tariff to increase by over 12% is almost zero.
- The power output of the Project was estimated on the basis of actual measurement data of the wind resources at the project site and therefore should represent the most reasonable forecast of the output in the project years and no big variations are expected.
- The chance for the total investment to decrease by 11% is also be very small because the material prices keep increasing with the positive inflation rate in China and the construction of the project would only start nearly two years after the FSR was prepared.

In conclusion, the proposed Project is not financially attractive. Therefore, step 3 of the tool is omitted.

Step 4. Common practice analysis

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

The proposed Project is a wind farm project in Heilongjiang Province, which is one of the regions that have rich wind resources in China. Therefore, wind farm projects that were built after 2002, when the reform of the Chinese electrical system was launched and competition was introduced into the industry, and with installed capacity between 15 MW and 100 MW in Heilongjiang Province are identified as similar projects. Wind farm projects that are applying for CDM registration or already registered as CDM projects are not included in the analysis. Identified similar projects are listed below.

Table 5: Projects similar to the proposed Project

No	Name	Turbine Model	Unit capacity (kW)	No. of turbines	Installed capacity (MW)
1	Mulan Menggushan	Xi'an Nordex	600	20	12
2	Fujin Bielayinshan	NEG Micon	900	27	24.3

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

There are essential distinctions between the projects identified above and the proposed Project. The Mulan Menggushan project enjoys a high power tariff of 0.78 RMB/kWh(incl. VAT)[13], which is nearly 30% higher than the expected power tariff of the proposed Project, while the Fujin Bielayinshan project is supported by the ADB loan[14]. Since the proposed Project does not have such financial or tariff advantages, the existence of the above projects does not contradict the claim that the proposed Project is financially unattractive.

Therefore, the proposed Project is additional.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

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Project emissions

Since the proposed Project is a wind farm project, according to the methodology ACM0002, the project emissions of the proposed Project is zero, i.e. $PE_y = 0$.

Baseline emissions

Since the proposed Project is a new power plant, according to the methodology ACM0002, the baseline emissions of the Project include only CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the Project activity, calculated as follows:

[13] Approval of the Pricing Administration of Heilongjiang Province on the on-grid power tariff of Heilongjiang Huafu Wind Power Mulan Co., Ltd., Hei Jia Ge Zi [2004] No.233, 29 November 2004

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

$BE_y = EG_y * EF_{grid,CM,y}$ (1)

Where:

BE_y	Baseline emissions in year y (tCO_2/yr).
EG_y	Electricity supplied by the project activity to the grid in year y (MWh/yr).
$EF_{grid,CM,y}$	Combined margin CO_2 emission factor for grid connected power generation in year y calculated using the latest version of the "Tool to calculate the emission factor for an electricity system" (tCO_2/MWh).

Calculation of $EF_{grid,CM,y}$

According to the "Tool to calculate the emission factor for an electricity system" (Version 01), the following steps are applied.

Step 1. Identify the relevant electric power system

Since the DNA of the host country has published[15] a delineation of the power grids in the country, such delineation is used for the identification of the project electricity system and connected electricity systems. According to the information published by the DNA, the project electricity system of the Project is identified as the Northeast Power Grid of China (NEPG), which covers Heilongjiang Province, Jilin Province and Liaoning Province and the connected electricity systems of the Project is the North Power Grid of China (NPGC). There is no power import from NPGC to NEPG.

Step 2. Select an operating margin (OM) method

According to the "Tool to calculate the emission factor for an electricity system" (Version 01.1), any of the four following methods can be used for the calculation of the operating margin emission factor ($EF_{grid,OM,y}$):

(a) Simple OM, or
(b) Simple adjusted OM, or
(c) Dispatch data analysis OM, or
(d) Average OM.

However, 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.

The low-cost/must-run resources constitute, on average, only 6.39% (7.08% in 2001, 5.44% in 2002, 4.72% in 2003, 6.46% in 2004 and 8.28% in 2005) of the total grid generation of the project electricity system, i.e. NEPG, based on the most recent 5-year data available at the time of PDD completion. Therefore, the simple OM method (option a) is selected for the calculation of $EF_{grid,OM,y}$.

The data vintage used for the calculation of the OM emission factor is as following:

[15] *Bulletin on determining the baseline emission factors for regional power grids in China*, Office of National Coordination Committee on Climate Change, NDRC, http://cdm.ccchina.gov.cn/web/NewsInfo.asp?NewsId=2193

- 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.

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

Since data on the fuel consumption, net electricity generation and the average efficiency of each power plant serving the project electricity system are not publicly available in China, Option A and Option B as listed in the "Tool to calculate the emission factor for an electricity system" (Version 01.1) for the calculation of the simple OM emission factor can not be used. Meanwhile, only nuclear and renewable power generation are considered as low-cost / must-run power sources in China and the quantity of electricity supplied to the grid by these sources is known. Therefore, Option C for the calculation of the simple OM emission factor is used, where 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 types and total fuel consumption of the project electricity system, as follows:

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

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 consumed in year y (GJ / mass or volume unit)
$EF_{CO2,i,y}$	CO_2 emission factor of fossil fuel type i consumed 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 consumed 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

The net electricity generation EG_y is calculated using the following formula:

$$EG_y = TEG_y * (1 - \eta_y) \quad (3)$$

Where:

TEG_y	Total electricity generated by all power sources serving the system, not including low-cost / must-run power plants / units, in year y (MWh)
η_y	Captive power rate of the power sources serving the system, not including low-cost / must-run power plants / units, in year y (%)

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

Since the electricity generation data of individual power plant are not publicly available in China, the sample group of power units used to calculate build margin is defined as the set of power capacity additions in the electricity system that comprise 20% of the system capacity, instead of system generation,

and that have been built most recently. This deviation was accepted by the EB[16] in its reply to the request for clarification on the use of AM0005 (replaced by ACM0002) in China.

In terms of vintage of data, the following option is chosen for the Project:

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

Step 5. Calculate the build margin emission factor

Due to the unavailability of the relevant data, an alternative method that has been suggested and accepted by CDM EB[17] is adopted with the following steps:

Step a): Calculate the proportion of the corresponding CO_2 emissions of solid, liquid and gas fuel in the total emissions of power generation using the most recent one year fuel consumption information available at the time of PDD submission:

$$\lambda_{Solid} = \frac{\sum_{i \in Solid} FC_{i,y} \times NCV_{i,y} \times EF_{CO2,i,y}}{\sum_{i} FC_{i,y} \times NCV_{i,y} \times EF_{CO2,i,y}} \quad (4)$$

$$\lambda_{Liquid} = \frac{\sum_{i \in Liquid} FC_{i,y} \times NCV_{i,y} \times EF_{CO2,i,y}}{\sum_{i} FC_{i,y} \times NCV_{i,y} \times EF_{CO2,i,y}} \quad (5)$$

$$\lambda_{Gas} = \frac{\sum_{i \in Gas} FC_{i,y} \times NCV_{i,y} \times EF_{CO2,i,y}}{\sum_{i} FC_{i,y} \times NCV_{i,y} \times EF_{CO2,i,y}} \quad (6)$$

Where:

λ	Proportion of the CO_2 emissions of each fuel category (solid, liquid and gas) in the total CO_2 emissions of power generation (%)
$FC_{i,y}$	The amount of fuel i consumed (mass or volume unit) in year y
$NCV_{i,y}$	Net calorific value (energy content) of fossil fuel type i consumed in year y (GJ / mass or volume unit)
$EF_{CO2,i,y}$	CO_2 emission factor of fossil fuel type i consumed in year y (tCO_2/GJ)
Solid, Liquid, Gas	Foot marks for solid, liquid and gas fuels

[16] http://cdm.unfccc.int/UserManagement/FileStorage/AM_CLAR_QEJWJEF3CFBP1OZAK6V5YXPQKK7WYJ

[17] http://cdm.unfccc.int/UserManagement/FileStorage/AM_CLAR_QEJWJEF3CFBP1OZAK6V5YXPQKK7WYJ

Step b): Calculate the emission factor of fossil-fuel fired power plants using the efficiency level of the best technology commercially available:

$$EF_{Thermal} = \lambda_{Solid} \times EF_{Solid,Adv} + \lambda_{Liquid} \times EF_{Liquid,Adv} + \lambda_{Gas} \times EF_{Gas,Adv} \quad (7)$$

Where:

$EF_{Thermal}$	Emission factor of fossil-fuel fired power plants using the efficiency level of the best technology commercially available (tCO_2/MWh)
$EF_{Solid,Adv}$	Emission factor of best commercially available solid-fuel fired technology (tCO_2/MWh)
$EF_{Liquid,Adv}$	Emission factor of best commercially available liquid-fuel fired technology (tCO_2/MWh)
$EF_{Gas,Adv}$	Emission factor of best commercially available gas-fuel fired technology (tCO_2/MWh)

The emission factors of best commercially available technologies are calculated as follows:

$$EF_{Solid,Adv} = 3.6 * EF_{CO2,Solid} / \eta_{Solid,Adv} \quad (8)$$
$$EF_{Liquid,Adv} = 3.6 * EF_{CO2,Liquid} / \eta_{Liquid,Adv} \quad (9)$$
$$EF_{Gas,Adv} = 3.6 * EF_{CO2,Gas} / \eta_{Gas,Adv} \quad (10)$$

Where:

$EF_{CO2,Solid}$	CO_2 emission factor of solid fossil fuel (tCO_2/GJ)
$EF_{CO2,Liquid}$	CO_2 emission factor of liquid fossil fuel (tCO_2/GJ)
$EF_{CO2,Gas}$	CO_2 emission factor of gas fossil fuel (tCO_2/GJ)
$\eta_{Solid,Adv}$	Power generation efficiency of best commercially available technology using solid fuel (%)
$\eta_{Liquid,Adv}$	Power generation efficiency of best commercially available technology using Liquid fuel (%)
$\eta_{Gas,Adv}$	Power generation efficiency of best commercially available technology using gas fuel (%)

Step c): Calculate the BM:

$$EF_{grid,BM,y} = \frac{CAP_{Thermal}}{CAP_{Total}} \times EF_{Thermal} \quad (11)$$

Where:

CAP_{Total}	The total newly added installed capacity in the project electricity system in most recent year(s) that comprise at least 20% of the total installed capacity (MW)
$CAP_{Thermal}$	The fossil-fuel fired installed capacity in the newly added at least 20% capacity in most recent year(s) (MW)

Step 6. Calculate the combined margin emission factor

The combined margin emission factor is calculated as follows:

$$EF_{grid,CM,y} = EF_{grid,OMsimple,y} \times w_{OM} + EF_{grid,BM,y} \times w_{BM} \quad (12)$$

Where:

$EF_{grid,OMsimple,y}$	Simple operating margin CO_2 emission factor in year y (tCO_2/MWh)
$EF_{grid,BM,y}$	Build margin CO_2 emission factor in year y (tCO_2/MWh)
w_{OM}	Weighting of operating margin emission factor (%)

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

As the proposed Project is a wind power generation project, the following default values for w_{OM} and w_{BM} are used: w_{OM} = 0.75 and w_{BM} = 0.25.

Leakage

No leakage is considered for the Project as per the methodology ACM0002.

Emission reductions

Since the project emissions of the Project is zero and no leakage is considered, the emission reductions of the Project then equal to the baseline emissions of the Project, as follows:

$$ER_y = BE_y \quad (13)$$

Where:
ER_y Emission reductions in year y (t CO2e/yr)
BE_y Baseline emissions in year y (t CO2e/yr)

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

Data / Parameter:	$NCV_{i,y}$
Data unit:	GJ / mass or volume unit
Description:	Net calorific value per mass or volume unit of fuel i used in year y
Source of data used:	National default values
Value applied:	A series of data as included in **Annex 3**
Justification of the choice of data or description of measurement methods and procedures actually applied :	The national default values of net calorific values for different fuel types are included in the *China Energy Statistical Yearbook*, which is compiled by the relevant national authorities and published annually.
Any comment:	

Data / Parameter:	$EF_{CO2,i,y}$
Data unit:	tCO_2/GJ
Description:	CO_2 emission factor of fuel i used in year y
Source of data used:	IPCC default values
Value applied:	A series of data as included in **Annex 3**
Justification of the choice of data or description of measurement methods and procedures actually applied :	As provided in table 1.4 of Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories.
Any comment:	

Data / Parameter:	$FC_{i,y}$

Data unit:	mass or volume unit
Description:	The amount of fuel i consumed in year y
Source of data used:	Official publications
Value applied:	A series of data as included in **Annex 3**
Justification of the choice of data or description of measurement methods and procedures actually applied :	The information is included in the *China Energy Statistical Yearbook*, which is compiled by the relevant national authorities and published annually.
Any comment:	

Data / Parameter:	TEG_y
Data unit:	MWh
Description:	Total electricity generated by all power sources serving the system, not including low-cost / must-run power plants / units, in year y
Source of data used:	Official publications
Value applied:	A series of data as included in **Annex 3**
Justification of the choice of data or description of measurement methods and procedures actually applied :	Information used is from *China Electric Power Yearbook*, which is published annually by the national authority.
Any comment:	

Data / Parameter:	η_y
Data unit:	%
Description:	Self consumption rate of the power sources serving the system, not including low-cost / must-run power plants / units, in year y
Source of data used:	Official publications
Value applied:	A series of data as included in **Annex 3**
Justification of the choice of data or description of measurement methods and procedures actually applied :	Information used is from *China Electric Power Yearbook*, which is published annually by the national authority.
Any comment:	

Data / Parameter:	CAP_{Total}
Data unit:	MW
Description:	The total newly added installed capacity in the project electricity system in most recent year(s) that comprise at least 20% of the total installed capacity
Source of data used:	Official publications
Value applied:	8,574.50 (see **Annex 3** for details)
Justification of the choice of data or	Information used is from *China Electric Power Yearbook*, which is published annually by the national authority.

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

Data / Parameter:	$CAP_{Thermal}$
Data unit:	MW
Description:	The fossil-fuel fired installed capacity in the newly added at least 20% capacity in most recent year(s)
Source of data used:	Official publications
Value applied:	7,829.10 (see **Annex 3** for details)
Justification of the choice of data or description of measurement methods and procedures actually applied :	Information used is from *China Electric Power Yearbook*, which is published annually by the national authority.
Any comment:	

Data / Parameter:	$\eta_{Solid,Adv}$, $\eta_{Liquid,Adv}$, $\eta_{Gas,Adv}$
Data unit:	%
Description:	Power generation efficiencies of best commercially available technology using solid, liquid and gas fuels
Source of data used:	Publication of DNA
Value applied:	See **Annex 3** for details
Justification of the choice of data or description of measurement methods and procedures actually applied :	Information used is from the *Bulletin on determining the baseline emission factors of power grids in China* published by the DNA of the host country.
Any comment:	

B.6.3 Ex-ante calculation of emission reductions:

>>

Following the procedures as described in section B.6.1, the combined margin emission factor of the project electricity system, i.e. NEPG, is calculated to be 1.1461 tCO_2/MWh. Detailed calculation process is included in Annex 3.

According to the Feasibility Study Report of the Project, the estimated annual net electricity supply from the Project to NEPG is 113,925 MWh. Therefore, the estimated annual emission reductions of the Project are as follows:

$ER_y = BE_y = EG_y * EF_{grid,CM,y} = 113,925 * 1.1461 = 130,569$ (tCO_2/yr)

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

>>

The renewable crediting period is chosen for the Project. The estimated total emission reductions during the first 7-year crediting period amount to 913,983 tons of CO_2e. The summary of the ex-ante estimation of emission reductions within the first crediting period is as follows:

Table 6: Summary of the ex-ante estimation of emission reductions

Years	**Estimation of project activity emissions** (tons of CO_2e)	**Estimation of baseline emissions** (tons of CO_2e)	**Estimation of leakage** (tons of CO_2e)	**Estimation of overall emission reductions** (tons of CO_2e)
2009(Jul.-Dec.)	0	65,284	0	65,284
2010	0	130,569	0	130,569
2011	0	130,569	0	130,569
2012	0	130,569	0	130,569
2013	0	130,569	0	130,569
2014	0	130,569	0	130,569
2015	0	130,569	0	130,569
2016(Jan.-Jun.)	0	65,285	0	65,285
Total (tonnes of CO_2 e)	0	913,983	0	913,983

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 in year y
Source of data to be used:	Electricity meters installed
Value of data applied for the purpose of calculating expected emission reductions in section B.6:	113,925
Description of measurement methods and procedures to be applied:	Digital electricity meters will be installed to monitor the net electricity delivered to the NEPG by the Project. Number and detailed installation location of the meters will be in accordance with the Power Purchase Agreement between the project owner and the grid company, which will be signed after the project is put into operation. The parameter will be measured continuously and recorded monthly.
QA/QC procedures to be applied:	Double check by receipt of sales.
Any comment:	

B.7.2 Description of the monitoring plan:

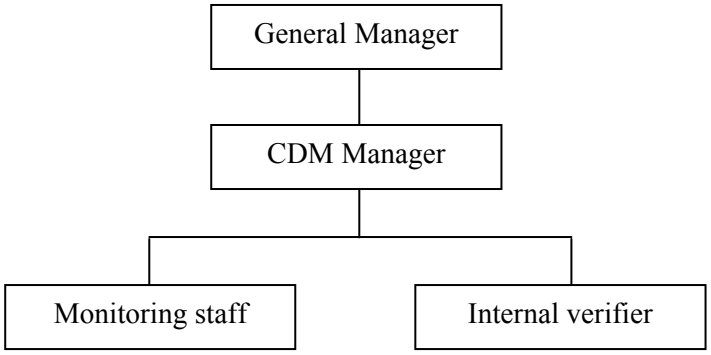
>>

The key parameter to be monitored throughout the crediting period of the Project is the net electricity supplied by the Project to NEPG. Digital electricity meters will be installed at the project site to monitor

the net electricity supplied by the Project to NEPG. Number and specific installation location of the meters will be in accordance with the Power Purchase Agreement between the project owner and the grid company. The meters will be calibrated every six months.

1. Organizational structure and staff responsibility

The project owner will establish the following organizational structure for the implementation of the monitoring plan.



The General Manager will oversee the overall implementation of the monitoring plan and give necessary support to other related staff. The CDM manager will take the responsibility to make sure the monitoring plan is implemented correctly and properly. The CDM manager will also be responsible to prepare the monitoring reports during the crediting period of the Project. The monitoring staff will be held responsible for the recording of meter readings and the archiving of the records and other relevant documents. The internal verifier will verify the records and make sure the monitoring is done properly as per the monitoring plan.

2. Meters and installation

The technical specifications and the installation requirements of the meters will be in accordance with the Power Purchase Agreement between the project owner and the grid company.

3. Data monitoring

The meter will measure the electricity amount continuously. Meter readings will be recorded monthly. The net power supply to the grid will be calculated and confirmed by both the project owner and the grid company. Sales invoice will be issued according to the confirmed electricity quantity and can be used as a cross check for the net power supply to the grid.

4. Quality control

The meters will be calibrated according to relevant standards and rules, such as JJG596-1999, by qualified entities to ensure accuracy of the data to be monitored. Meters will be sealed after each calibration and must not be opened until the next calibration. All calibration records and reports will be archived together with other monitoring records.

5. Data management

All data collected as part of monitoring will be archived both electronically and on paper and will be kept for at least 2 years after the end of the last crediting period. The electronic documents will be backed up in Compact Disc or Hard Disc. Copies of all the sales invoice and calibration records and reports will be properly archived for the verification of the emission reductions by DOE.

6. Training

Training will be provided to relevant staffs and only trained staffs are allowed to undertake the monitoring tasks. The training records should be archived.

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 application of the baseline study and monitoring methodology of the proposed Project was completed on 10/11/2008 by the following person/entity, who is not a project participant.

Mr. Wang Donglei
Beijing Changjia Investment Co., Ltd.
Address: Room 2504, Building G, Huiyuan International Plaza, Asian Games Village, Chaoyang District, Beijing, China 100101
Phone: 86-10-84972818
Fax: 86-10-64991543
Email: wangdonglei@263.net

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:

>>
22/05/2007, when the equipment order was placed.

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, or the registration date, whichever is later.

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.

SECTION D. Environmental impacts

>>

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

>>

An Environmental Impact Assessment form was completed for the Project by Harbin Institute of Technology on 6 November 2005 and was approved by the Environmental Protection Administration of Heilongjiang Province on 8 February 2006. The analysis of the environmental impacts of the Project is summarized below.

Potential impacts to the environment during the construction and operation of the Project include noise, dust, wastewater and the loss of vegetation. The noise will be mainly from the construction site during the construction phase and the on-site substation during the operation phase. Since there are no residential areas or schools within 8km of the Project site, the noise will not have negative impacts to the environment. The dust pollution during the construction of the Project can be mitigated by spraying water on the open earth ground. The wastewater generated by the Project is very limited because wastewater is only generated because of the daily life of the plant staff. The vegetation loss during the construction of the Project will be restored after the construction is completed.

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:

>>

In general, the Project will not have significant environmental impacts.

SECTION E. Stakeholders' comments

>>

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

>>

During Jan.-Feb. 2008, comments of the stakeholders were collected by the Project owner in the form of a questionnaire in Dongning County of Heilongjiang Province. The local stakeholders interviewed include representatives from local government authorities, local residents and representatives from different business sectors. The questionnaire form contains the following sections:

1. Background of the Project
2. Basic information of the respondents
3. Questions to be answered
   (1) What impacts do you think the implementation of the Project will bring up to the environment?
   (2) What impacts do you think the Project will bring up to the local economy?
   (3) How do you think of the impacts the Project will bring up to the local employment?
   (4) What social impacts do you think the Project will bring up?
   (5) What impacts will the Project bring up to your daily life?
   (6) What is your attitude towards the implementation of the Project?
   (7) What other comments do you have regarding the Project? (if any, please detail)

Each question except question (7) is provided with three options, i.e., negative, positive or neutral. If negative answers are selected, respondents are requested to give further explanation on why they choose so.

The basic information of the stakeholders interviewed are summarized in the following table.

Item		Number of stakeholders
Age	16-30	3
	31-40	9
	41-50	7
	51-60	5
	>60	1
	Total	25
Education	College or above	3
	Junior college	5
	Polytechnic or high school	10
	Middle school or below	7
	Total	25
Occupation	Government staff	3
	Worker or technical personal	8
	Enterprise management staff	7
	Farmer	6
	Teacher or researcher	1
	Total	25

E.2.	Summary of the comments received:

>>

Summary of comments received from the 25 respondents are shown below:

(1) All the 25 stakeholders believe that the Project will bring up positive impacts on the environment.
(2) All the 25 stakeholders believe that the Project will promote the local economic development.
(3) All the 25 stakeholders think that the Project will improve the local employment situations.
(4) 23 of the respondents believe that the Project will promote the local social development and the other 2 think that there will be no social impact.
(5) 23 stakeholders think that the Project will improve their daily lives; only 2 of the respondents thinks there will be no impact.
(6) All the 25 stakeholders are supportive to the implementation of the Project.
(7) No further comments from stakeholders were received.

In conclusion, the summary of the survey indicates that all stakeholders reviewed support the implementation of the Project.

The received survey forms are available from the Project owner.

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

>>

Since the overall comments on the Project are positive, no action or any changes to the project will have to be considered in the implementation of the proposed project activity.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Heilongjiang Dongning Huafu Wind Power Co., Ltd.
Street/P.O.Box:	4 South Zhonghua Road
Building:	
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State/Region:	Heilongjiang Province
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FAX:	
E-Mail:	
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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

The Project does not involve any public funding.

Annex 3

BASELINE INFORMATION

Table A3-1: Fuel consumption in NEPG in the three most recent years for which data is available

Fuel type	Unit	Liaoning Province			Jilin Province			Heilongjiang Province			Total
		2003	2004	2005	2003	2004	2005	2003	2004	2005	
Raw coal	ton	35,565,100	41,442,000	43,054,100	20,066,600	23,109,000	24,461,300	27,636,200	30,848,000	33,832,100	**280,014,400**
Clean coal	ton	708,300	847,500	-	-	10,900	-	30,000	48,800	-	**1,645,500**
Other washed coal	ton	6,170,400	5,776,700	5,247,400	159,000	142,600	192,600	534,100	610,000	241,600	**19,074,400**
Coke oven gas	m^3	166,000,000	483,000,000	103,000,000	-	291,000,000	357,000,000	-	-	68,000,000	**1,468,000,000**
Other gas	m^3	531,000,000	5,733,000,000	1,262,000,000	-	419,000,000	837,000,000	-	-	-	**8,782,000,000**
Crude oil	ton	33,900	-	11,600	-	-	-	-	-	-	**45,500**
Diesel oil	ton	3,200	20,400	11,800	3,400	11,600	14,800	-	2,400	5,700	**73,300**
Fuel oil	ton	148,700	128,100	93,200	7,000	17,800	24,600	43,200	28,600	15,500	**506,700**
LPG	ton	15,500	21,900	1,200	-	-	-	-	-	-	**38,600**
Refinery gas	ton	40,300	97,900	54,800	-	-	-	4,600	11,400	13,200	**222,200**
Natural gas	m^3	-	-	-	4,000,000	3,000,000	84,000,000	447,000,000	253,000,000	224,000,000	**1,015,000,000**
Other energy	tsce	293,800	269,700	161,800	-	50,700	-	-	-	-	**776,000**

Source: China Energy Statistical Yearbook, 2004, 2005, 2006

Table A3-2: Total power generation and net power supply in NEPG

Province	2003			2004			2005			Total net power supply
	Power generated	Self use rate	Net power supply	Power generated	Self use rate	Net power supply	Power generated	Self use rate	Net power supply	
	MWh	%	MWh	MWh	%	MWh	MWh	%	MWh	MWh
Liaoning	79,751,000	7.17	74,032,853	84,543,000	7.21	78,447,450	83,697,000	7.03	77,813,101	230,293,404
Jilin	29,739,000	7.32	27,562,105	33,242,000	7.68	30,689,014	35,294,000	6.59	32,968,125	91,219,245
Heilongjiang	48,493,000	8.48	44,380,794	53,482,000	7.84	49,289,011	58,000,000	7.96	53,383,200	147,053,005
Total			145,975,752			158,425,475			164,164,426	468,565,654

Source: China Electric Power Yearbook, 2004, 2005, 2006

Table A3-3: Simple OM emission factor calculation

Fuel type	CO_2 emission factor[1]	Net calorific value[2]	Fuel consumption[3]	CO_2 emission
	tCO_2/GJ	GJ/t, GJ/m^3	t, m^3	tCO_2
	A	B	C	D=A*B*C
Raw coal	0.0946	20.908	280,014,400	553,839,586
Clean coal	0.0946	26.344	1,645,500	4,100,820
Other washed coal	0.0946	8.363	19,074,400	15,090,517
Coke oven gas	0.0444	0.016726	1,468,000,000	1,089,369
Other gas	0.0444	0.005227	8,782,000,000	2,036,586
Crude oil	0.0733	41.816	45,500	139,526
Diesel oil	0.0741	42.652	73,300	231,561
Fuel oil	0.0774	41.816	506,700	1,639,258
LPG	0.0631	50.179	38,600	122,154
Refinery gas	0.0576	46.055	222,200	682,910
Natural gas	0.0561	0.038931	1,015,000,000	2,216,790
Other energy	0	0	776,000	-
Total CO_2 emission (tCO_2)				**581,189,077**
Total net power supply (MWh)[4]				**468,565,654**
Simple OM emission factor (tCO_2/MWh)				**1.2404**

Source: 1. 2006 IPCC Guidelines on National GHG Inventories, Vol. 2 (Energy), Chapter 1, table1.4
2. China Energy Statistical Yearbook 2006
3. Table A3-1 of the PDD.
4. Table A3-2 of the PDD.

Table A3-4: Calculation of the percentage of emission of each fuel category in the total emission

Fuel category	Fuel type	Unit	Fuel consumption in 2005[1]			Total	CO_2 emission factor[2]	Net calorific value[3]	CO_2 emission	Percentage of emission of each fuel category in total emission
			Liaoning	Jilin	Heilongjiang		tCO_2/GJ	GJ/t, GJ/m^3	tCO_2	
			A	B	C	D=A+B+C	E	F	G=D*E*F	
Solid	Raw coal	ton	43,054,100	24,461,300	33,832,100	**101,347,500**	0.0946	20.908	200,454,896	
	Other washed coal	ton	5,247,400	192,600	241,600	**5,681,600**	0.0946	8.363	4,494,940	
	Subtotal								**204,949,836**	**98.88%**
Liquid	Crude oil	ton	11,600	-	-	**11,600**	0.0733	41.816	35,571	
	Diesel oil	ton	11,800	14,800	5,700	**32,300**	0.0741	42.652	102,039	
	Fuel oil	ton	93,200	24,600	15,500	**133,300**	0.0774	41.816	431,247	
	Subtotal								**568,858**	**0.27%**
Gas	Refinery gas	ton	54,800	-	13,200	**68,000**	0.0576	46.055	208,991	
	Natural gas	m^3	-	84,000,000	224,000,000	**308,000,000**	0.0561	0.038931	672,681	
	Coke oven gas	m^3	103,000,000	357,000,000	68,000,000	**528,000,000**	0.0444	0.016726	391,817	
	Other gas	m^3	1,262,000,000	837,000,000	-	**2,099,000,000**	0.0444	0.005227	486,768	
	Subtotal								**1,760,257**	**0.85%**
								Total	**207,278,950**	

Source: 1. China Electric Power Yearbook 2006

2. 2006 IPCC Guidelines on National GHG Inventories, Vol. 2 (Energy), Chapter 1, table1.4

3. China Energy Statistical Yearbook 2006

Table A3-5: Calculation of CO_2 emission factor of thermal power generation with best commercially available technology

Fuel category	Power generation efficiency of best commercially available technology[1]	CO_2 emission factor of fuel[2]	CO_2 emission factor of technology	Percentage of emission of each fuel category in total emission[3]	Weighted emission factor
		tCO_2/GJ	tCO_2/MWh		tCO_2/MWh
	A	B	C=3.6*B/A	D	E=C*D
Solid	35.82%	0.0946	0.9508	98.88%	0.9401
Liquid	47.67%	0.0774	0.5843	0.27%	0.0016
Gas	47.67%	0.0561	0.4237	0.85%	0.0036
	CO_2 emission factor of thermal power generation with best commercially available technology				**0.9453**

Source: 1. *Bulletin on determining the baseline emission factors of power grids in China*, Office of National Coordination Committee on Climate Change, NDRC.
2. 2006 IPCC Guidelines on National GHG Inventories, Vol. 2 (Energy), Chapter 1, table1.4
3. Table A3-4 of the PDD.

Table A3-6: Calculation of BM emission factor

Year	Province	Installed capacity (MW)[1]				% in the 2005 capacity
		Thermal	Hydro	Wind	Total	
1998	Liaoning	12,560.30	1,223.10	17.00		
	Jilin	4,428.60	3,474.70	-		
	Heilongjiang	9,116.00	784.50	-		
	Subtotal	**26,104.90**	**5,482.30**	**17.00**	**31,604.20**	**78.66%**
1999	Liaoning	12,425.70	1,240.00	22.90		
	Jilin	4,583.10	3,508.20	-		
	Heilongjiang	10,128.10	774.50	-		
	Subtotal	**27,136.90**	**5,522.70**	**22.90**	**32,682.50**	**81.34%**
2005	Liaoning	15,999.00	1,403.90	135.50		
	Jilin	6,359.40	3,720.80	85.40		
	Heilongjiang	11,575.60	846.70	52.40		
	Subtotal	**33,934.00**	**5,971.40**	**273.30**	**40,178.70**	**100.00%**
Capacity addition in 1998-2005		7,829.10	489.10	256.30	8,574.50	
% in the total addition		91.31%	5.70%	2.99%		
Emission factor[2] (tCO_2/MWh)		0.9453				
BM emission factor (tCO_2/MWh)		0.8631				

Source: 1. China Electrical Power Yearbook, 1999, 2000, 2006
2. Table A3-5 of the PDD.

Table A3-7: Calculation of CM emission factor

	Emission factor	**Weight**	**Weighted emission factor**
	tCO_2/MWh		tCO_2/MWh
BM	0.8631	0.25	0.2158
OM	1.2404	0.75	0.9303
		CM emission factor	**1.1461**

Annex 4

MONITORING INFORMATION

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