



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

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**SECTION A. General description of project activity****A.1. Title of the project activity:****Project Title:** Guohua Tongliao Kezuo Zhongqi Phase I 49.5 MW Wind Farm Project**Version No:** 07**Completion Date:** 25/09/2010

Version No	Date	Remarks
Version 01	10/08/2007	Version for GSP
Version 02	25/10/2007	Revisions addressing the comments posed by DOE in the draft validation report
Version 03	12/05/2008	Revisions addressing the comments resulting from TR process by DOE
Version 04	17/06/2008	Final version for EB registration
Version 05	12/08/2009	Revisions addressing the correction comments posed by EB, rejected due to insufficient evidences as to whether the tariff could be considered to be an E- policy.
Version 06	14/07/2010	Revalidation
Version 07	25/09/2010	Final submission

A.2. Description of the project activity:

Guohua Tongliao Kezuo Zhongqi Phase I 49.5 MW Wind Farm Project (hereafter referred to as the proposed project) is a grid-connected renewable energy project. The objective of the proposed project is to generate electricity from wind resources using advanced wind power generation technology and deliver to the Northeast China Power Grid (hereinafter referred to as “the NECPG”).

The proposed project is located in Dailiji County, Tongliao City, Inner Mongolia Autonomous Region, P.R.China. The total installed capacity of the proposed project is 49.5MW, consisting of 33sets of turbines with a unit capacity of 1500kW. It is estimated that the annual generation of the proposed project will be 108,830MWh once fully operation, with a plant load factor of 25.1%¹. The project lifetime is 21 years (including 1 year construction period)².

The electricity currently generated by the Grid is relatively fossil fuel intensive, with an operating margin emission factor of 1.1293tCO₂/MWh and a build margin emission factor of 0.7241tCO₂/MWh (see Section B for further details). The proposed project is therefore expected to reduce emissions of GHG of 111,877 tCO₂e per year during the first crediting period by displacing electricity from NECPG. For the proposed project, the scenario existing prior to the start of the implementation of the project activity is the same electricity service as the proposed project provided by the NECPG. The baseline scenario is the same as the scenario existing prior to the start of implementation of the project activity

Being as an environmentally sound energy supply technology, the contributions of the proposed project are summarized as follows:

¹ P77 of FSR, PLF = 2199/8760, determined by the third party contracted with the PP

² P166 of FSR



- Being located in a power grid dominated by coal-fired power plants, development of the proposed project will not only reduce GHG emissions but also mitigate local environmental pollution caused by air emissions from coal-fired power plants.
- The proposed project could be helpful to diversify power structure of the NECPG and reduce the dependence on exhaustible fossil fuels for power generation.
- North China where the proposed project is located is facing rapid increase in electricity demand. Development of the proposed project could contribute to meeting local electricity demand, and therefore boosts the economy in the local region.

For the local population, they can benefit from the compensation for the deserted land occupation, and the job opportunities due to the construction and operation of the proposed project.

A.3. Project participants:

Name of Party involved (*) ((host) indicates a host Party)	Private and/or public entity(ies) project participants (*) (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
P.R.China (host)	Guohua (Tongliao) Wind power Co., Ltd	No
The United Kingdom of Great Britain and Northern Ireland	Merrill Lynch Commodities (Europe) Limited	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.		

Please see Annex 1 for detailed contact information.

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

A.4.1.1. Host Party(ies):

People's Republic of China

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

Inner Mongolia Autonomous Region

A.4.1.3. City/Town/Community etc:

Tongliao City, Kezuozhong Qi, Dailiji County

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

The proposed project is located in the east of Kezuozhong Qi, Tongliao City, Inner Mongolia Autonomous Region, about 95km straight-line distance away from the Tongliao City, about 28km straight-line away from Kezuo Zhongqi, about 260km straight-line away from Liaoning City, and about 184km straight-line distance away from the Changchun City. The geographical coordinates of the proposed project is east longitude 122°57' and north latitude 41°13'.

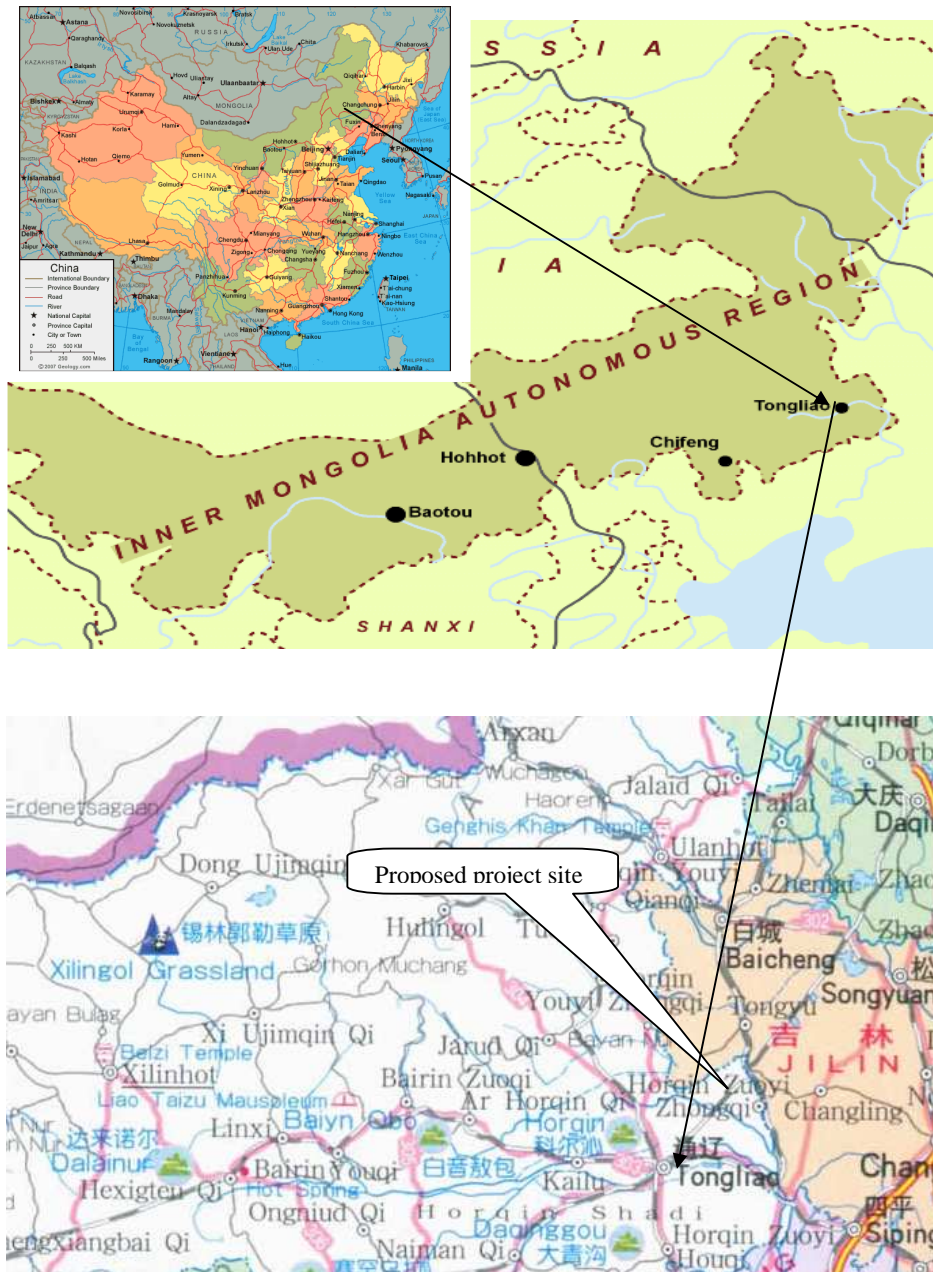


Figure A-1. The location of the proposed project in China

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

Sectoral Scopes: 01 Energy industries

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

The purpose of the proposed project is to generate electricity from wind power and deliver it to the NECPG. For the proposed project,

- The scenario existing prior to the start of the implementation of the project activity is NECPG providing the same electricity service as the proposed project;
- The project scenario is the implementation of the proposed project, the installation and operation of 33 sets of wind turbines with a total capacity of 49.5MW, which will supply an average annual generation of 108,830MWh to the NECPG and replace the same amount of electricity generated by fossil fuel fired power plants connected to the NECPG;
- The baseline scenario is the same as the scenario existing prior to the start of implementation of the project activity.

Given that the wind speed, the FD 77-1500 wind turbine manufactured by Sichuan Dongfang Wind Turbine Factory in China was finally adopted by the project owner. The wind turbines have been installed in many wind farms, the performance proved its high quality and technical advantage. The wind turbines are estimated to generate on average 108,830MWh of electricity annually once fully operation, with a plant load factor of 25.1%³. The proposed project is to use the domestic equipment, and therefore doesn't involve in technology transfer.

The turbines manufacturer will be provided on-the-job training for the staff of the proposed wind farm before the start of operation. As per the Wind Turbine Generator Contract, the main technical specifications of the wind turbines are provided in Table A-1.

Table A-1: The main technical specifications of the wind turbine to be installed

No	Item	Unit	Value
1	Installed capacity	MW	49.5
2	Rated capacity	kW	1,500
3	Annual Operation hour	Hour	2,199
4	Annual grid-connected output	MWh	108,830
5	Rotor Diameter	m	77
6	Number of blades		3
7	Swept area	m ²	4657
8	Rated Rotation speed of wind wheel	rpm	9.6~17.3 ±10%
9	Cut-in wind speed	m/s	3.5
10	Cut-out wind speed	m/s	20
11	Rated wind speed	m/s	12.5
12	Hub height of the wind turbines	m	70
13	Rated voltage of generator	v	690
14	Lifetime of the wind turbine	Year	21
15	Plant Load Factor	%	25.1

³ P77 of FSR, PLF = 2199/8760, determined by the third party contracted with the PP



The proposed project will connect to 220kV step-up substation, which is constructed by the proposed project. Finally, it will be connected to the NECPG.

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

A 7×3 year renewable crediting period is selected for the proposed project activity and the estimation of the emission reductions are indicated in the table A-2 below. The annual average emission reductions are 111,877 tCO₂e and the total emission reductions amount to 783,139tCO₂e in the first crediting period (from 1 May 2011 to 30 April 2018). The amount of annual and total emissions reductions are estimated in the following table A-2.:

Table A-2: Estimated emission reductions of the project in the first crediting period

Years	Annual estimation of emission reductions in tonnes of CO₂e
01/05/2011-31/12/2011	74,585
2012	111,877
2013	111,877
2014	111,877
2015	111,877
2016	111,877
2017	111,877
01/01/2018-30/04/2018	37,292
Total estimated reductions (tonnes of CO₂e)	783,139
Total number of crediting years	7
Annual average over the crediting period of estimated reductions (tonnes of CO₂e)	111,877

A.4.5. Public funding of the project activity:

There is no public funding from Annex I parties for the proposed project.

SECTION B. Application of a baseline and monitoring methodology:

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

Approved consolidated baseline and monitoring methodology ACM0002 (Version 11): Consolidated baseline methodology for grid-connected electricity generation from renewable sources (approved on 52nd CDM-EB conference)

This methodology draws upon the following tools:

- Tool for the demonstration and assessment of additionality (version 05.2)
- Tool to calculate the emission factor for an electricity system (version 02)

For more information on the baseline and monitoring methodology we refer to the UNFCCC 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:

This methodology is applicable to grid-connected renewable power generation project activities that (a) install a new power plant at a site where no renewable power plant was operated prior to the implementation of the project activity (Greenfield plant); (b) involve a capacity addition; (c) involve a retrofit of (an) existing plant(s); or (d) involve a replacement of (an) existing plant(s).

Therefore, the methodology ACM0002 (Version 11) is applicable because the proposed project activity is the installation of a Greenfield, grid-connected wind power plant (a).

The methodology is applicable under the following conditions:

Criteria	Applicability	Conclusion
The project activity is the installation, capacity addition, retrofit or replacement of a power plant/unit of one of the following types: hydro power plant/unit (either with a run-of-river reservoir or an accumulation reservoir), wind power plant/unit, geothermal power plant/unit, solar power plant/unit, wave power plant/unit or tidal power plant/unit	The project is a grid-connected renewable power generation project activity that install a new wind power plant at a site where no wind power plant was operated prior to the implementation of the project activity (Greenfield plant)	OK
In the case of capacity additions, retrofits or replacements: the existing plant started commercial operation prior to the start of a minimum historical reference period of five years, used for the calculation of baseline emissions and defined in the baseline emission section, and no capacity expansion or retrofit of the plant has been undertaken between the start of this minimum historical reference period and the implementation of the project activity	The proposed project activity is a Greenfield plant and does not represent a capacity addition to an existing plant.	OK
In case of hydro power plants, one of the following conditions must apply: <ul style="list-style-type: none"> ● The project activity is implemented in an existing reservoir, with no change in the volume of reservoir; or ● The project activity is implemented in an existing reservoir, where the volume of reservoir is increased and the power density of the project activity, as per definitions given in the Project Emissions section, is greater than 4 W/m²; or ● The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the Project Emissions section, is greater than 4 W/m² 	Not applicable. The proposed project activity is a wind power plant.	OK

The methodology is not applicable to the following:

Criteria	Applicability	Conclusion
Project activities that involve switching from fossil fuels to renewable energy sources at the site of the project activity, since in this case the	The proposed project activity does not involve switching from fossil fuels to renewable energy	OK



baseline may be the continued use of fossil fuels at the site;	at the site of the project activity.	
Biomass fired power plants	Not applicable. The proposed project activity is a wind power plant	OK
Hydro power plants that result in new reservoirs or in the increase in existing reservoirs where the power density of the power plant is less than 4 W/m ²	Not applicable. The proposed project activity is a wind power plant	OK

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

Emission sources:

For the baseline determination only CO₂ emissions from electricity generation by fossil fuel fired power plant that is displaced due to the project activity are taken into account.

The greenhouse gases and emission sources included in or excluded from the project boundary are shown in Table B-1.

Table B-1: Emission sources included in or excluded from the project boundary

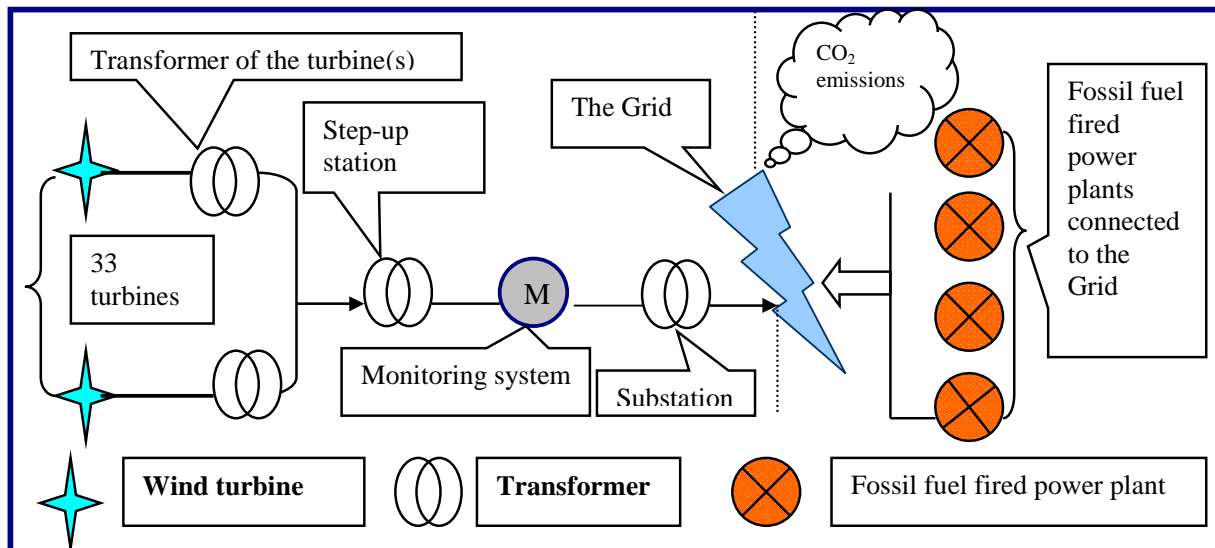
Source		Gas	Included?	Justification / Explanation
Baseline	Electricity generation in fossil fuel-fired power plants that are displaced due to the project activity	CO ₂	Yes	Main emission source
		CH ₄	No	Excluded according to ACM0002 (Version11)
		N ₂ O	No	Excluded according to ACM0002 (Version11)
Project Activity	Project Emission	CO ₂	No	The proposed project is a wind power project that the project emissions should not be considered as per ACM0002 (Version 11).
		CH ₄	No	
		N ₂ O	No	

Spatial boundary:

As per ACM0002 (Version 11), the spatial extent of the project boundary includes the project power plant and all power plant connected physically to the electricity system that proposed project power plant is connected to. In accordance with the *Notification on Determining Baseline Emission Factor of China's Grid* issued by China DNA on 06/07/2009⁴, NECPG is defined as the project boundary of the proposed project.

In line with the guidelines for completing the PDD (version 07), a flow diagram of the project boundary is presented in Figure B-1 below. The flow diagram physically delineates the project boundary, includes the flow of electricity and represents the emissions included and the monitoring variable.

⁴. <http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File2333.pdf>

Figure B-1: Flow diagram of the project boundary**B.4. Description of how the baseline scenario is identified and description of the identified baseline scenario:**

According to the “*Tool to calculate the emission factor for an electricity system (Version 02)*”, if the DNA of the host country has published a delineation of the project electricity system and connected electricity systems, these delineations should be used.

The electricity generated by the proposed project will be sold to the NECPG according to the delineation which is published by the Chinese DNA on 06/07/2009, NECPG is considered as the “project electricity system”. The proposed project activity is the installation of a new grid-connected renewable power plant/unit, and is not a modification/retrofit of an existing plant/unit, the baseline scenario, according to methodology ACM0002 (Version 11), is summarized as follows:

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

The analysis and description in B.5 and B.6 will support the baseline scenario shown above. And the provision of an equivalent amount of annual power output by the NECPG is the baseline scenario. This section and Section B.5 are complementary. Some of the steps undertaken here may overlap with the steps undertaken in Section B.5 depending on the procedures used to select the baseline scenario and demonstrate additionality.

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):***CDM Consideration***

The proposed project owner seriously considered CDM before the actual implementation of the proposed project. The timeline for the proposed project was tabled as follows:



Time	Milestone	Evidence
07/2006	EIA report was completed	EIA report
25/09/2006	EIA report was approved	The approval of EIA
07/2006	FSR was finalized	The FSR
04/09/2006	The commitment letter on the on-grid tariff was issued by Inner Mongolia Autonomous Region Development and Reform Commission	The commitment letter on the on-grid tariff
09/11/2006	The FSR was approved by Inner Mongolia Development and Reform Commission	The approval letter to the FSR
12/2006	Supplementary FSR was finalized by the design institute	Supplementary FSR
01/2007	Project owner decided to develop the proposed project as CDM project.	CDM Development Resolution by Board of Directors
02/2007	CDM Service Agreement was signed with Chinese Renewable Industries Association (CREIA)	The CDM Consulting Service Agreement
25/03/2007	Survey of Stakeholders' comments was completed	The questionnaires about Stakeholders' comments
12/06/2007	The project owner signed the Equipment Purchasing Agreement with Sichuan Dongfang Wind Turbine Factory	The Equipment Purchase Agreement
08/09/2007 ⁵	The PDD was made publicly available for Global Stakeholder Process (GSP)	UNFCCC website
10/2007	Letter of Approval from China DNA was obtained.	Letter of Approval from China DNA
10/2007	The construction contract was signed.	The Construction Contract
13/03/2008	Letter of Approval from the United Kingdom DNA was obtained.	Letter of Approval from the United Kingdom DNA
25/07/2008	Emission Reduction Purchase Agreement was signed with Merrill Lynch Commodities (Europe) Limited	The Emission Reduction Purchase Agreement

The project owner signed the Equipment Purchasing Agreement on 12/06/2007, then in October 2007 the project owner signed the construction contract; therefore, the starting date of the proposed project is 12/06/2007.

The incentive from the CDM had been taken into account prior to the starting date of the project activity, aiming to obtain the additional funding to secure the project financially. In the supplementary FSR, the revenue from CDM was analyzed and it is concluded that if the project is registered as a CDM project, the revenue from CDM will make the project attractive financially. Therefore, the project owner decided to apply for CDM registration to overcome the financial barriers and signed the CDM Consulting Service Agreement before the start date of the project.

Conclusion:

The above timelines clearly demonstrated that the project owner seriously considered CDM in the project decision making process and project implementation and took real action to ensure CDM registration in parallel with the project implementation.

⁵ <http://cdm.unfccc.int/Projects/Validation/DB/47SVNTXWQP21VAAECIA1HCR8QVFUIM/view.html>

***Additionality***

According to the approved consolidated baseline and monitoring methodology ACM0002 (Version 11), the additionality of project activity is demonstrated and assessed using the latest version “*Tool for the demonstration and assessment of additionality, Version 05.2*”. The tool uses the following steps:

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

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

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

Identify realistic and credible alternative(s) available to the project participants that provide outputs or services comparable with the proposed CDM project activity. According to Clause (4) quoted from “*Tool for the demonstration and assessment of additionality*” (Version 05.2), *Project activities that apply this tool in context of approved consolidated methodology ACM0002, only need to identify that there is at least one credible and feasible alternative that would be more attractive than the proposed project activity;*

Therefore, these alternatives are to include:

- a) The proposed project activity undertaken without being registered as a CDM project activity.
- b) Supply of equivalent annual electricity output supplied by NECPG.

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

Alternative a) and b) comply with China current law and regulations, but doesn't belong to mandatory scope.

Step 2. Investment analysis

The purpose of this step is to determine whether the proposed project activity is economically or financially less attractive than other alternatives without additional funding that may be derived from the CDM project activities. The investment analysis was conducted in the following steps:

Sub-step 2a. Determine appropriate analysis method

The three analysis methods suggested by Tools for the Demonstration and Assessment of Additionality (Ver.05.2) are simple cost analysis (option I), investment comparison analysis (option II) and benchmark analysis (option III). Since the proposed project will earn revenues from not only the CDM but also from electricity output, the simple cost analysis method is not appropriate. The proposed project will use benchmark analysis method (option III) based on Project IRR.

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

In according with *Interim Rules on Economic Assessment of Electric Engineering Retrofit Projects*⁶

⁶ *Interim Rules on Economic Assessment of Electric Engineering Retrofit Projects*, State Power Corporation of China, Beijing: China Electric Power Press, 2003



issued by former State Power Corporation of China in 2002, the financial benchmark total investment Internal rate of return (IRR) after income tax of Chinese electricity industry is 8%, which has been used widely for Feasibility Studies of new power projects investment, including the wind power project in China. If the IRR (after-tax) of the project is higher than or equivalent to this benchmark, the proposed project is financially feasible.

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

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

(1) Basic parameters for calculation of financial indicators

Based on the Feasibility Study Report (FSR) and supplementary FSR, basic parameters for calculation of financial indicators are summarized as follows:

Table B-2: The financial indicators for the proposed project

Indicator	Unit	Value	Source
Installed capacity	MW	49.5	Table 14.2.2, P 174 of FSR
Annual output	MWh	108,830	Table 14.2.2, P 174 of FSR
Static Total Investment	10,000 CNY	44,537	Table 14.2.2, P 174 of FSR
On-grid Tariff (Including tax)	RMB/KWh	0.5123	Supplementary FSR
Value added tax rate	%	8.5	P169 of FSR
Income tax	%	15	
Education Tax	%	0	
City Build Tax	%	0 ⁷	
Residual value rate	%	5%	<i>Notification on the execution time for enterprise to adjust the ratio of residual value to the fixed assets ,released by</i>

⁷ Notification of Guoshuifa [994] 038 by National Tax Bureau,
<http://www.examda.com/Accountant/571/20091225/132354944.html>



			<i>State Administration of Taxation</i> ⁸
Depreciation period	year	15	Income Tax Law
Depreciation rate	%	6.33%	Calculated
Annual O&M Cost	10,000 CNY	1157	IRR calculation
Project lifetime	year	20	P166 of FSR
Expected CERs price	EURO/ t CO ₂ e	11	Expected price

All the parameters are from FSR dated August 2006, except for the on-grid tariff. The on-grid tariff in FSR is a theoretical value for the project owner to judge whether the project is financially attractive or not. However, the on-grid tariff from supplementary FSR is the realistic tariff when the project owner made an investment decision.

According to the commitment letter for the on-grid tariff and the indication in the FSR approval letter issued by Inner Mongolia Development and Reform Commission on 04/09/2006 and 09/11/2010 respectively, the electricity tariff of the proposed project during the whole operational lifetime can refer to the bidding electricity tariff of other projects. There are two bidding tariff of the wind farm project in Inner-Mongolia Autonomous Region were public on 13/08/2006, after the FSR preparation. The bidding tariffs of these two projects are 0.4056RMB/ kWh (including tax) and 0.4656 RMB/ kWh (including tax) respectively⁹. Furthermore, taking into account the regional wind resources, power grid status, local economic development and the construction condition of the proposed project, the Design Institute re-assumed the electricity tariff of the proposed project in the supplementary FSR, which is 0.5123RMB/kWh (after tax).

The reasonability of key financial parameters will be illustrated in the following table:

No.	Reg.No.	Project name	Investment cost per kW (RMB/kW)	Plant load factor	VAT	Depreciation (years)	Other cost (RMB/kW)	Percentage of O&M costs relative to total investment cost
1	0689	Inner Mongolia Chifeng Dongshan 49.3MW Wind Power Project ¹⁰	10445	28%	8.5%	15	54	1.7%
2	0994	Inner Monglia Chifeng Saihanba West 30.6MW Wind Farm Project ¹¹	9491	28%	8.5%	/	/	2.3%
3	1487	Inner Mongolia Wudaogou 50.25MW Wind Power Project ¹²	9406	28%	8.5%	12	40	2.4%

⁸ <http://www.chinalawedu.com/news/1200/22016/22020/22124/22131/gu631174417180150026617.htm>

⁹ As above

¹⁰ <http://cdm.unfccc.int/UserManagement/FileStorage/K9OBB75WSIE80WQ9HJYEGNMJRQUSTJ>

¹¹ <http://cdm.unfccc.int/UserManagement/FileStorage/HCB32NWP4DLVYTHMY4YLL0S3P8NOJL>

¹² <http://cdm.unfccc.int/UserManagement/FileStorage/VN4B5BGD9LDZI7LYHW2O5AT8TFZACL>



4	1488	Inner Mongolia Sunjiaying 50.25MW Wind Power Project	10073	27%	8.5%	12.5	40	2.4%
5	1628	Inner Mongolia Dali Phase IV 49.5MW Wind Power Project ¹³	11049	28%	8.5%	15	45	4.0%
6	1629	Inner Mongolia Dali Phase V 49.5MW Wind Power Project ¹⁴	11719	25%	8.5%	15	45	2.3%
7	1830	Inner Mongolia Chifeng Bolike 50 MW Wind Power Project	10 372	28%	8.5%	15	54	1.7%
8	1869	Inner Mongolia Chifeng Dongshan Phase II 50 MW Wind Power Project ¹⁵	10 180	28%	8.5%	15	36	1.6%
9	2165	Inner Mongolia Chifeng Saihanba Tashanzi Wind Power Project ¹⁶	9264	28%	8.5%	12	25	2.75%
10	2617	Inner Mongolia Chifeng Saihanba Qingmachang Wind Power Project ¹⁷	9389	28%	8.50%	12	25	2.75%
11	2811	Inner Mongolia Chifeng Yihegong Windfarm Project ¹⁸	9762	26%	8.50%	15	34	2.17%
12	2886	Inner Mongolia Tongliao Huolinhe Wind Power Project ¹⁹	9188	27%	8.50%	15	30	2.23%
13	3116	Inner Mongolia Chifeng Daguangdingzishan Wind Power Project ²⁰	10064	30%	8.5%	12	8	3.44%
14	3264	Inner Mongolia Tongliao Wind Farm Project Phase III ²¹	113,700	26%	8.5%	15	5	1.91%
15	3297	Inner Mongolia Tongliao Wind Farm Project Phase IV ²²	9705	25%	8.5%	15	9	1.97%
		The proposed project	8990	25%	8.5%	15	40	2.6%

¹³ <http://cdm.unfccc.int/UserManagement/FileStorage/R8YATR6GZASARWOENB4ZSQA7RKE65Y>

¹⁴ <http://cdm.unfccc.int/UserManagement/FileStorage/PG62O59CAHDL0IWC0KCVSF9XK2QIUUY>

¹⁵ <http://cdm.unfccc.int/UserManagement/FileStorage/5AB8PUS64QFO70EZ3V9GDK2M1IJWTC>

¹⁶ <http://cdm.unfccc.int/UserManagement/FileStorage/XGPT5A6BY81KIQFLEUZHRS4O2CD0W>

¹⁷ <http://cdm.unfccc.int/UserManagement/FileStorage/H4DUTQ86OKXR9PWGBZ1N3MYCS5VE0I>

¹⁸ <http://cdm.unfccc.int/UserManagement/FileStorage/IS7WZN95RYK12684HT3OMX0DVUGJAL>

¹⁹ <http://cdm.unfccc.int/UserManagement/FileStorage/TD8G7V0CBJ5QIRU3YNLMS2OFWE1AZ4>

²⁰ <http://cdm.unfccc.int/UserManagement/FileStorage/VN92BI6JTY4Q1U0MDF8HK5WGZLPSEO>

²¹ <http://cdm.unfccc.int/UserManagement/FileStorage/X01IMKQ9N6PJFTCHBLAZR5UVWD37EG>

²² <http://cdm.unfccc.int/UserManagement/FileStorage/BJGPD31U0AW8IFE6TVMYHROZS9X4Q5>

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

In accordance with the benchmark analysis (Option III), the proposed project will be financially unattractive if the financial indicators of the proposed project (e.g. project IRR) are lower than the benchmark rate.

Table B-3 shows the fluctuating situation of project IRR of the proposed project, with and without CDM revenues. As shown from Table B-3, the project IRR (after-tax) is 6.10% in absence of CDM revenues, which is lower than the benchmark rate of 8%. And therefore the project is unattractive to the investor, as well as not applicable commercially. However, with the CDM revenue, project IRR is significantly improved and exceeds the benchmark rate. Therefore the CDM revenues enable the project to overcome the investment barrier and demonstrate the additionality of the proposed project.

Table B-3: Financial indicators of the proposed project

	IRR (Total investment) Benchmark rate =8%
Without CDM revenue	6.10%
With CDM revenue	9.34%

Sub-step 2d. Sensitivity analysis

The purpose of the sensibility analysis is to examine whether the conclusion regarding the financial attractiveness is robust to reasonable variations in the critical assumption. The investment analysis provides a valid argument in favour of additionality only if it consistently supports (for a realistic range of assumptions) the conclusion that the project activity is unlikely to be the most financially attractive or is unlikely to be least financially attractive.

As for the proposed project, the following indicators will be identified as the variable factors to conduct the sensibility analysis of financial attraction:

1. Total static investment;
2. Annual O&M cost;
3. On-grid tariff;
4. Annual electricity supply.

When above four indicators fluctuate between -10% and 10%, the IRR of the proposed project (without income from CERs) varies to different extent as analyzed below.

Table B-4: Sensibility analysis of financial indicator for the proposed Project
(Project IRR without the CDM revenue)

	-10%	-5%	0	5%	10%
Total static investment	7.45%	6.75%	6.10%	5.50%	4.95%
Annual O&M costs	6.46%	6.28%	6.10%	5.91%	5.73%
On-grid tariff	4.41%	5.27%	6.10%	6.90%	7.68%
Annual electricity supply	4.41%	5.27%	6.10%	6.90%	7.68%

Figure B-2: Sensibility analysis of financial indicator**Table B-5: Variation of financial parameters to make the project IRR reach 8%**

Variation of the parameters to make IRR reach the benchmark 8%	Total static investment	Annual O&M cost	On-grid tariff	Annual electricity supply
	-13.7%	-63%	12.1%	12.1%



Total investment of fixed asset

Total static investment is an important parameter affecting the project IRR. If the total static investment decreases by 12.1%, the IRR of the proposed project will reach the benchmark. As evaluated in the FSR, the total static investment of the proposed project is mainly composed by the wind turbine system and construction engineering. However, the prices of raw materials, labor and commodities have been increasing recently²³. Furthermore, in accordance with Final Account of the proposed project issued by the independent third party 02/09/2009, the actual expenditure of the proposed project is 486.084 million RMB Yuan, which is more than 445.37million RMB Yuan. Therefore, it is impossible that the static investment is 12.1% lower than estimated in the FSR and PDD.

Annual O&M Costs

The impact of the average annual O&M cost is the slightest, the IRR of the proposed project will exceed the benchmark when the annual O&M cost declined 63%. Whereas, according to the FSR, the O&M costs are composed of maintenance costs, annual salaries for the employees, insurance premium of fixed assets, material costs and miscellaneous costs. Moreover, the price of material and salaries of the employees are gradually increasing in China, which leads annual O&M cost gradually increasing. Furthermore, the FSR was finished by a qualified consultant company focused in wind power engineering and has been approved by NDRC, so the O&M cost wouldn't decline 63% compared with the one listed in FSR. Therefore, the proposed project is always lack of financial attractiveness within the reasonable range of annual O&M cost.

On-grid Tariff

The IRR of proposed project will reach the benchmark when the expected tariff increases by 12.1% (0.574RMB/KWh). However, as demonstrated below that the entire approved similar wind farm tariffs since 2002 in eastern Inner Mongolia Autonomous Region is stable at 0.54Yuan/kWh (incl. VAT), it is unlikely that the tariff of the proposed project could increase by 12.1%.

According to the statistics of installed capacity of wind power in China in 2007 by Professor Shi Pengfei²⁴ and the Development Report of New Energy and Renewable Energy of China²⁵, there were no existing commercial wind farms in East Inner Mongolia before 2006.

Since 9 June 2007, NDRC began to unify wind farm tariffs in eastern Inner Mongolia to be 0.54Yuan/kWh (incl. VAT)²⁶. The wind farm tariff in eastern Inner Mongolia has since been maintained at 0.54Yuan/kWh in the subsequent tariff notifications issued by NDRC dated 03/12/2007²⁷, Document [2008]1876 dated 23/07/2008²⁸ and Document [2009]1906²⁹ dated on 20/07/2009³⁰.

Since from 2002 till now, there are totally 15 conventional (un-tendering) wind farms in eastern Inner Mongolia Autonomous Region obtaining the approved tariff and all the tariffs have been unified the same at 0.54Yuan/kWh (incl. VAT), it can be concluded that it is unlikely that the tariff assumed in the supplementary FSR and PDD would be increased by 12.1%.

²³ <http://www.in-en.com/power/html/power-1636163635255708.html>

²⁴ http://www.cwea.org.cn/download/display_list.asp?cid=2

²⁵ <http://www.newenergy.org.cn/html/00412/20041605.html>

²⁶ http://www.hebj.gov.cn/upfiles/xy_col32gjc_20070718164220007126.htm

²⁷ Notification of on-grid tariff for wind power projects in Hebei Zhangjiawan and Heilongjiang Wuerqulishan issued by NDRC on 3rd December 2007, document number:[2007]3303;

²⁸ Notification of on-grid tariff for wind power projects of Heihongjiang Maanshan, Liaoning Fuxin issued by NDRC on 23rd July 2008, document number: [2008]1876. As for more detail information, please refer to http://www.sdpc.gov.cn/jggl/zcfg/t20080813_230726.htm.

²⁹ <http://www.sdpc.gov.cn/jggl/jggs/W020090727550526181974.pdf>

³⁰ http://www.sdpc.gov.cn/jggl/jggs/t20090727_292846.htm



Annual On-grid Electricity Power

If the electricity generation increases by 12.1%, the project IRR can reach 8%. However, large variation of annual electricity generation is impossible:

- The annual net supplied power is taken from the FSR, which is prepared by a 3rd independent qualified design institute with the highest grade: Grade A;
- The wind resource was assessed based on historical meteorological data in the local area over the past 25 years (1971-2005), and onsite measured wind data in the year from August 2005 to August 2006 in accordance with the ‘Methodology of wind energy resource for wind farm’ (GB/T 18710-2002), published by General Administration of Quality Supervision, Inspection and Quarantine of the People’s Republic of China in 2002;
- The estimated net supplied power is calculated using professional WASP software based on the wind resources and the turbine parameters, and the output is maximized through selection of the most suitable turbines, optimal turbine distribution in the wind farm, and considering the specific turbine characteristics, and the grid connection.

Therefore, IRR of the proposed project is only 6.10% without CDM revenue, justifying that the proposed project is facing with the investment barriers.

Step 3: Barrier analysis

The proposed project does not adopt barrier analysis.

Step 4: Common practice analysis

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

As per the “Tool for the demonstration and assessment of additionality” (Version 05.2), the other activities that are operational and that are similar to the proposed project activity were selected according to the follow rules:

- The activities should be located in the same province. In China, the general environment of projects of this type of wind farm such as the wind resources³¹, on-grid tariff, investment climate³² are only similar and comparable in the same province. Therefore, the project is compared to other projects in Inner Mongolia Autonomous Region.
- The activities should be implemented after 2002. The wider power sector reforms happened in China since 2002, which led to diversification in the ownership of power generation. As a result, new generation, including wind power, was expected to compete under more commercial conditions. Moreover, the Chinese Government launched the Wind Concession Program in 2002³³, which was designed to bring wind power development in China onto a new commercial footing.
- The installed capacity of activities should be more than 15MW. Projects less than 15MW belong to small-scale projects.

All the wind farm projects list in table below are from “ Statistics of domestic wind farm installation capacity in 2007”, Shi Pengfei, excluding the CDM project activities (registered project and project activities which have been publish on the UNFCCC website for global stakeholder consultation as part of the validation process)³⁴.

³¹ http://cvera.cma.gov.cn/upload/b_2_left_02.jpg

³² http://www.ndrc.gov.cn/nyjt/nyzywx/t20050810_41378.htm

³³ A study on the Price Policy of Wind Power in China issued by Chinese Renewable Energy Industries Association (CREIA), GREENPEACE and Global Wind Energy Council (GWEC) dated 10 2006.

³⁴ <http://cdm.unfccc.int/Projects/registered.html>; <http://cdm.unfccc.int/Projects/Validation/index.html>



The similar projects with capacity of no less than 15MW in Inner Mongolia Autonomous Region and that have commissioned since 2002 without CDM support are summarized in the following table.

The projects those are operational and similar to the proposed project activity, excluding other CDM project are listed in the following table.

<i>Name of the Wind Farm</i>	<i>Installed capacity(MW)</i>	<i>Date of connecting to the grid</i>	<i>Remarks</i>
<i>Inner Mongolia Chifeng Dali Wind Power Project (Phase III)</i>	31.2	2004	Demonstration Project supported by the national debt fund ³⁵
Honiton Energy Bailingmiao wind farm project	35	12/2007	Applying for Voluntary Emission Reduction support under Gold Standard ³⁶

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

From the table above it can be shown that there are two similar wind farms which are not applying for CDM financial support. Dali phase III wind project was Demonstration Project supported by the national debt fund³⁷ and such support can no longer be obtained in Inner Mongolia. Honiton Energy Bailingmiao wind farm project is developed by foreign investor and the project can not apply for CDM, therefore, the developer is applying for Gold Standard Voluntary Emission Reduction³⁸.

It can be concluded that it is not feasible to develop wind farms in Inner Mongolia Autonomous Region without the CER revenue. All wind farm developers are applying for support of carbon credit; several wind farms in Inner Mongolia have already successfully been registered as CDM projects in EB³⁹. Therefore, the wind power projects similar with the proposed project activity are not common practice in Inner Mongolia Autonomous Region.

In conclusion, the proposed CDM project is not the baseline scenario, and the project activity is additional.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

I. Baseline emissions (BE_y) Calculation

According to ACM0002, the baseline emissions include only CO₂ emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity, calculated as follows:

$$BE_y = EG_{PJ,y} \times EF_{grid,CM,y}$$

Where:

BE_y = Baseline emissions in year y (tCO₂/yr)

³⁵ <http://www.chifeng.gov.cn/html/2008-11/3130.shtml>

³⁶ <http://www.sgsqualitynetwork.com/tradeassurance/ccp/projects/project.php?id=423>

³⁷ <http://www.chifeng.gov.cn/html/2008-11/3130.shtml>

³⁸ <http://www.sgsqualitynetwork.com/tradeassurance/ccp/projects/project.php?id=423>

³⁹ <http://cdm.unfccc.int/Projects/registered.html>



$EG_{PJ,y}$ = Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y (MWh/yr)

$EF_{grid,CM,y}$ = 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” (tCO₂/MWh)

According to ACM0002 (Version 11) the propose project is the installation of a new grid-connected renewable power plant/unit at a site where no renewable power plant was operation prior to the implementation of the project activity, the following applies:

$$EG_{PJ,J} = EG_{facility,y}$$

Where:

$EG_{PJ,y}$ = Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y (MWh/yr)

$EG_{facility,y}$ = Quantity of net electricity generation supplied by the project plant/unit to the grid in year y (MWh/yr)

According to the *Tool to calculate the emission factor for an electricity system.(Version 02)*, the baseline emission factor(EF_y) is calculated as a combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) factors according to the following seven steps. OM and BM are calculated by the method of ex-ante, which will be fixed during the first crediting period. Data for calculation are based on official national statistics books: China Energy Statistical Yearbook and China Electric Power Yearbook.

The following seven steps are applied to calculate the baseline emission factor (CM emission factor):

STEP 1: Identify the relevant electricity systems.

STEP 2: Choose whether to include off-grid power plants in the project electricity system (optional)

STEP 3: Select a method to determine the operating margin (OM).

STEP 4: Calculate the operating margin emission factor according to the selected method.

STEP 5: Identify the group of power units to be included in the build margin (BM).

STEP 6: Calculate the build margin emission factor.

STEP 7: Calculate the combined margin (CM) emissions factor.

Step1: Identify the relevant electricity systems

The electric power system of the proposed project activity has been identified as NECPG in section B.3 above. The electricity generated by the proposal project will be supplied to the NECPG, in the absence of the project activity; both the existing power plants and the power plants to be built in a foreseeable future within the NECPG would supply electricity comparable to that supplied by the proposed project. In accordance with the *Notification on Determining Baseline Emission Factor of China's Grid* issued by China DNA on 06/07/2009, the Northeast China Power Grid includes provincial grid spatial extent of Heilongjiang Power Grid, Jilin Power Grid, and Liaoning Power Grid.

Step 2: Choose whether to include off-grid power plants in the project electricity system (optional).

Option I (only grid power plants are included in the calculation) provided in *Tool to Calculate the Emission Factor for an Electricity System* is chosen to calculate the operating margin and build margin emission factor.

Step 3: Select a method to determine the operating margin (OM).



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

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

The Simple OM method can be used where 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 normal data for hydroelectricity production. Low-cost/must-run resources do indeed constitute less than 50% of NECPG during 2003 to 2007, so, the project participants have chosen to use the Simple OM method (option a) for calculating the operating margin emission factor.

The Simple OM can be calculated using either of the two following data vintages for year y ;

- *Ex ante option*: If the *ex ante* option is chosen, the emission factor is determined once at the validation stage, thus no monitoring and recalculation of the emissions factor during the crediting period is required. For grid power plants, use 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;
- *Ex post option*: If the *ex post* option is chosen, the emission factor is determined for the year in which the project activity displaces grid electricity, requiring the emissions factor to be updated annually during monitoring. If the data required calculating the emission factor for year y is usually only available later than six months after the end of year y , alternatively the emission factor of the previous year $y-1$ may be used. If the data is usually only available 18 months after the end of year y , the emission factor of the year preceding the previous year $y-2$ may be used. The same data vintage (y , $y-1$ or $y-2$) should be used throughout all crediting periods.

Here *ex-ante* option is chosen, and $EF_{grid,OMsimple,y}$ is fixed during the crediting period. The three most recent years for which the latest data is available at the time of GSP are 2005-2007.

Step 4: Calculate the operating margin emission factor according to the selected method

According to “*Tool to calculate the emission factor for an electricity system (Version 02)*”, the simple OM emission factor is calculated as the generation-weighted average CO₂ emissions per unit net electricity generation (tCO₂/MWh) of all generating power plants serving the system, not including low-cost / must-run power plants / units, and including electricity imports to the grid. Electricity imports from a connected electricity system should be considered as one power source, and the simple OM of this export electricity system should be selected as the electricity imports.

The simple OM may be calculated:

Option A: Based on the net electricity generation and a CO₂ emission factor of each power unit⁴⁰; or

Option B: Based 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.

⁴⁰ Power units should be considered if some of the power units at the site of the power plant are low-cost/must-run units and some are not. Power plants can be considered if *all* power units at the site of the power plant belong to the group of low-cost / must-run units or if *all* power units at the site of the power plant do *not* belong to the group of low-cost/must-run units.



Option B can only be used if:

- (a) The necessary data for Option A is not available; and
- (b) Only nuclear and renewable power generation are considered as low-cost/must-run power sources and the quantity of electricity supplied to the grid by these sources is known; and
- (c) Off-grid power plants are not included in the calculation (i.e., Option I has been chosen in *Step 2*).

However, the data of each power plant /unit is unavailable; Option A is not applicable to the proposed project. Furthermore, nuclear and renewable power generation are considered as low-cost / must-run power sources and the quantity of electricity supplied to the grid by these sources is known. Therefore, Option B is chosen to calculate the operating margin emission factor ($EF_{grid,OMsimple,y}$) of NECPG.

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

$$EF_{grid,OMsimple,y} = \frac{\sum_i FC_{i,y} \times NCV_{i,y} \times EF_{CO_2,i,y}}{EG_y} \quad (1)$$

Where:

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

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

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

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

EG_y = Net electricity generated and delivered to the grid by 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 = The relevant year as per the data vintage chosen in Step 3, i.e., 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).

The data on electricity generation, installed capacity and auxiliary electricity consumption are obtained from the *China electric Power Yearbook* from 2005 to 2008 (published annually). The data on different fuel consumptions for power generation and the net caloric values ($NCV_{i,y}$) of different fuels are obtained from the *China Energy Statistical Yearbook* from 2006 to 2008. The data source of electricity exchange between the power grids is respectively *Electric Power Industry Summary Statistics* from 2005 to 2006 and *Electric Power Industry Statistics Compilation, 2007*. The emission factors ($EF_{CO_2,i,y}$) of the fuels adopted are obtained from IPCC default values at the lower limit of the uncertainty at a 95% confidence interval as provided in Table 1.2 of Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories

Based on these data, the Simple OM Emission Factor ($EF_{grid,OMsimple,y}$) of NECPG is calculated as 1.1293tCO_{2e}/MWh (refer to Annex 3 for details).

**Step 5: Identify the group of power units to be included in the build margin**

According to “Tool to calculate the emission factor for an electricity system, Version 02”, the sample group of power units *m* used to calculate the build margin consists of either⁴¹:

- (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 recently⁴².

In NECPG, the information on the five power plants built most recently is not available. According to the EB’s guidance on DNV deviation request, the EB accepted the following deviation⁴³:

- 1) Use of capacity additions during last 1 - 3 years for estimating the build margin emission factor for grid electricity;
- 2) Use of weights estimated using installed capacity in place of annual electricity generation;
- 3) Use the efficiency level of the best technology commercially available in the provincial/regional or national grid of China, as a conservative proxy, for each fuel type in estimating the fuel consumption to estimate the build margin (BM).

The set of power units that comprises the larger annual generation should be used. Therefore, in term of NECPG, option b) is chosen since it would represent a larger, more representative of annual generation.

In terms of vintage of data, project participants can choose between one of the following 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, *ex post*, including those units built up to the year of registration of the project activity or, if information up to the year of registration is not yet available, including those units built up to the latest year for which information is available. For the second crediting period, the build margin emissions factor shall be calculated *ex ante*, as described in Option 1 above. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used.

In term of vintage of data, the Option 1 was chosen for this project.

Step 6: Calculate the build margin emission factor

⁴¹ If this approach does not reasonably reflect the power plants that would likely be built in the absence of the project activity, project participants are encouraged to submit alternative proposals for consideration by the CDM Executive Board.

⁴² If 20% falls on part capacity of a unit, that unit is fully included in the calculation.

⁴³ <http://cdm.unfccc.int/Projects/Deviations>

On 7 October 2005 DNV requested guidance for projects in China. The EB guidance was given in a response letter entitled “Several projects in China (application of approved methodology AM0005), see http://cdm.unfccc.int/UserManagement/FileStorage/AM_CLAR_QEJWJEF3CFBP1OZAK6V5YXPQKK7WYJ. While the request for deviation was submitted relating to AM0005, the guidance can also be used for ACM0002 as this directly replaces AM0005 and all OM and BM calculations in these two methodologies are the same.



In accordance with “*Tool to calculate the emission factor for an electricity system, Version 02*”, the build margin emissions factor is the generation-weighted average emission factor (tCO₂/MWh) of all power units m during the most recent year y for which power generation data is available, calculated as follows:

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

Where:

- $EF_{grid,BM,y}$ = Build margin CO₂ emission factor in year y (tCO₂/MWh)
 $EG_{m,y}$ = Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh)
 $EF_{EL,m,y}$ = CO₂ emission factor of power unit m in year y (tCO₂/MWh)
 m = Power units included in the build margin
 y = Most recent historical year for which power generation data is available

Where, the CO₂ emission factor of each power unit m ($EF_{EL,m,y}$) should be determined as per the *Tool to calculate the emission factor for an electricity system* in Step 4 (a) for the simple OM, using options A1, A2 or A3, using for y the most recent historical year for which power generation data is available, and using for m the power units included in the build margin. For NECPG, only data on electricity generation and the fuel types used for a power unit m is available, the emission factor should be determined based on the CO₂ emission factor of the fuel type used and the efficiency of the power unit. Therefore, the CO₂ emission factor of each power unit m ($EF_{EL,m,y}$) was calculated based on option A2.

ACM0002 allows project participants to choose between two given options for calculating the Build Margin for the project, one is ex-ante calculation, and the other is annual ex-post updating in the first crediting period. For this project the first option is chosen. The Build Margin Emission Factor therefore is based ex-ante on the most recent information available on plants already built at the time of PDD submission to the DOE for validation. The $EF_{grid,BM,y}$ therefore is fixed for the first crediting period.

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.

Due to the unavailability of some data, some changes have been made and approved by CDM EB. That is to calculate the incremental installed capacity and the mix of power generating techniques first, and then calculate the weight of the incremental installed capacity created by all kinds of power generating techniques and finally calculate emission factors by using the maximized efficiency figures of techniques.

Since the figures of the capacity of coal-fired, oil-fired and gas-fired power generation cannot be separated from the statistics of thermal power generation, the following measures will be taken in calculation: first, work out the proportion of CO₂ emission caused by solid, liquid or gas fuels to the total emission based on the available data of energy balance in the recent year; second, taking the

proportion as the weight, calculate the emission factor of thermal power generation for each grid based on the emission factor at the maximized efficiency level of techniques; finally, BM of the grid equals to the emission factor of thermal power generation multiplied the weight of the thermal power installed capacity in the increase of total installed capacity which is close but not exceeding 20% of existing installed capacity.

The calculation steps and formulas are as follows:

Step a - Calculate the proportion of CO₂ emissions caused by solid, liquid and gas fuels in the total emissions respectively:

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

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

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

Where:

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

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

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

And COAL, OIL and GAS are footnote group for solid fuels, liquid fuels and gas fuels respectively.

For more detailed information, please refer to Annex 3.

Step b - Calculate the corresponding emission factor for thermal power generation

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

Where, $EF_{Coal,Adv,y}$, $EF_{Oil,Adv,y}$ and $EF_{Gas,Adv,y}$ respectively refer to the emission factor representing best technology commercially available for fuel of coal, oil or gas fired power plants in China.

For more detailed information, please refer to Annex 3.

Step c - Calculate BM of the grid

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

Where:



- $CAP_{Thermal,y}$ =The increased installed capacity of thermal power generation
- $CAP_{Total,y}$ =The total amount of newly incremental installed capacity, which is more than 20% of existing capacity

The data on the net caloric values of the different fuels are obtained from P283 of the *China Energy Statistical Yearbook 2008*. The emission factors of the different fuels adopted are obtained from *2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2 Energy*, and 95% confidence interval lower limit on the emission factor of the different fuels was adopted.

In accordance with the *Notification on Determining Baseline Emission Factor of China's Grid* issued by China DNA on 06/07/2009⁴⁴, the estimated coal consumption of Power Station with a capacity of 600MW is 322.5gce/kWh, which corresponds to an efficiency of 38.10% for electricity generation. For gas and oil power plants, a 200MW power plant with a specific fuel consumption of 246gce/kWh, which corresponds to an efficiency of 49.99% for electricity generation, is selected as commercially available best practice technology in terms of efficiency.

According to the *Notification on Determining Baseline Emission Factor of China's Grid*, the build margin emission factor ($EF_{grid,BM,y}$) of the NECPG is 0.7241 tCO₂e/MWh (refer to Annex 3 for details).

Step 7: - Calculate the combined margin emission factor

Based on the “*tool to calculate the emission factor for an electricity system (Version 02)*” the combined margin emissions factor is calculated as follows:

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

Where:

- $EF_{grid,BM,y}$ =Build margin CO₂ emission factor in year y (tCO₂/MWh)
- $EF_{grid,OM,y}$ =Operating margin CO₂ emission factor in year y (tCO₂/MWh)
- ω_{OM} =Weighting of operating margin emissions factor (%)
- ω_{BM} =Weighting of build margin emissions factor (%)

The Combined Margin emission factor ($EF_{grid,CM,y}$) should be calculated as the weighted average of the Operating Margin emission factor ($EF_{grid,OM,y}$) and the Build Margin emission factor ($EF_{grid,BM,y}$), where the weights ω_{OM} and ω_{BM} , by default, are 0.75 and 0.25 (owing to their intermittent and non-dispatchable nature) for the first crediting period and for subsequent crediting periods; and $EF_{grid,OM,y}$ and $EF_{grid,BM,y}$ are calculated as described above and are expressed in tCO₂/MWh.

$$EF_{grid,CM,y} = 1.1293 * 0.75 + 0.7241 * 0.25 = 1.0280 \text{ (tCO}_2\text{e/MWh)}$$

II. Project emissions (PE_y)

The proposed project is a wind power plant and the project emissions should not be taken into account according to ACM0002 (Version 11), i.e. $PE_y = 0 \text{ tCO}_2\text{e}$.

⁴⁴ <http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File2332.doc>

**III. Project leakage (LE_y)**

No leakage is identified as the project is a wind project, and any electricity usage is taken into account in the net electricity generation from the proposed project, i.e. $LE_y = 0$ tCO₂e.

IV. Emission reductions (ER_y)

The project activity will generate GHG emission reductions by avoiding CO₂ emissions from electricity generation by fossil fuel power plants of NECPG. The emission reduction (ER_y) is calculated as follows:

$$ER_y = BE_y - PE_y$$

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

Data / Parameter:	$FC_{i,y}$
Data unit:	Mass or Volume unit
Description:	Amount of fossil fuel type i consumed in the project electricity system in year y
Source of data used:	China Energy Statistical Yearbook (2006~2008)
Value applied:	See Annex 3 for details.
Justification of the choice of data or description of measurement methods and procedures actually applied :	Based on official national statistics
Any comment:	-

Data / Parameter:	$NCV_{i,y}$
Data unit:	GJ/mass or volume unit
Description:	Net calorific value (energy content) of fuel type i in year y
Source of data used:	China Energy Statistical Yearbook 2008
Value applied:	See Annex 3 for details.
Justification of the choice of data or description of measurement methods and procedures actually applied :	Based on official national statistics
Any comment:	

Data / Parameter:	$EF_{CO_2,i,y}$
Data unit:	t CO ₂ /GJ
Description:	CO ₂ emission factor of fossil fuel type i in year y
Source of data used:	Taken from DNA of China, see http://qhs.ndrc.gov.cn/qjzjz/t20090703_289357.htm . Original data used are the IPCC default values at the lower limit of the uncertainty at a 95%



	confidence interval as provided in table 1.4 of Chapter1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories
Value applied:	See Annex 3 for details.
Justification of the choice of data or description of measurement methods and procedures actually applied :	Based on official national statistics
Any comment:	

Data / Parameter:	EG_y
Data unit:	MWh
Description:	Net electricity generated in the project electricity system (NECPG) in year y , not including low-cost/must-run power plants/units
Source of data used:	China Electric Power Yearbook, 2005~2008
Value applied:	See Annex 3 for details.
Justification of the choice of data or description of measurement methods and procedures actually applied :	Based on official national statistics
Any comment:	

Data / Parameter:	$\eta_{best, i}$
Data unit:	%
Description:	Best commercial available efficiency of coal, gas, oil fuel power plant
Source of data used:	<i>Notification on Determining Baseline Emission Factor of China's Grid</i> issued by China's DNA on 06/07/2009; http://qhs.ndrc.gov.cn/qjzjz/t20090703_289357.htm
Value applied:	See Annex 3 for details.
Justification of the choice of data or description of measurement methods and procedures actually applied :	Based on official national statistics
Any comment:	

Data / Parameter:	Installed Capacity
Data unit:	MW
Description:	The installed capacity of NECPG in year y
Source of data used:	China Electric Power Yearbook, 2006~2008
Value applied:	See Annex 3 for details.
Justification of the choice of data or description of measurement methods and procedures actually applied :	Based on official national statistics



Any comment:

--

B.6.3. Ex-ante calculation of emission reductions:**I. Estimated baseline emissions**

According to the Feasibility Study Report, the annual power generation is estimated to be 108,830 MWh. The baseline emission factor is 1.0280 tCO₂e/ MWh and the annual baseline emission of the project is 111,877 tCO₂e as calculated below.

$$BE_y = EG_y \times EF_y = 108,830 \times 1.0280 = 111,877 \text{ tCO}_2\text{e}$$

II. Estimated project emissions

The proposed project is a wind power plant that the project emissions should not be taken into account according to ACM0002, PE_y i.e. =0tCO₂e.

III. Calculate the project leakage

According to ACM0002, the proposed project needn't consider leakages, L_y i.e. =0tCO₂e.

IV. Calculate the emission reductions

The project activity will generate GHG emission reductions by avoiding CO₂ emissions from electricity generation by fossil fuel power plants. The emission reduction (ER_y) is calculated as follows:

$$ER_y = BE_y - PE_y - L_y = 111,877 - 0 - 0 = 111,877 \text{ tCO}_2\text{e}$$

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

Year	Estimation of project activity emissions (tonnes of CO ₂ e)	Estimation of baseline emissions (tonnes of CO ₂ e)	Estimation of leakage (tonnes of CO ₂ e)	Estimation of overall emission reductions (tonnes of CO ₂ e)
01/05/2011-31/12/2011	0	37,292	0	74,585
2012	0	111,877	0	111,877
2013	0	111,877	0	111,877
2014	0	111,877	0	111,877
2015	0	111,877	0	111,877
2016	0	111,877	0	111,877
2017	0	111,877	0	111,877
01/01/2018-30/04/2018	0	74,585	0	37,292
Total (tonnes of CO₂e)	0	783,139	0	783,139

B.7. Application of the monitoring methodology and description of the monitoring plan:**B.7.1. Data and parameters monitored:**



Data to be monitored in tables below shall be archived for 2 years following the end of the crediting period.

Data / Parameter:	$EG_{Total,y}$
Data unit:	MWh
Description:	The total net electricity supply to the NECPG by “P” and “X” in year y
Source of data to be used:	The data measured by the main meter
Value of data applied for the purpose of calculating expected emission reductions in section B.5	The annual on-grid electricity supply of “P” is expected at 108,830 MWh, which is used for calculating expected emission reductions of the proposed project.
Description of measurement methods and procedures to be applied:	The readings of the electricity meter will be continuously 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 0.2s, in line with relevant national standard. The calibration frequency is once a year.
Monitoring frequency	Continuously measurement and monthly recording
QA/QC procedures to be applied:	According to national standard, meter will be calibrated annually. Data measured by the meter will be cross checked by receipts.
Any comment:	Uncertainty level of data is low.

Data / Parameter:	$E_{P,y}$ and $E_{X,y}$
Data unit:	MWh
Description:	Electricity generation by “P” and “X” in year y.
Source of data to be used:	The data measured by on-site meters
Value of data applied for the purpose of calculating expected emission reductions in section B.5	---
Description of measurement methods and procedures to be applied:	The readings of the electricity meter will be continuously 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 0.5, in line with relevant national standard. The calibration frequency is once a year.
Monitoring frequency	Continuously measurement and monthly recording
QA/QC procedures to be applied:	According to national standard, meter will be calibrated annually.
Any comment:	Uncertainty level of data is low.

B.7.2. Description of the monitoring plan:

The proposed project adopts the approved consolidated monitoring methodology ACM0002 (Version011) “Consolidated baseline methodology for grid-connected electricity generation from renewable sources” to determine the emission reductions due to the net electricity supply to NECPG by the proposed project.

1. The users --- who use the monitoring plan

The proposed project owner will use this document as guideline in monitoring of the project emission reduction performance and will adhere to the guidelines set out in this monitoring plan. This plan should be modified according to actual conditions and requirements of DOE in order to ensure that the monitoring is credible, transparent and conservative.

2. Operational and management structure for monitoring

The monitoring of the emission reductions will be carried out according to Figure4 below.

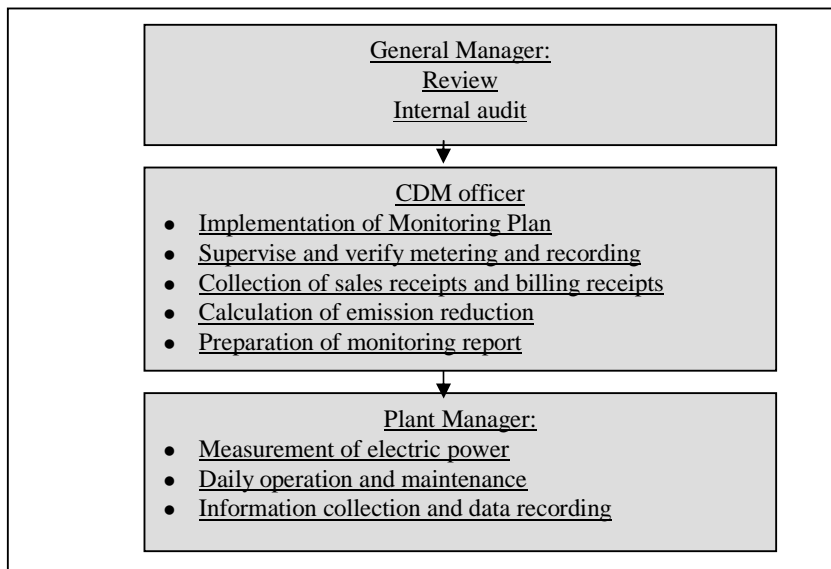


Figure4. The personnel structure of the project monitoring

Plant manager of wind farm is responsible to record and collect the information and data required by the Monitoring Plan. The required information and data will be documented and sent to the CDM officer monthly. The CDM officer works out the monitoring plan, charges of its implementation and reports to the General Manager of the company. The General Manager of the company will make the confirmations on monitoring calculation data and reports.

The project owner and CREIA will work together to train relevant staffs of the wind power plant for data monitoring and data management. The training contains CDM knowledge, operational regulations, quality control (QC) standard, data monitoring and data management etc.

3. Monitoring

3.1 Monitoring equipment

The main meter and back-up meter installed in the substation is bidirectional, recording the electricity of “P” and “X” exported to the grid ($EG_{export,y}$) and imported from the grid ($EG_{import,y}$). They will be owned, operated and maintained by the grid company. The reading records are provided to the project owner by the grid company regularly, and can be cross-checked by sales receipts. The Meter 1 and Meter X are installed at lower side of the on-site 220kV transformers, which are used to monitor the

electricity generation of “P” ($E_{P,y}$) and “X” ($E_{X,y}$). The on-site meters are owned, operated and maintained by the project owner. The location of those meters is presented in following figure5:

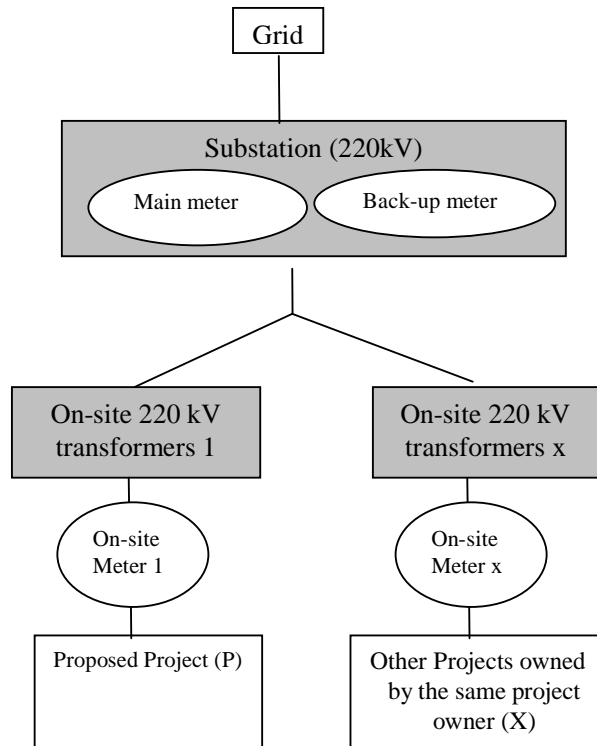


Figure 5 Meters Location

Note: X here stands for different on-site meters for the corresponding projects owned by the same project owner. Each project matches with an on-site 220KV transformers.

As mentioned above, $EG_{export,y}$ and $EG_{import,y}$ was recorded by main meter installed in the substation. The net electricity supply by “P” and “X” ($EG_{Total,y}$) is the difference between $EG_{export,y}$ and $EG_{import,y}$, i.e.

$$EG_{Total,y} = EG_{export,y} - EG_{import,y}$$

As demonstrated in the beginning of B.7, since the “P” and “X” share the same main meter, the separate net electricity supply for each project cannot be obtained from the main meter; therefore the on-site meters can be used to calculate the share of the net supply to the grid by each project. The net electricity supplied from “P” ($EG_{P,y}$) can now be calculated as follows:

$$EG_{P,y} = EG_{Total,y} \times E_{P,y} / (E_{P,y} + E_{X,y})$$

Where:

$EG_{P,y}$ is the calculated net electricity supplied from “P” in year y;

$EG_{Total,y}$ is the total net electricity supplied to the NECPG by “P” and “X” in year y, read by the main meter;



$E_{x,y}$ is the electricity exported by the other projects owned by the same project owner in year y, read by on-site meter x;

$E_{p,y}$ is the electricity exported by the proposed project in year y, read by on-site meter 1.

The calculated net electricity supplied from “P” ($EG_{p,y}$) is therefore used for the emission reduction calculations.

This approach is flexible to accommodate potential future installations which also share the same main meter with “P”.

3.2 Monitoring Procedures

The project owner and the grid company are responsible for maintenance, calibration and monitoring of the on-site meters and the main meter respectively. The procedures of monitoring the electricity are summarized as follows:

- 1) At fixed time on a particular day of each month, the grid company should read and record data from the main meter and together with the project owner read and record data from on-site meters installed in each project site and then check the reading of the main meter against the on-site meters.
- 2) The grid company provides the project owner with the monthly record of EG_{total} .
- 3) The sales receipts will be used for cross check purpose.
- 4) The project owner carries out an internal audit on the readings, grid data and calculations, and report to DOE for verification.

Should any previous months reading of the main meter be inaccurate by more than the allowable error, or otherwise functioned improperly, the net energy output shall be determined by:

- (a) first, by reading backup meter installed, unless a test by either party reveals it is inaccurate;
- (b) if the backup system is not within acceptable limits of accuracy or is otherwise performing improperly the developer and grid company shall jointly prepare an estimate of the correct reading;
- (c) if the grid company and the developer fail to agree then the matter will be referred for arbitration according to agreed procedures.

4. Calibration of Meters & Metering

An agreement should be signed between the project owner and the grid company that defines the metering arrangements and the required quality control procedures to ensure accuracy. The metering equipment will be properly calibrated and checked annually for accuracy.

- 1) The metering equipment shall have sufficient accuracy so that error resulting from such equipment shall not exceed $\pm 0.5\%$ of full-scale rating.
- 2) All the meters installed shall be tested within 10 days after:
 - (a) The detection of a difference larger than the allowable error in the reading of both meters
 - (b) The repair of all or part of the meter caused by the failure of one or more parts to operate in accordance with the specifications.

Calibration is carried out with the records being provided to the project owner, and these records will be maintained by the project owner.

5. Quality Assurance and Quality Control

The quality assurance and quality control procedures for recording, maintaining and archiving data shall be improved as part of this CDM project activity. This is an on-going process which will be



ensured through the CDM mechanism in terms of the need for verification of the emissions on an annual basis according to this PDD and the CDM manual.

6. Data Management System

This provides information on record keeping of the data collected during monitoring. Record keeping is the most important exercise in relation to the monitoring process. Without accurate and efficient record keeping, project emission reductions cannot be verified. Below follows an outline of how project related records would be managed.

Overall responsibility for monitoring of GHG emissions reduction will rest with the CDM responsible person of the proposed project. The CDM manual sets out the procedures for tracking information from the primary source to the end-data calculations in paper document format. It is the responsibility of the project owner to provide additional necessary data and information for validation and verification requirements of respective DOE.

Data will be archived at the end of each month using electronic spreadsheets and will be stored on hard disk. Physical documentation such as paper-based maps, diagrams and environmental assessment will be collated in a central place, together with this monitoring plan. In order to facilitate the auditor's reference, monitoring results will be indexed. All paper-based information will be stored by the project owner and kept at least one copy. And all data including calibration records is kept until 2 years after the end of the total crediting period of the CDM project.

7. Monitoring Report

The CDM officer will write the monitoring report including electricity produced and emission reduction every month and then submit it to the general manager, who will audit it internally. And all these documents can be verified by DOE.

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

The completion of the baseline methodology is 14/07/2010.

The technicians determining the baseline methodology include:

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None of the people above is the project participants.

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:

12/06/2007 (the date of Equipment Purchasing Agreement signed)

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

20 years 0 month.

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:

01/05/2011 or the registration date of the proposed project (whichever is later)

C.2.1.2. Length of the first crediting period:

7 years 0 months

C.2.2. Fixed crediting period:

n/a

C.2.2.1. Starting date:

n/a

C.2.2.2. Length:

n/a

SECTION D. Environmental impacts

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

An Environmental Impact Assessment (EIA) for the proposed project was completed in July 2006 by Inner Mongolia Exploration & Design Institute of Water Resources and Hydropower and subsequently approved by the Inner-Mongolia Environmental Protection Bureau in September 2006.

A summary of the impacts is presented below. The environmental impacts are not deemed to be significant.



Analysis of environmental impacts during construction duration

Atmospheres

The largest impact scope of dust emission is 420 meters. The closest distance between construction site and local village is 500 meters. Therefore, there is not so much environmental impact on local air quality.

Noise

Noise during construction is mainly caused by equipment installation and operation. Since the closest distance between construction site and local village is 500 meters, the noise is acceptable during the construction.

Solid waste

Few people lives nearby the wind farm site. Solid waste will be reasonably treated, which include clean up the extra earth in time, clam the landscape, recover the previous plants, protect the natural environment with less destruction, so the destruction level of local natural environment by this project implementation is controlled relatively low, therefore the project implementation doesn't have obvious impacts on local natural environment.

Waste water

Waste water is mainly produced by daily water discharged by workers. Minimum amount of waste water will be discharged directly on the earth. There is no surface water at the project site. So the discharged waste water will be absorbed by earth or vaporized. Therefore surface water will not be polluted.

Ecological impact

There is no endangered species live in this area. The project owner will strictly control the on-site construction scope, take vegetation protection into account; meanwhile, restore vegetation generation based on restoration framework, so it will not influence the ecological environment very much.

Analysis of environmental impacts after put into production

Waste water

The treated waste water of the project site fulfil standard of <water quality standard of agricultural irrigation> (GB5084-1992). The project owner will prepare one pump to treat waste water. After pumped, the waste water will be composted after decomposed by anaerobic bacteria in septic tank, which will cause little impact on surface water quality.

Noise

The proposed project will produce noise to surrounding areas between 37.1-41.0dB (A) after the proposed project put into production. This is acceptable noise level. Consider that there is no other noise source in the villages nearby, the background noise level is relative low. So the operation noise of the proposed project can be within level I of <Urban area environmental noise standard>. It will not cause negative impact to local inhabitants.

Solid waste

The main solid waste after the site put into production is household garbage. The household garbage is stored centrally and transport to special area for storage and burying. So solid waste discharged by this project will not influence the local ecological environment.



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 a word, the proposed project is a renewable energy project without negative impacts on the environment but of great economic, environmental and social benefit.

SECTION E. Stakeholders' comments

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

Project owners carried out a survey of the local villagers and residents in the Kezuo Zhongqi on March 25, 2007.

An easy understanding questionnaire was designed to fill in, which are summarised as follows:

- Project introduction
- Respondent's basic information and education level
- Questions on:

The questionnaire includes below contents:

1. Do you know this project?
2. Do you think the proposed project will be helpful to improve the local economy?
3. Will the project impact your livelihood positively or negatively?
4. Do you think the location of the proposed project is reasonable or unreasonable?
5. Will the proposed project impact the environment?

E.2. Summary of the comments received:

>>

The forum issued a total of 27 copies of the questionnaire, 27 recoveries, 100% recovery rate. There were 6 items to be interviewed in this public investigation and interview comments are summarized as follows.

- 89% of the respondents know the proposed project and 11% know a little about it;
- 100% of the respondents argue that the proposed project will promote the local economic;
- 100% agree that the proposed project will affect their life positively;
- 100% think that the proposed project is located reasonably;
- 100% think that the proposed project has no bad impact on the environment;
- 100% of the respondents support the proposed project.

Conclusion

From the comments above, it can be concluded most representatives think the proposed project will do good to local environment and economy and all support it.

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



>>

The villagers are all supportive of the proposed project and to date there has been no need to modify the project design according to the comments received. The project owner has an overall environment-friendly plan to guarantee that the project has the minimum negative impact on the environment during the project construction and operation.

**Annex 1****CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY**

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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

There is no public funding from Annex I parties for the proposed project.

**Annex 3****BASELINE INFORMATION**

Table A1- A8 below shows the data and calculation process of the simple operating margin emission factor of the NECPG. And Table A9 to A13 are data used to calculate $EF_{BM,y}$.

Table A1. Thermal power generation of NECPG in 2005

Province	Power Generation (MWh)	Power electricity used by the power plant (%)	Electricity to the Grid (MWh)
Liaoning	83,697,000	7.03	77,813,101
Jilin	35,294,000	6.59	32,968,125
Heilongjiang	58,000,000	7.96	53,383,200
Total			164,164,426

Source: 《China Electric Power Yearbook 2006》

Table A2. Thermal power generation of NECPG in 2006

Province	Power Generation (MWh)	Power electricity used by the power plant (%)	Electricity to the Grid (MWh)
Liaoning	96,282,000	6.62	89,908,132
Jilin	38,576,000	6.78	35,960,547
Heilongjiang	62,964,000	7.85	58,021,326
Total			183,890,005

Source: 《China Electric Power Yearbook 2007》

Table A3. Thermal power generation of NECPG in 2007

Province	Power Generation (MWh)	Power electricity used by the power plant (%)	Electricity to the Grid (MWh)
Liaoning	106,500,000	7	99,045,000
Jilin	43,700,000	7.68	40,343,840
Heilongjiang	68,400,000	7.67	63,153,720
Total			202,542,560

Source: 《China Electric Power Yearbook 2008》



Table A4. Total Emissions of NECPG in 2005

Fuel Type	Unit	Liaoning	Jilin	Hei Longjiang	Total	Emission Factor (tc/TJ)	Oxidate (%)	low caloric value(MJ/t,m3,tce) (MJ/t,km3)	CO2 emission (tCO2) K=G*H*I*J*44/12/10000 m) K=G*H*I*J*44/12/1000
		A	B	C	G=A+B+C	H	I	J	
Raw Coal	10 ⁴ t	4305.41	2446.13	3383.21	10134.75	87,300	100	20,908	184,986,389
Cleaned Coal	10 ⁴ t			0	0	87,300	100	26,344	0
Other Washed Coal	10 ⁴ t	524.74	19.26	24.16	568.16	87,300	100	8,363	4,148,079
Coke	10 ⁴ t				0	95,700	100	28,435	0
Coke Oven Gas	10 ⁸ m ³	1.03	3.57	0.68	5.28	37,300	100	16,726	329,409
Other Gas	10 ⁸ m ³	12.62	8.37		20.99	37,300	100	5,227	409,236
Crude Oil	10 ⁴ t	1.16			1.16	71,100	100	41,816	34,488
Gasoline	10 ⁴ t				0	67,500	100	43,070	0
Diesel Oil	10 ⁴ t	1.18	1.48	0.57	3.23	72,600	100	42,652	100,018
Fuel Oil	10 ⁴ t	9.32	2.46	1.55	13.33	75,500	100	41,816	420,842
Liquefied Petroleum Gas	10 ⁴ t	0.12			0.12	61,600	100	50,179	3,709
Refinery Gas	10 ⁴ t	5.48		1.32	6.8	48,200	100	46,055	150,950
Natural Gas	10 ⁸ m ³		0.84	2.24	3.08	54,300	100	38,931	651,098
Other Petroleum Products.	10 ⁴ t				0	75,500	100	41,816	0
Other Coking Products.	10 ⁴ t				0	95,700	100	28,435	0
Other Energy	10 ⁴ tce	16.18			16.180	0	0	0	0
								Total	191,234,218

Source: 《China Energy Statistical Yearbook 2006》



A5. Total Emissions of NECPG in 2006

Fuel Type	Unit	Liaoning	Jilin	Hei Longjiang	Total	Emission Factor	Oxidate	low caloric value(MJ/t,m3,tce)	CO ₂ emission (tCO ₂)
						(tc/TJ)	(%)	(MJ/t,km3)	$K=G*H*I*J*44/12/10000$ (m)
		A	B	C	G=A+B+C	H	I	J	$K=G*H*I*J*44/12/1000$ (v)
Raw Coal	10 ⁴ t	4681.99	2738.24	3698.29	11118.52	87,300	100	20,908	202,942,832
Cleaned Coal	10 ⁴ t	0.03			0.03	87,300	100	26,344	690
Other Washed Coal	10 ⁴ t	674.74	17.83	96	788.57	87,300	100	8,363	5,757,270
Coke	10 ⁴ t	3.32			3.32	95,700	100	28,435	90,345
Coke Oven Gas	10 ⁸ m ³	2.68	0.16	1.44	4.28	37,300	100	16,726	267,021
Other Gas	10 ⁸ m ³	55.26	1.43		56.69	37,300	100	5,227	1,105,268
Crude Oil	10 ⁴ t	0.49			0.49	71,100	100	41,816	14,568
Gasoline	10 ⁴ t				0	67,500	100	43,070	0
Diesel	10 ⁴ t	0.75	0.39	0.3	1.44	72,600	100	42,652	44,590
Fuel Oil	10 ⁴ t	11.73	0.45	1.44	13.62	75,500	100	41,816	429,998
Liquefied Petroleum Gas	10 ⁴ t				0	61,600	100	50,179	0
Refinery Gas	10 ⁴ t	8.55		4.27	12.82	48,200	100	46,055	284,585
Natural Gas	10 ⁸ m ³		0.19	2.1	2.29	54,300	100	38,931	484,095
Other Petroleum Products.	10 ⁴ t				0	75,500	100	41,816	0
Other Coking Products.	10 ⁴ t				0	95,700	100	28,435	0
Other Energy	10 ⁴ tce	12.16	17.6	82.77	112.53	0	0	0	0
								Total	211,421,263

Source: 《China Energy Statistical Yearbook 2007》



Table A6. Total Emissions in 2007

Fuel Type	Unit	Liaonin g	Jilin	Hei Longjiang	Total	Emission Factor (tc/TJ)	Oxidate (%)	low caloric value (MJ/t,m3,tce) (MJ/t,km3)	CO ₂ emission (tCO ₂) $K=G*H*I*J*44/12/10000(m)$ $K=G*H*I*J*44/12/1000(v)$
		A	B	C	G=A+B+C	H	I	J	
Raw Coal	10 ⁴ t	4869.32	2873.4 5	3736.11	11478.88	87,300	100	20,908	209,520,369
Cleaned Coal	10 ⁴ t				0	87,300	100	26,344	0
Other Washed Coal	10 ⁴ t	747.85	16.52	106.81	871.18	87,300	100	8,363	6,360,397
Coke	10 ⁴ t	4.99			4.99	95,700	100	28,435	135,789
Coke Oven Gas	10 ⁸ m ³	5.53	1.44	1.89	8.86	37,300	100	16,726	552,758
Other Gas	10 ⁸ m ³	68.38	9.06		77.44	37,300	100	5,227	1,509,825
Crude Oil	10 ⁴ t	0.24			0.24	71,100	100	41,816	7,135
Gasoline	10 ⁴ t				0	67,500	100	43,070	0
Diesel	10 ⁴ t	0.96	0.39	0.47	1.82	72,600	100	42,652	56,357
Fuel Oil	10 ⁴ t	8.43	0.45	1.48	10.36	75,500	100	41,816	327,076
Liquefied Petroleum Gas	10 ⁴ t				0	61,600	100	50,179	0
Refinery Gas	10 ⁴ t	7.33		1.99	9.32	48,200	100	46,055	206,890
Natural Gas	10 ⁸ m ³		0.02	2.03	2.05	54,300	100	38,931	433,360
Other Petroleum Products.	10 ⁴ t	0.01			0.01	75,500	100	41,816	316
Other Coking Products.	10 ⁴ t	0.46			0.46	95,700	100	28,435	12,518
Other Energy	10 ⁴ tce	12.41	2.43	51.35	66.19	0	0	0	0
								Total	219,122,791

Source: 《China Energy Statistical Yearbook 2008》



Table A7. OM Calculation of NECPG

Year	Thermal Power Generation	Emission	Emission Factor
2005	164,164,426	191,234,218	1.16489
2006	183,890,005	211,421,263	1.14972
2007	202,542,560	219,122,791	1.08186
Weighted OM Emission Factor	550,596,991	621,778,272	1.12928



Table A8 Calculating the proportion of solid fuel, liquid fuel and gas fuel in the total emission

	Units	Liaoning	Jilin	Heilongjia ng	Total	Calorific value	Emission Factors	Oxidation rate	emission
Raw coal	10 ⁴ t	A	B	C	D=A+B+C	E	F	G	H=D*E*F*G*44/12 /100
Cleaned coal	10 ⁴ t	4,869.32	2,873.45	3,736.11	11,478.88	20,908	87,300	1	209,520,369
Other washed coal	10 ⁴ t	0	0	0	0	26,344	87,300	1	0
Briquettes	10 ⁴ t	747.85	16.52	106.81	871.18	8,363	87,300	1	6,360,397
Coke	10 ⁴ t				0	20,908	87,300	1	0
Other Coking products	10 ⁴ t	4.99	0	0	4.99	28,435	95,700	1	135,789
Total	10 ⁴ t	0.46			0.46	28,435	95,700	1	12,518
Crude oil	10 ⁴ t								216,029,074
Gasoline	10 ⁴ t	0.24	0	0	0.24	41,816	71,100	1	7,135
Kerosene	10 ⁴ t	0	0	0	0	43,070	67,500	1	0
Diesel	10 ⁴ t	0.96	0.39	0.47	1.82	42,652	72,600	1	56,357
Fuel oil	10 ⁴ t	8.43	0.45	1.48	10.36	41,816	75,500	1	327,076
Other oil product	10 ⁴ t	0.01	0	0	0.01	41,816	75,500	1	316
Sub-total	10 ⁴ t								390,885
Natural Gas	10 ⁷ m ³	0	0.2	20.3	20.5	38,931	54,300	1	433,360
Coke oven gas	10 ⁷ m ³	55.3	14.4	18.9	88.6	16,726	37,300	1	552,758
Other gas	10 ⁷ m ³	683.8	90.6	0	774.4	5,227	37,300	1	1,509,825
PLG	10 ⁴ t	0	0	0	0	50,179	61,600	1	0
Refinery gas	10 ⁴ t	7.33	0	1.99	9.32	46,055	48,200	1	206,890
Sub-total									2,702,833
Total									219,122,791



According to the formula (4), (5), (6) in B.6.1, , $\lambda_{Coal,y} = 98.88\%$, $\lambda_{Oil,y} = 0.27\%$, $\lambda_{Gas,y} = 0.85\%$.

Table A9. Emission factor of the commercially best technologies

	Variables	The efficiency of power supply	Fuel emissions factor (kgCO ₂ /TJ)	Oxidation rate	Emission Factors (tCO ₂ /MWh)
		A	B	C	D=3.6/A/1000*B*C*44/12
Coal-fired Power Plant	$EF_{Coal,Adv}$	38.1%	87,300	1	0.9508
Coal-fired Power Plant	$EF_{Gas,Adv}$	49.99%	75,500	1	0.4237
Coal-fired Power Plant	$EF_{Oil,Adv}$	49.99%	54,300	1	0.5843

Therefore, according to $EF_{Thermal} = \lambda_{Coal} \times EF_{Coal,Adv} + \lambda_{Oil} \times EF_{Coal,Adv} + \lambda_{Gas} \times EF_{Gas,Adv} = 0.8191(\text{tCO}_2/\text{MWh})$

**Table A10. The installed capacity of the NECPG in 2005**

	Units	Liaoning	Jinlin	Heilongjiang	Total
Thermal Power	MW	15,999	6,359.4	11,575.6	33,934
Wind Power	MW	1,403.9	3,720.8	846.7	5,971.4
Nuclear	MW	0	0	0	0
Wind power and other	MW	135.5	85.4	52.4	273.3
Total	MW	17538.4	10165.6	12474.7	40178.7

Source: 《China Electric Power Yearbook 2006》

Table A11. The installed capacity of the NECPG in 2006

	Units	Liaoning	Jinlin	Heilongjiang	Total
Thermal Power	MW	16,721	7,039	12,456	36,216
Wind Power	MW	1,401	3,872	853	6,126
Nuclear	MW	0	0	0	0
Wind power and other	MW	216	221	115	552
Total	MW	18,338	11,132	13,424	42,894

Source: 《China Electric Power Yearbook 2007》

Table A12. The installed capacity of the NECPG in 2007

	Units	Liaoning	Jinlin	Heilongjiang	Total
Thermal Power	MW	19,720	7,580	14,080	41,380
Wind Power	MW	1,410	3,890	870	6,170
Nuclear	MW	0	0	0	0
Wind power and other	MW	359	514	230	1103
Total	MW	21,489	11,984	15,180	48,653

Source: 《China Electric Power Yearbook2008》

**Table A13 Calculation of BM emission factor of NECPG**

	Installed capacity in 2004	Installed capacity in 2005	Installed capacity in 2007	Capacity additions from 2004 to 2007	Share in total capacity additions
	A	B	C	D=C-A	
Thermal Power	32,178.1	33,934	41,380	9,201.9	88.42%
Wind Power	5,849.9	5,971.4	6,170	320.1	3.08%
Nuclear	0	0	0	0	0.00%
Wind power and other	217.4	273.3	1,103	885.6	8.51%
Total	38,245.4	40,178.7	48,653	10,407.6	100.00%
Share in total installed capacity of 2007	78.61%	82.58%	100%		

$$EF_{BM,y} = 0.8191 \times 88.42\% = 0.7241 \text{ tCO}_2/\text{MWh}.$$



Annex 4

Monitoring Information

No further information on the monitoring information.