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

CONTENTS

Annexes

SECTION A. General description of project activity

A.1 Title of the project activity:

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Hebei Chengde Yudaokou Windfarm 48MW project

Version number of the document: 03

Date: 03/08/2009

A.2. Description of the project activity:

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Hebei Chengde Yudaokou 48MW Windfarm (hereinafter referred to as the proposed project) is located within Weichang County of Chengde City, Hebei Province of P. R. China. The proposed project is a new project, which will be constructed and operated by China Resources Wind Power (Chengde) Co., Ltd.

The scenario existing prior to the start of the implementation of the proposed project: The location of the proposed project is covered by North China Power Grid (hereinafter referred to NCPG).Local electricity service is provided by the NCPG prior to the start of the implementation of the proposed project. The installed capacities of the thermal power plants in 2004-2006 in NCPG were 96.51%, 96.90%, 96.63% (See details in A.4.3.). It can be concluded that the NCPG is dominated by thermal power plants.

The project scenario: The proposed project is a newly constructed wind farm. The total capacity of the proposed project is 48MW and a total of 64 wind turbines with 750kW per-unit capacity will be installed. The wind turbines will turn wind resource into clean electricity which will be sold to the NCPG. It won't produce CO_2 during the process. The expected annual electricity supplied to the NCPG is 98,400MWh .The electricity will replace power generated by the fossil fuels in the NCPG and reduce the CO_2 emission.

The baseline scenario: The baseline scenario is the NCPG which is the same as it existing prior to the start of the implementation of the proposed project (See details in B. 4).

The proposed project will not only bring prominent environmental and social benefit, but also contribute to the sustainable development of host country in the ways as following:

- Reduce the pollution of atmosphere. By replacing power generated by thermal power plants, the proposed project can reduce the emission of not only CO_2, but also air pollutants, such as SO_2, NO_x, and Total Suspended Particle.
- Increase the revenue of local government. The proposed project owner will pay a large sum of income taxes to the local government. In addition, the proposed project will promote the development of local tourism industry.
- Create new employment opportunities. Many local inhabitants were required in the construction period of the proposed project and 24 person will be employed in the operation period .

A.3. Project participants:

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Participants to the project activity are the following:

Name of Party involved(*) ((host) indicates a host Party)	Private and/or public entity(ies) project participants (*) (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
People's Republic of China (host)	China Resources Wind Power (Chengde) Co., Ltd.	NO
Switzerland	Vitol S.A.	NO

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

A.4.1.1. Host Party(ies):

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People's Republic of China

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

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Hebei Province

A.4.1.3. City/Town/Community etc:

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Yudaokou Town, Weichang County, Chengde City.

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

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The proposed project is sited within Yudaokou town in the northwest of Weichang County, which is located in the most north of Chengde City in Hebei Province. The proposed project is about 18 kilometers to the east of Yudaokou and 55 kilometres away from the Weichang County. The approximate coordinates of the site are east longitude of 116°59'16"~117°03'38" and north latitude of 42°18'21"~42°21'45". The center of the proposed project is located at east longitude 117°21′21.72″and north latitude 42°18′11.46″, and the average altitude is 1,678 meters. For more details, please refer to Fig. 1 and Fig. 2.

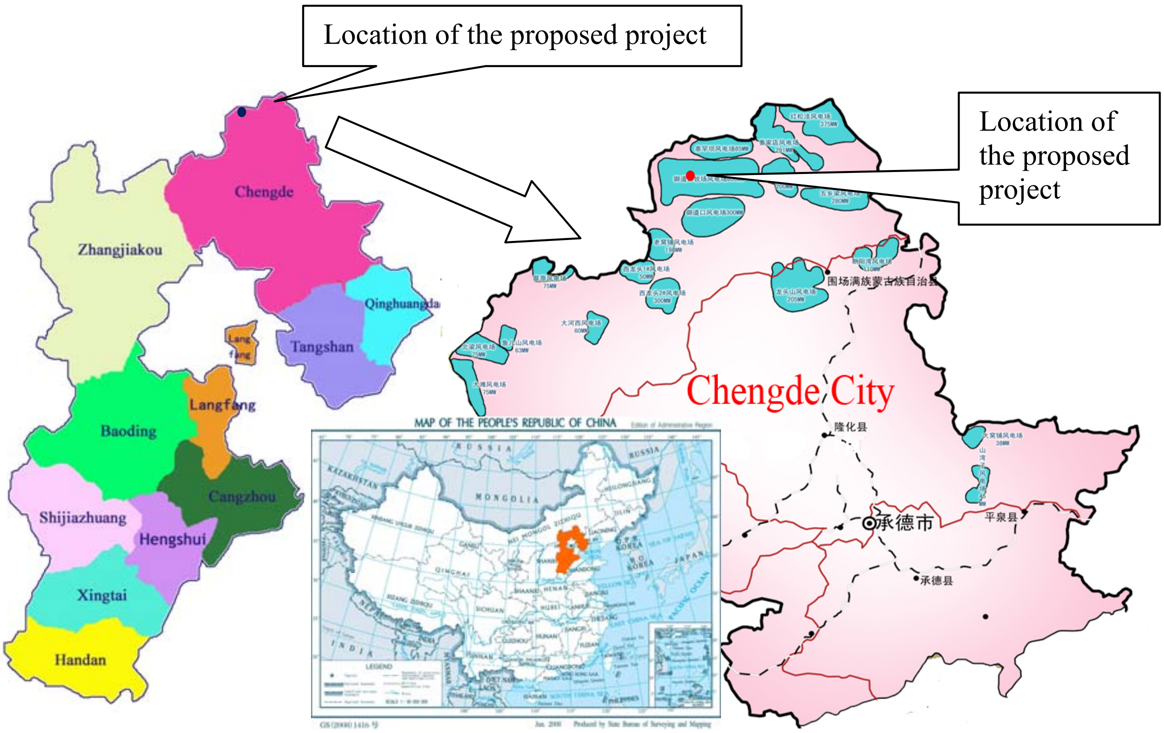

Fig1. Location of the proposed project in Hebei Province, China

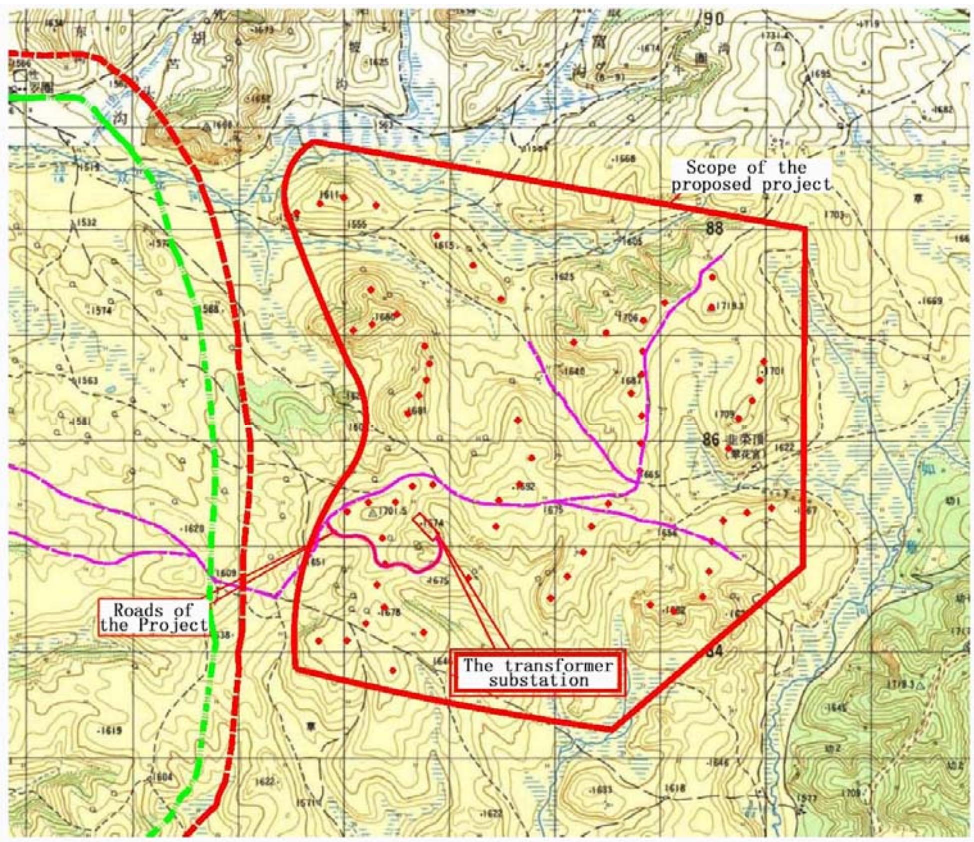

Fig. 2: Site layout of the proposed project

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

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The project activity falls under the category of grid-connected electricity generation
Sectoral scope 1: energy industries (renewable sources)

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

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Scenario existing prior to the implementation of the proposed project

Prior to the start of implementation of the proposed project, local electricity is provided by the NCPG which is dominated by the thermal power plants (The thermal power plants accounted for more than 96% of the total installed capacity of the NCPG. See details in Table A-1) The thermal power plants will emit a lot of CO_2 when firing fossil fuels.

Table A-1 Installed capacity of the NCPG in 2004-2006(Unit: million kW)

Item	2004	Proportion of Total Installed Capacity	2005	Proportion of Total Installed Capacity	2006	Proportion of Total Installed Capacity
Thermal Power	935.94	96.51%	1110.69	96.90%	1415.38	96.63%
Hydropower	32.51	3.35%	32.16	2.81%	40.04	2.73%
Wind Power and Other	1.38	0.14%	3.36	0.29%	9.37	0.64%
Total	969.83	100%	1146.20	100%	1464.79	100%

Data resource: *China Electric Power Yearbook 2005*, page473; *China Electric Power Yearbook 2006*, page571; *China Electric Power Yearbook 2007*, page637.

Details of the proposed project

The proposed project generates electric power by wind energy; the principle process is as follows:

Wind Power —Blade→ Mechanical Energy —Generators→ Electric Power

The proposed project consists of wind turbines, transformers and transformer substation. The main equipments are 64 wind turbines with 750kW per-unit capacity (Model type: 50/750), which are produced by Goldwind Science & Technology Ltd.

The main technology parameters of 50/750 are showed in table A-2.

Table A-2 Main technology parameters of 50/750

Item	Unit	Parameter
Quantity	-	64
Hub height	m	50
Lifetime	Years	20
Turbine		
Rated Power	kW	750
Diameter of blades	m	50
Cut-in Wind Speed	m/s	4
Cut-out Wind Speed	m/s	25

Item	Unit	Parameter
Rated Wind Speed	m/s	15
Survival Wind Speed	m/s	72
Generator		
Rated Power	kW	750
Rated Voltage	V	690
Power Factor	-	0.98
Rated Speed	rpm	1520

The output voltage of each turbine is 0.69kV; it will be transformed to 35kV and then connected to a 220kV transformer substation at the project site. Then the electricity will send to the Yudaokou substation. Electricity meters will be installed to measure the electricity of the proposed project supplied to the grid (See Fig.B-3 for detail information). The designed lifetime of the proposed project is 20 years.

Baseline scenario of the proposed project

Equivalent power will be supplied by the NCPG without the proposed project, see details in B.4. Therefore, the baseline scenario is the same as the scenario existing prior to the start of the implementation of the proposed project.

The proposed project doesn't involve international transfer of technology.

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

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The proposed project applies renewable crediting period. The proposed project is expected to generate the emission reductions, 103,792 tones of CO_2e per year. The proposed project will generate a total amount of 726,544 tCO_2e emission reductions over the first 7-year crediting period (November, 2009 to October, 2016). See B.6.3 for details.

Years	Annual estimation of emission reductions in tonnes of CO_2e
01/11/2009-01/12/2009	17,299
2010	103,792
2011	103,792
2012	103,792
2013	103,792
2014	103,792
2015	103,792
01/01/2016-31/10/2016	86,493
Total estimated reductions (tonnes of CO_2e)	726,544
Total number of first crediting years	7
Annual average over the crediting period of estimated reductions (tonnes of CO_2e)	103,792

A.4.5. Public funding of the project activity:

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There is no public funding involved in the proposed project.

SECTION B. Application of a baseline and monitoring methodology

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

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Approved consolidated baseline and monitoring methodology ACM0002," Consolidated baseline methodology for grid-connected electricity generation from renewable sources (Version07)", EB36.

"Tool for the demonstration and assessment of additionality (Version 05.2)", EB 39;

"Tool to calculate the emission factor for an electricity system (Version 01.1)", EB 35.

For more detail information about the baseline and monitoring methodology, please refer to: http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html

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

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The proposed project can meet all applicability criteria stated in the baseline and monitoring methodology ACM0002 as follows:

- The proposed project is a grid-connected renewable power generation project. The project generates power by wind resource, and the electricity will be supplied to the NCPG.
- The proposed project does not involve switching from fossil fuels to renewable energy sources at the site of the project activity.
- The geographic and system boundary of the NCPG can be clearly identified and information on the characteristics of the grid is available.

Therefore, the approved baseline and monitoring methodology ACM0002, "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" is applicable to the proposed project.

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

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Electricity generated by the proposed project will be delivered into the NCPG. The spatial extent of the project boundary should include the project site and all power plants connected physically to the NCPG. According to the Office of National Coordination Committee on Climate Change which is subjected to Chinese DNA (NDRC), NCPG covers two cities and four provinces / autonomous region: Beijing, Tianjin, Hebei Province, Shanxi Province, Shandong Province, and Inner Mongolia Autonomous Region[1].

The sources and gases included in the project boundary are described in Table B-1 as follows:

Table B-1 Sources and gases included in the project boundary

	Source	Gas	Included?	Justification/Explanation
Baseline	NCPG	CO_2	Yes	Main emission source
		CH_4	No	Ignored for little amount, it is conservative.
		N_2O	No	Ignored for little amount, it is conservative.
Project Activity	Wind Power Generation	CO_2	No	Excluded according to methodology.
		CH_4	No	Excluded according to methodology.
		N_2O	No	Excluded according to methodology.

The flow diagram of the project boundary is presented in the following:

[1] http://cdm.ccchina.gov.cn/web/NewsInfo.asp?NewsId=2193

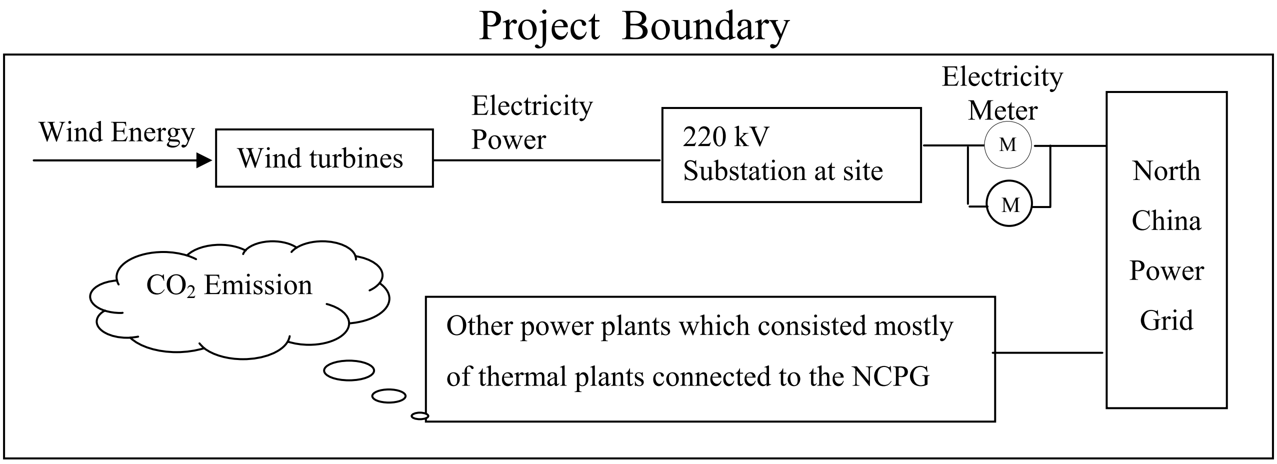

Fig. B-1 The flow diagram of the project boundary

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

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The project activity is the installation of a new grid-connected wind power plant. According to the ACM0002, the baseline scenario of the proposed project is the following:

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

Parameters used to determine the baseline emission are listed in the following Table B-2:

Table B-2 Parameters used to determine the baseline emission[2]

Item	Unit	Value
$EF_{grid,OM,simple}$	tCO_2e/MWh	1.1169
$EF_{grid,BM,y}$	tCO_2e/MWh	0.8687
$EF_{grid,CM,y}$	tCO_2e/MWh	1.0548

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

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The proposed project adopts the "*Tool for the Demonstration and Assessment of Additionality*" Version 5.2 (EB 39) to demonstrate the additionality of the proposed project.

Prior consideration of the CDM

The first version of Feasibility Study Report of the proposed project (hereinafter referred to FSR Ⅰ) was completed in April 2007 in which 2MW wind turbines were considered and CDM was introduced. And the Board of Directors decided to investigate CDM accordingly in July 2007. However, only 1.5MW wind turbines were available from domestic manufacturers and the supply in the market was very limited in 2007, and considering that 750kW wind turbines have been widely used in other wind farms in the same region and had abundant market supply and experiences of operation, 750kW wind turbines were recommended in the second version of Feasibility Study Report (hereinafter referred to FSR Ⅱ) which was completed in October 2007. In the FSR Ⅱ, the project IRR is only 5.48% when using the electricity tariff approved by

[2] Data Source: 2008 Baseline Emission Factors for Regional Power Grids in China
http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/2008/200887164119674.pdf

the NDRC which the on-grid tariff of wind power projects in Hebei province as 0.54 RMB/kWh (incl. VAT) within 30,000 utilization hours, and local average on-grid tariff for the following operational years, and the project IRR will rise to 8.26% when considering revenue from CDM. Considering the low financial indicator without CDM, the Board of Directors of the host company of the proposed project determined to implement the project with help of CDM to reduce the investment risk on November 10, 2007.

In December 2007, the contract of CDM service was signed with Beijing Jipeng Investment Information & Consultant LTD., and the Emission Reduction Purchase Agreement (ERPA) was signed with Vitol S.A. in June, 2008.

The main equipments purchase was contracted in Jan. 2008 and the construction of the project started in June, 2008.

The timeline of project implementation and CDM action of the proposed project is shown in Table B-3:

Table B-3 Schedule of Implementation of the proposed project

Time	Item
04/ 2007	The FSRⅠ was completed
06/ 2007	Environmental Impact Assessment was completed
23/07/ 2007	Environmental Impact Assessment was approved by Hebei Environmental Protection Bureau
21/08/ 2007	The FSRⅠ was approved by Hebei Development and Reform Committee
10/ 2007	The FSRⅡ was completed
17/01/2008	The wind turbines' purchase agreement was signed.
29/04/2008	Hub purchase agreement was signed.
13/07/2008	Transformer Substation construction contract was signed.
07/08/2008	The main construction contract was signed.

Table B-4 Schedule of CDM Application of the proposed project

Time	Item
22/07/2007	The Board of Directors decided to investigate CDM
10/11/2007	On the basis of FSRⅡ,the Board of Directors decided to invest the project with help of CDM to reduce the investment risk
07/12/2007	The project proponent signed a contract of CDM service with Beijing Jipeng Investment Information & Consultant LTD.
18/04/2008	The stakeholders' comments was investigated
09/06/2008	The project proponent signed the ERPA with Vitol S.A.
22/09/2008	The proposed project was approved as a CDM project by the host country
25/05/2009	The proposed project was approved by the DNA of Sweden

In conclusion, during the decision-making process, the project proponent has seriously considered the CDM revenue as a crucial factor to overcome the investment barrier of the proposed project.

Steps as follows are the demonstration and assessment of additionality of this project:

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

The methodological step requires a number of sub-steps. First of all, identify all realistic and credible alternatives to the project activity.

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

Therefore, some scenarios showed as below could be chosen as the baseline scenario.

Alternative a)**:** The proposed project not undertaken as a CDM project activity.
Alternative b): Supply equivalent power with thermal power plants.
Alternative c): Supply equivalent power with renewable energy power plant.

Alternative d)**:** Equivalent electricity supplied by the NCPG.

Alternative c): Besides wind energy, solar energy, biomass, geothermy, and hydro resource are the possible renewable energies for power generation. However, due to the technology development status and high investment costs for power generation, solar PV [3]is far from being economically attractive. In addition, the project located at typically mountainous area, where geothermal resources, exploitable biomass or hydro resource are limited on-site or around and could not provide the same amount of electricity output of the proposed project. In conclusion, "Construction of a hydropower or other kinds of renewable energy power plant with equivalent annual electricity generation supply" is not realistic alternative.

Sub-step 1b: Consistency with current laws and regulations

Alternative b): The average operating hours of fire power plants in China in 2006 are 5612 hours[4]. As generating the equivalent annual electricity, the capacity of the fuel-fired power plant should be lower than 50MW, according to Chinese power regulations, the construction of coal-fired power plants with capacity less than 135MW are prohibited in the areas covered by large grids[5] . It is not in compliance with Chinese regulation, so "Construction of a fuel-fired power plant with equivalent installed capacity or annual electricity generation supply" is not feasible.

Alternative a) "The proposed project itself, without taken CDM project activity" and Alternative d) "Equivalent capacity or electricity service provided by the NCPG" comply with Chinese current laws and regulations.

Therefore, Alternative a) and Alternative d) will be analyzed Step 2 as potential alternatives.

Step 2. Investment analysis

The purpose of investment analysis is to determine whether the proposed project activity is economically or financially less attractive than at least one other alternative, identified in step 1, without the revenue from the sale of certified emission reductions (CERs). To conduct the investment analysis, use the following sub-steps:

Sub-step 2a. Determine appropriate analysis method

It should be determined whether to apply simple cost analysis, investment comparison analysis or benchmark analysis (sub-step 2b). If the CDM project activity generates no financial or economic benefits other than income related to CDM, it can apply the simple cost analysis (Option I), otherwise, it should apply the investment comparison analysis (Option II) or the benchmark analysis (Option III).

In this proposed project, the financial and economic benefits come from not only the CDM revenue but also electricity sales. Therefore, the Simple cost analysis (Option I) is not appropriate.

The baseline scenario of the proposed project is the North China Grid rather than similar investment projects. Therefore, the investment comparison analysis (Option II) is not appropriate.

Therefore, the benchmark analysis (Option III) should be used.

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

According to *Interim Rules on Economic Assessment of Electrical Engineering Technology Retrofit Projects*[6] published by the State Power Corporation of China, benchmark of the project IRR (after tax) for power industry is 8%. The benchmark is commonly applied for economic evaluation in power industry in China and is selected in the benchmark analysis of the project activity.

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[3] The cost of solar PV is around RMB 3.7/kWh. *China Solar PV Report 2007*, China Environment Science Press, Page 54.

[4] *China Electric Power Yearbook 2007*, page 626.

[5] Notice on Strictly Prohibiting the Installation of Fuel-fired Generators with the Capacity of 135MW or below issued by the General Office of the State Council, decree No. 2002-6.

[6] State Electric Power Corporation, *Interim Rules on Economic Assessment of Electrical Engineering Technology Retrofit Projects*, China Electric Power Press 2003

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

1) The basic parameters to calculate the IRR

According to the FSRⅡ, the project proponent signed the Emission Reduction Purchase Agreement (ERPA) with the buyer, the basic parameters to calculate the financial data as follow in Table B-5.

Table B-5 Basic financial parameters for calculation of IRR of total invest

Parameters	Value	unit	Data Resource
Installed Capacity	48	MW	FSRⅡ
Estimated Annual Electricity Output	98.40	GWh	FSRⅡ
Tariff (Incl. VAT)	0.54	RMB /kWh	FSRⅡ
Project Lifetime	20	Year	FSRⅡ
Period of Depreciation	15	Year	FSRⅡ
Residue Value	5%	-	FSRⅡ
Expected CERs Price	10	Euro/tCO_2e	FSRⅡ
Static Total Investment	428	Million RMB	FSRⅡ
Fluid Capital	1.44	Million RMB	FSRⅡ
Average annual O&M cost	7.51	Million RMB	FSRⅡ
Value-Added Tax Rate	8.5%	-	FSRⅡ
Income Tax Rate	25%	-	FSRⅡ

Chinese government will give guidance tariff of the renewable energy projects, while the practical tariff will be agreed by negotiations between project owner and the Grid Company. However, only if the government approved the project on the basis of the FSR provided by the project owner, the Electricity Purchase Agreement could be agreed. As a result, the tariff is determined after the FSR was approved[7]. Therefore, the consultative institutions who compile FSR can only estimate the tariff to calculate the IRR. The guidance tariff of Hebei Province was chosen for the investment analysis.

In the term of Option III., Apply benchmark analysis, if the financial indicators of the proposed project, such as the project IRR, are lower than the benchmark, the proposed project is not considered to be financially attractive.

Table as below shows the IRR (after Value-Added Tax) of the proposed project with and without CERs revenues.

Table B-6 Influence of CERs to the Financial Indicators

	Without CERs	With CERs
IRR after VAT	6.18%	9.57%

According to Table B-6, the IRR of the proposed project without CERs revenues is 6.18%, which is lower than the financial benchmark 8%; if the CERs revenues are taken into account, calculated with 10Euro/tCO_2e estimated in the FSRⅡ, the project IRR will be 9.57%, which is higher than the financial benchmark. Therefore, the proposed project is not considered as financially attractive without the income of CERs. The CDM revenues enable the project to get the reasonable profits and overcome the investment barrier.

Sub-step 2d. Sensitivity analysis

[7] http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File2236.pdf

The sensitivity analysis is to show whether the conclusion regarding the financial attractiveness is robust to reasonable variations in the critical assumptions. For the proposed project, four parameters were selected as sensitive factors to check out the financial attractiveness:

1) Static Total Investment
2) O&M Cost
3) Tariff (Incl. VAT)
4) Annual net electricity output

The IRR of the proposed project varies to different degrees in accordance with the fluctuation of four parameters within the range of -10% to 10%.The results of sensitivity analysis of four indicators of the proposed project are shown in Table B-7 and Figure B-1.

Table B-7 Sensitivity analysis of IRR according to the variation of the financial indicators

Variation Ration	-10%	-5%	0	5%	10%
Static Total Investment	7.48	6.80	6.18	5.60	5.06
O&M Cost	6.35	6.27	6.18	6.09	6.00
Tariff (Incl. VAT)	4.91	5.55	6.18	6.79	7.39
Annual Net Electricity Output	4.91	5.55	6.18	6.79	7.39

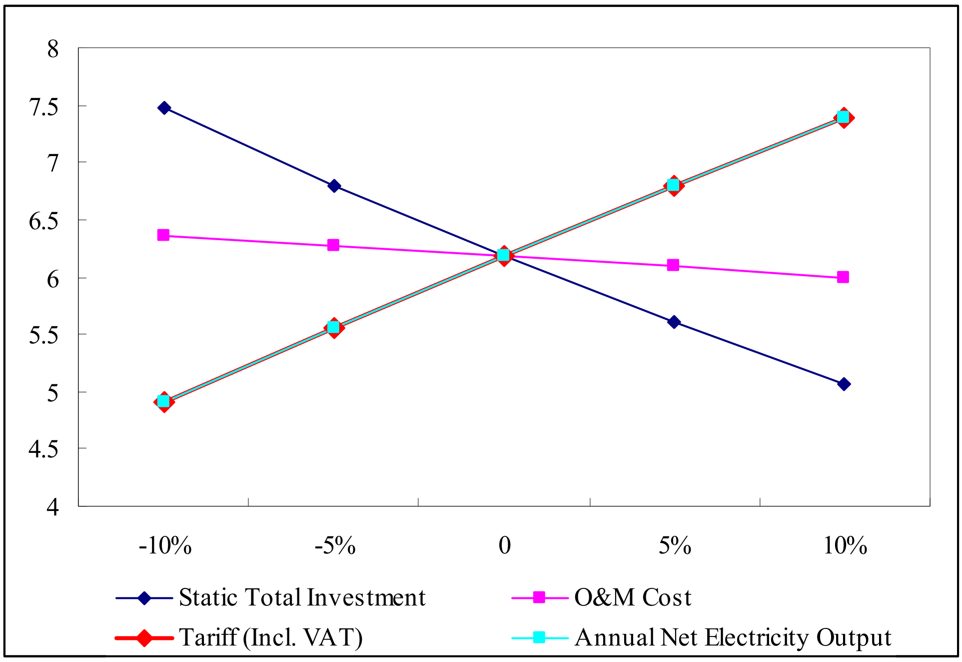

Fig. B-1 Sensitivity analysis of IRR according to the variation of the financial indicators

It could be concluded from the Table B-3 and Fig. B-1 above:

IRR of the proposed project varied to different degrees in accordance with the fluctuation of the static total investment, expected tariff, annual net electricity output, O&M operation cost within the range of negative 10% to positive 10%, it would not reach to 8%.

1) Static Total Investment

It is demonstrated that the IRR can't reach the benchmark when the static total investment vary in the range of 10%. The IRR will exceed benchmark only if the static total investment decreases by over 13.5%. However, 87% of static total investment has been contracted even though the project construction is still undergoing. Therefore, it is impossible for the static total investment of the proposed project decrease by over 13.5%.

2) Tariff

The benchmark stays safe when electricity tariff of the project vary in the range of 10%. The benchmark of the project IRR will only be crossed if the tariff increases by 15%, which is as high as 0.62 RMB/kWh (Incl. VAT). However, tariff for all wind power projects in Hebei province approved by the National Development and Reform Commission (NDRC) since 2007 is 0.54 RMB/kWh (Incl. VAT) within 30,000 utilization hours, and local average on-grid tariff for the following operational years (NDRC Price [2007] No.3303, NDRC Price [2008] No.1876[8]). Once the on-grid tariff is issued by the NDRC, it will be strictly carried out. For the proposed project, applying RMB 0.54 RMB/kWh (Incl. VAT) for IRR calculation throughout the lifetime is conservative.

3) Annual net electricity output

The benchmark will not be crossed when annual electricity output increase by 10%. The critical point of electricity output for the IRR to reach the benchmark is to increase by 15%. However, the annual net electricity output was calculated based on multi-year historical meteorological statistics and two-year on-site wind measurement data given specific wind turbine type by third-party design institute, even though the wind resources will fluctuate year by year, the average level throughout the 20 years of operation period can hardly vary by 15%. Therefore, the possibility of power generation increase by 15% is extremely small.

4) O&M cost

Compared with the other three factors, the annual O&M cost has little effect on the impact of IRR. The IRR can't reach the benchmark even if the O&M Cost decrease to zero.

The sensitivity analysis underlines the fact that the proposed project without CDM revenue is not financially attractive

In conclusion, Alternative d) "Equivalent capacity or electricity service provided by the NCPG"is the only feasible alternative.

Step 4 Common practice analysis

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

The proposed project is a 48MW windfarm which will be built in Hebei Province.

In April 2002, China implemented the policy "*Separate power plants from network and compete in price to enter network*". The objective of this power sector reform is to establish a more commercialized power market in China. Power project investment has to be under a more commercialized condition and considers project investment return more seriously. The power projects can't obtain high tariff as before after the reform. Since market condition for wind power project development changes much since 2002, this common practice analysis starts from 2002.

According to the methodology ACM0002, projects with installed capacity of or below 15MW belong to small scale projects.

The proposed project is located in the Hebei Province.

Therefore, the activities similar to the proposed project are wind power projects in Hebei Province which have been operated after 2002 and installed capacity is larger than 15MW, excluding the projects registered as CDM project and the projects that have been published on the UNFCCC website.

On the basis of open and available information which include "Shi Pengfei, Statistics of Installed Capacity of Wind Power in China in 2007"[9], 39 wind farm projects which are under construction or operation were

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[8]http://www.sdpc.gov.cn/jggl/zcfg/t20080218_193008.htm
http://www.sdpc.gov.cn/zcfb/zcfbtz/2008tongzhi/t20080813_230718.htm

[9] http://www.cwea.org.cn/upload/20080324.pdf

found in Hebei Province. In all projects, 37 of them registered as CDM projects or have been published on the UNFCCC website. There were only two wind farms, Hongsong windfarm and Shangyi Damanjing windfarm, having a similar scale and having not been registered as CDM project or published on the UNFCCC website. They were showed in the table below.

Table B-8 Similar wind farm projects in Hebei Province since 2002

Name	Commissioning Time	Capacity (MW)	Notes
Chengde Hongsong windfarm	Dec, 2004	50.1	Facing financial barriers, receiving carbon financing
Shangyi Damanjing windfarm	Sep, 2005	34.5	Facing financial barriers, receiving carbon financing

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

As for Table B-8, both of two projects faced financial barriers during operating period. Because Chengde Hongsong[10] and Shangyi Damanjing[11] met the standards of Voluntary Carbon Standard, both of them have received the carbon financing from the Voluntary market to overcome this serious barrier.

Presently, without a higher supporting tariff or favourable financial support, further development of similar wind farms in Hebei province faces financial barriers and is not feasible in Hebei province. Therefore, the wind power projects similar with the proposed project are not the common practice in Hebei Province.

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

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

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According to the consolidated methodology ACM0002/ver.7, the GHG emission reduction of the proposed project can be calculated based on "Tool to calculate the emission factor for an electricity system". The data from *China Electric Power Yearbook*, *China Energy Statistical Yearbook* and *the baseline Emission Factor of Chinese Power Grid in 2008,* published by the NDRC, are used.

The key methodological steps are:

1. Calculating the Baseline Emission (BE_y)
2. Calculating the proposed project Emission (PE_y)
3. Calculating the Leakage Emission (LE_y)
4. Calculating the Emission Reduction (ER_y)

1. Calculating the Baseline Emission (BE_y)

According to the ACM0002, the baseline emission (BE_y) is the product of the baseline emission factor ($EF_{grid,CM,y}$) times the electricity supplied by the project activity to the grid (EG_y). First, the baseline emission factor is calculated as the Combined Margin emission factor.

1.1 Calculation of the baseline emission factor ($EF_{grid,CM,y}$)

According to "Tool to calculate the emission factor for an electricity system", six steps were utilized to calculate the baseline emission:

[10] Wind power generation, China. http://www.newsroom.barclays.com/imagelibrary/default.aspx?SubjectID=587

[11] http://cdm.unfccc.int/UserManagement/FileStorage/QJT5M08PEASYLBR3C2GHKVFU7DO49W

Step 1, Identify the relevant electric power system
Step 2, Select an operating margin (OM) method
Step 3. Calculate the operating margin emission factor ($EF_{grid,OM,y}$) according to the selected method
Step 4. Identify the cohort of power units to be included in the build margin (BM)
Step 5. Calculate the build margin emission factor（$EF_{grid,BM,y}$）
Step 6. Calculate the baseline emission factor（$EF_{grid,CM,y}$）

Step 1, Identify the relevant electric power system

According to the Office of National Coordination Committee on Climate Change who is a department of Chinese DNA (NDRC), NCPG covers six sub-grids which are Beijing Grid, Tianjin Grid, Hebei Province Grid, Shanxi Province Grid, Shandong Province Grid and Inner Mongolia Autonomous Region Grid [12]. The proposed project is located in Hebei Province and covered by the NCPG. In addition, the geographic and system boundaries can be clearly identified. Therefore, NCPG is chosen as the relevant electric power system.

According to ”Tool to calculate the emission factor for an electricity system”, the operating margin emission factor (OM) and build margin emission factor (BM) of NCPG can be calculated basing on the data from *China Electric Power Yearbook*, *China Energy Statistical Yearbook* and *the baseline Emission Factor of Chinese Power Grid in 2008,* published by the NDRC. The baseline emission factor ($EF_{grid,CM,y}$) is obtained by a combined margin (CM) of OM&BM.

Step 2, Select an operating margin method

The calculation of OM emission factor is based on one of the four following methods:

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

As the detailed dispatch data of the NCPG is not available, method (b) and method (c) is not applicable.

Method (a)can only be used if low-cost/must run resources[13] constitute less than 50% of total grid generation in :1)average data of the 5 most recent years, or2)based on long-term averages for hydroelectricity production.

As showed in the table B-9, among the total electricity generation from 2002 to 2006 in NCPG which is the relevant electric power system of the proposed project, the amount of electricity generated by low-cost/must run resources accounts for about 0.89%, 0.86%, 0.71%, 0.67% , 0.74% respectively. Therefore, Method (a) Simple OM was selected to calculate the OM emission factor.

Method (d)can only be used when 1) low-cost/must run resources constitute more than 50% of total amount of grid electricity output and 2) detailed data required by applying method (b) and method (c) is unavailable. Therefore the method is not applicable to be used.

Table B-9 The Electricity Generation of NCPG in 2002-2006

Year	**The Electricity Generation(10^5 MWh)**	**The ratio of low-**

[12] http://cdm.ccchina.gov.cn/web/NewsInfo.asp?NewsId=2193

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

	Thermal	Hydro	Nuclear	Wind	Others	Total	cost/must-run resources
2002	4039.19	34.55	0	1.7		4075.45	0.89%
2003	4576.75	37.98	0	1.81		4616.53	0.86%
2004	4477.88	29.9	0	0.56	1.45	4509.8	0.71%
2005	5113.82	30.41	0	1.99	1.93	5148.15	0.67%
2006	5790.63	36.08	0	5.21	2.15	5834.07	0.74%

Data source: *China Electric Power Yearbook 2003*, Page 585; *China Electric Power Yearbook 2004*, Page 709; *China Electric Power Yearbook 2005*, Page 485; *China Electric Power Yearbook 2006*, Page 572; *China Electric Power Yearbook 2007*, Page 638.

In conclusion, it is reasonable to select the method (a) to calculate the OM emission factor.

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

According to "Tool to calculate the emission factor for an electricity system", the simple OM emission factor in y year ($EF_{grid,OM,simple,y}$) is calculated as the generation-weighted average CO_2 emissions per unit net electricity generation (tCO_2e/MWh) of all generating power plants serving the system, not including low-cost / must-run power plants / units. It may be calculated:

Option A: Based on data on fuel consumption and net electricity generation of each power plant / unit, or

Option B: Based on data on net electricity generation, the average efficiency of each power unit and the fuel type(s) used in each power unit, or

Option C: Based on data on the total net electricity generation of all power plants serving the system and the fuel types and total fuel consumption of the project electricity system.

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

Because the fuel consumption and net electricity generation data of each power plant / unit in the NCPG is not available, but the total net electricity generation, the fuel types and total fuel consumption of all power plants in the NCPG is available and the low-cost/must run power resources in NCPG include only renewable power generation, so option C is selected.

The formula to calculate simple operating margin emission factor ($EF_{OM,simple,y}$) is as follows:

$$EF_{OM,simple,y} = \frac{\sum_i FC_{i,y} \times NCV_{i,y} \times EF_{CO_2\,i,y}}{EG_y} \qquad (1)$$

Where:

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

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

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

$EF_{CO2,i,y}$ = CO_2 emission factor of fossil fuel type *i* in year *y* (tCO_2/GJ)

EG*y* = Net electricity generated and delivered to the NCPG by all power sources ,excluding low-cost / must-run power plants / units, in year y (MWh)

i = All fossil fuel types combusted in the NCPG in year *y*

y = The three most recent years for which data is available at the time of submission of the PDD to the DOE for validation.

The electricity generated by the proposed project is supplied to the NCPG. In addition, extra electricity coming from North-east China Power Grid was imported to the NCPG and was considered in the calculation.

Basing on the achievable data and calculating method and steps above, the Simple OM Emission Factor ($EF_{OM, simple, y}$) of the NCPG was calculated as 1.1169tCO_2e/MWh (see Annex 3 for details).

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

The methodology provides two options to calculate $EF_{BM,simple.y}$,

Option1. Calculate the Build Margin emission factor $EF_{BM,simple.y}$ ex ante based on the most recent information available on plants already built for sample *m* at the time of PDD submission.

Option2. For the first crediting period, the Build Margin emission factor $EF_{BM,simple.y}$ must be updated annually ex post for the year in which actual project generation and associated emission reductions occur.

The proposed project will choose "Option 1. Calculate the Build Margin emission factor $EF_{BM,simple.y}$ ex ante based on the most recent information available on plants already built for sample m at the time of PDD submission". This option does not require monitoring the emission factor during the crediting period.

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

(a) The five power plants that have been built most recently, or

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

Project participants should choose one from these two options which comprises the larger annual generation.

For all the power plants emphasize the confidentiality, it is very difficult to get the data of five new power plants, it is suggested to use option (b) to calculate $EF_{grid,BM, y}$, choosing the power plants capacity additions that comprise 20% of NCPG.

According to the "deviation in use of methodology AM0005 (replaced by the ACM0002) by several project activities in China" [14], the Board agreed to "use of capacity additions during last 1-3 years for estimating the build margin emission factor for grid electricity". Therefore, the proposed project used the capacity addition over 1-3 years, whichever results in a capacity addition that is closest to 20% of total installed capacity.

The total installed capacity of NCPG in 2003-2006 was showed in the table B-10.

Table B-10 Total Installed Capacity of NCPG (Unit: MW)

	2003	2004	2005	2006
Beijing	4405.6	4514.4	4882.5	5061
Tianjin	6013.5	6013.5	6178.9	6541
Hebei	18476.5	20730	23165.7	27090
Shanxi	15831.5	18480.6	23029.8	27451
Shandong	30545.2	32923.5	37413.4	50054

[14] Http://cdm.unfccc.int/Projects/Deviations

Inner Mongolia	12090.4	14321.2	19950.2	30282
Total	**87362.7**	**96983.2**	**114620.5**	**146479**
Capacity Addition	**59116.3**	**49495.8**	**21858.5**	**0**
Proportion of Addition	**40.36%**	**33.79%**	**21.75%**	

Data source: *China Electric Power Yearbook 2004*, Page 709; *China Electric Power Yearbook 2005*, Page 485; *China Electric Power Yearbook 2006*, Page 572 ;*China Electric Power Yearbook 2007*, Page 637.

As 2006 is the latest year in which the data is available, showed in Table B-7, the proportion of newly installed capacity of 2005-2006, 2004-2006, 2003-2006 is respectively 21.75%, 33.79%, 40.36%. Among of these data, 21.75% of 2005-2006 is the most closed to 20%.Therefore, the power plants capacity additions in 2005-2006 is the used to calculate. $EF_{BM,simple.y}$.

Step 5. Calculate the build margin emission factor（$EF_{BM,simple.y}$）

According to “Tool to calculate the emission factor for an electricity system”, the generation-weighted average emission factor (tCO_2e/MWh) of a sample of power plants *m*, using formula as follows:

$$EF_{\mathrm{grid},BM,y} = \frac{\sum_{m} EG_{m,y} \times EF_{EL,m,y}}{\sum_{m} EG_{m,y}} \qquad (3)$$

where:

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

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

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

m = Power units included in the build margin

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

Since data of installed capacities can not be separated into coal based, oil based and gas based at present, the calculation adopted the deviation method approved by EB, ie. The method published by the Chinese DNA (NDRC).

First of all, calculate the percent of the CO_2 emission from the solid-fired, oil-fired and gas-fired power plants in total fuel-fired CO_2 emission;

Second, calculate the emission factor using the most advanced commercialized technologies which applied by the solid-fired, oil-fired and gas-fired power plants;

Finally, calculate the Build Margin emission factor basing on the fuel-fired emission factor times the weight-average of fuel-fired installed capacity which the newly installed capacity addition nearest to 20% of the total installed capacity.

Step 5.a. Calculate the share of the CO_2 emission for solid, liquid and gas fuel for power generation in the total emission

$$\lambda_{coal} = \frac{\sum_{i \in Coal,j} F_{i,j,y} \times \mathrm{NCV}_{i,y} \times EF_{CO_2,i,j,y}}{\sum_{i,j} F_{i,j,y} \times \mathrm{NCV}_{i,y} \times EF_{CO_2,i,j,y}} \qquad (4)$$

$$\lambda_{oil} = \frac{\sum_{i \in Oil, j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,j,y}}{\sum_{i,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,j,y}} \qquad (5)$$

$$\lambda_{gas} = \frac{\sum_{i \in Gas, j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,j,y}}{\sum_{i,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,j,y}} \qquad (6)$$

Where:

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

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

$EF_{CO2,i,i,y}$ = CO_2 emission factor of fossil fuel type *i* (tCO_2/GJ)

Step 5.b. Calculate emission factor for thermal power of the grid.

$$EF_{Thermal,y} = \lambda_{Coal,y} \times EF_{Coal,Adv,y} + \lambda_{Oil,y} \times EF_{Oil,Adv,y} + \lambda_{Gas,y} \times EF_{Gas,Adv,y} \qquad (7)$$

Where,

$EF_{Coal,Adv,y}$, $EF_{Oil,Adv,y}$ and $EF_{Gas,Adv,y}$ are emission factor of the most advanced coal-fired, oil-based and gas-based power generation technology commercially available in China. The $EF_{Thermal,y}$ was calculated as 0.9083tCO_2e/MWh. (See details in Annex 3).

Step 5.c. Calculate BM of the grid

As analysis above, the newly installed capacity addition in 2005 is the nearest to 20% of the total installed capacity.

$$EF_{grid,BM,y} = \frac{CAP_{Thermal,y}}{CAP_{Total,y}} \times EF_{Thermal,y} \qquad (8)$$

Where,
$CAP_{Total,y}$ = The total capacity additions from 2005 to 2006;
$CAP_{Thermal,y}$ = The capacity additions of thermal power from 2005 to 2006.
As a result, the percent of thermal power plants in total capacity additions is 95.64% and $EF_{BM,simple.y}$ is 0.8687 tCO_2e/MWh (See details in Annex 3).

Step 6. Calculate the baseline emission factor（$EF_{grid,CM,y}$）

According to ACM0002, the baseline emission factor $EF_{grid,CM,y}$ is calculated as the weighted average of the operating margin emission factor ($EF_{grid,OM, y}$) and the build margin emission factor ($EF_{grid,BM, y}$), the default weights of wind and solar projects are as follows: w_{OM} = 0.75 and w_{BM} = 0.25.

$$EF_{grid,CM,y} = w_{OM} \times EF_{grid,OM,y} + w_{BM} \times EF_{grid,BM,y} \qquad (9)$$

1.2. Calculation of the Baseline Emission (BE_y)

$$BE_y = (EG_y - EG_{baseline}) \times EF_{grid,CM,y} \qquad (10)$$

Where:
BE_y = Baseline emissions in year *y* (tCO_2e/yr).
EG_y = Net electricity supplied by the project activity to the grid (MWh), which can be calculated by the exported electricity (EG_{ex}) minus the imported electricity (EG_{im}), i.e. $EG_y = EG_{ex.} - EG_{im}$
$EG_{baseline}$ = Baseline electricity supplied to the grid in the case of modified or retrofit facilities (MWh). For new power plants this value is taken as zero.

$EF_{grid,CM,y}$ = Combined margin CO_2 emission factor for grid connected power generation in year *y* calculated using the latest version of the "Tool to calculate the emission factor for an electricity system".

2. Calculating the Project Emission (PE_y)

The proposed project is wind power project. According to the ACM0002, the GHG Emission of the project is zero, i.e. $PE_y = 0$.

3. Calculating the Leakage Emission (LE_y)

According to the ACM0002, the leakage of the project is zero, i.e. $L_y = 0$

4. Calculating the Emission Reduction (ER_y)

The annual emission reduction（ER_y）of the proposed project is calculated as:

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

Therefore, the annual emission reduction in the first crediting period of the project is estimated as 103,792tCO_2e。

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

Data / Parameter:	$FC_{i,y}$
Data unit:	10^4t or 10^8m^3
Description:	Amount of fossil fuel type *i* consumed in NCPG in year *y*
Source of data used:	*China Energy Statistical Year Book 2005-2007*
Value applied:	See Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Latest Official Statistical Data
Any comment:	

Data / Parameter:	$NCV_{i,y}$
Data unit:	MJ/t, MJ/m^3
Description:	Net calorific value (energy content) of fossil fuel type *i* in year *y*
Source of data used:	*China Energy Statistical Year Book 2007*
Value applied:	See Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Latest Official Statistical Data
Any comment:	

Data / Parameter:	$EF_{CO2,i,y}$
Data unit:	t C/TJ
Description:	CO_2 emission factor of fossil fuel type *i* in year *y*
Source of data used:	2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value applied:	See Annex 3
Justification of the choice of data or description of	Adopt the default value of IPCC

measurement methods and procedures actually applied :	
Any comment:	

Data / Parameter:	***EG_y***
Data unit:	MWh
Description:	Net electricity generated and delivered to the NCPG by all power sources ,excluding low-cost/must-run power plants/units, in year *y*
Source of data used:	*China Electric Power Yearbook, 2005-2007*
Value applied:	See Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Latest Official Statistical Data
Any comment:	

Data / Parameter:	***$F_{i,j,y}$***
Data unit:	10^4t or 10^7m^3
Description:	Amount of fuel *i* consumed by province *j* in year *y*
Source of data used:	*China Energy Statistical Year Book 2007*
Value applied:	See Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Latest Official Statistical Data
Any comment:	

Data / Parameter:	**Installed Capacity**
Data unit:	MW
Description:	Installed capacity of type *m* in province *i* in year *y*
Source of data used:	*China Electric Power Yearbook, 2005-2007*
Value applied:	See Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Latest Official Statistical Data
Any comment:	

Data / Parameter:	**Efficiency level of the best technology commercially available for coal, oil and gas-fired power plant**
Data unit:	%
Description:	The power supply efficiency of most advanced commercialized power plants of fuel *i* in China
Source of data used:	Publication of Chinese DNA
Value applied:	Best efficiency for coal plant is 37.28% Best efficiency for oil plant is 48.81%

	Best efficiency for gas plant is 48.81%
Justification of the choice of data or description of measurement methods and procedures actually applied :	Latest Official Statistical Data
Any comment:	

B.6.3 Ex-ante calculation of emission reductions:

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According to B.6.1, the emission factor of NCPG which is the baseline of the proposed project is EF_y=1.0548tCO_2e/MWh, as showed in the Financial Assessment Report of the project activity, the project will deliver 98,400MWh to NCPG.

The formula of baseline emission is:

$$BE_y = (98,400 \text{ MWh} - 0) \times 1.0548 \text{ tCO}_2\text{e/MWh} = 103,792 \text{ tCO}_2\text{e}$$

The proposed project is wind power project. According to the ACM0002, the GHG Emission of the project is zero, i.e. $PE_y = 0$; the leakage of the project is zero, i.e. $L_y = 0$

The power generation of the project institutes that generated by the fossil fuel power plant, avoiding the CO_2 emission, and the annual emission reduction（ER_y）of the project is calculated as:

$$ER_y = 103,792 \text{ tCO}_2 - 0 - 0 = 103,792 \text{ tCO}_2\text{e}$$

Therefore, the annual emission reduction in the first crediting period of the project is estimated as 103,792tCO_2e

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

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Years	**Estimation of Project activity Emission (tonnes of CO_2e)**	**Estimation of baseline emission (tonnes of CO_2e)**	**Estimation of leakage (tonnes of CO_2e)**	**Estimation of Emission reductions (tonnes of CO_2e)**
01/11/2009-01/12/2009	0	17,299	0	17,299
2010	0	103,792	0	103,792
2011	0	103,792	0	103,792
2012	0	103,792	0	103,792
2013	0	103,792	0	103,792
2014	0	103,792	0	103,792
2015	0	103,792	0	103,792
01/01/2016-31/10/2016	0	77,844	0	86,493
Total estimated reductions (tonnes of CO_2e)	0	86,493	0	726,544
Total number of crediting years	0	7	0	7
Annual average over the crediting period of estimated reductions (tonnes of CO_2e)	0	103,792	0	103,792

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

B.7.1 Data and parameters monitored:

Data / Parameter:	$EG_{ex,y}$
Data unit:	MWh
Description:	Electricity supplied by the project activity to the grid in year *y*
Source of data to be used:	Measured by the gateway meter (M7)
Value of data applied for the purpose of calculating expected emission reductions in section B.5	98,400
Description of measurement methods and procedures to be applied:	Continuous measurement and monthly recording.
QA/QC procedures to be applied:	The meter will be annually calibrated and power supplied to the grid will be cross-checked against invoices.
Any comment:	If the proposed project shares a joint invoice meter with another wind farm, calculated proportion of the meter reading will be applied, please see B.7.2 for detail information.

Data / Parameter:	$EG_{im,y}$
Data unit:	MWh
Description:	Electricity imported to the proposed project in year *y*
Source of data to be used:	Measured by the gateway meter (M7)
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0
Description of measurement methods and procedures to be applied:	Continuous measurements and monthly recording.
QA/QC procedures to be applied:	The meter will be annually calibrated and power imported to the grid will be cross-checked with invoices.
Any comment:	If the proposed project shares a joint invoice meter with another wind farm, calculated proportion of the meter reading will be applied, please see B.7.2 for detail information.

Data / Parameter:	EG_y
Data unit:	MWh
Description:	Net electricity supplied to the Grid by the project activity in year *y*
Source of data to be used:	Calculated as $EG_{ext,y}$ minus $EG_{im,y}$
Value of data applied for the purpose of calculating expected emission reductions in section B.5	98,400

Description of measurement methods and procedures to be applied:	Calculated using monitored result of $EG_{ext,y}$ and $EG_{im,y}$ .Please refer to the B.7.2 for details.
QA/QC procedures to be applied:	Power supplied to the grid will be checked by internal verification procedure and electricity sales receipts.
Any comment:	

B.7.2 Description of the monitoring plan:

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The applied methodology ACM0002 "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" version 07 is adopted as general guidance of monitoring of the proposed project activity. The monitoring plan is designed to reflect good monitoring practice appropriate to the wind power project, and to guarantee accurate, reliable and transparent monitoring of all necessary parameters during the whole crediting period, and to ensure the real, measurable, long-term GHG emission reduction from this project.

1. Management Structure

A department for CDM management of the proposed project will be established within the owner company. The department will take charge of the management and the implementation of the monitoring plan. The responsibilities of the staff are as follow:

General Manager: The General Manager will take charge of general-guidance and decision-making.

CDM Project Manager: To be responsible for internal review, document management.

Operation staff: To be responsible for data collection and daily operation recording, etc.

Financial chief: To be responsible for collection of sales invoices.

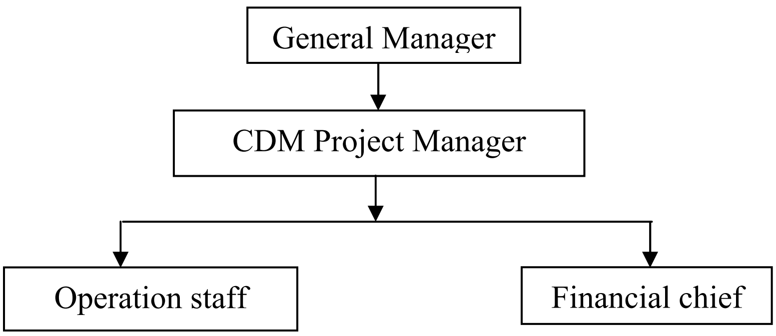

Fig. B-2 The Structure of the CDM Monitoring

2. Monitoring Data

During the crediting period, the electricity supplied by the project activity to the grid ($EG_{ex,y}$) and imported by the proposed project from the grid ($EG_{ex,y}$), and the calculated net electricity supplied (EG_y) will be monitored.

3. Installation of the Monitoring Equipments

The power connection and meter installation are shown in the Fig. B-3.

Electricity supplied/imported by the proposed project to/from the grid will be monitored by a bi-directional gateway electricity meter (M7). According to the power purchase agreement (PPA) signed with the power grid company, the gateway meter will be used as the invoice meter. There's back-up system for the gateway meter (M7), including its standby meter (M8) and meters installed in the project site (M5 and M6). The accuracy of the gateway meter and its standby is no lower than 0.5S.

However, another potential wind farm will possibly connect to the same substation to transform its voltage into 220kV (Shown in Fig. B-3) in the future. In order to calculate how much measured electricity by the

gateway meter (M7) can be counted by the proposed project activity, the weighted share of the joint meter reading will be applied. Four meters (M1 to M4) and several meters for the potential project (Represented by Mn) with accuracy no lower than 0.5S will be installed as shown in the diagram below. Any one of all meters has a same meter as backup meter in the same position.

As the meter reading of M7 will be the sum of the proposed project and the potential project, and M1 to M4 and Mn are all connect to the same transformer substation, and the losses from transforming and transmission afterward are the same, the weighted share of the power supply/consumption of the project activity can be calculated based on the ratio of power generation of the project activity and the potential project.

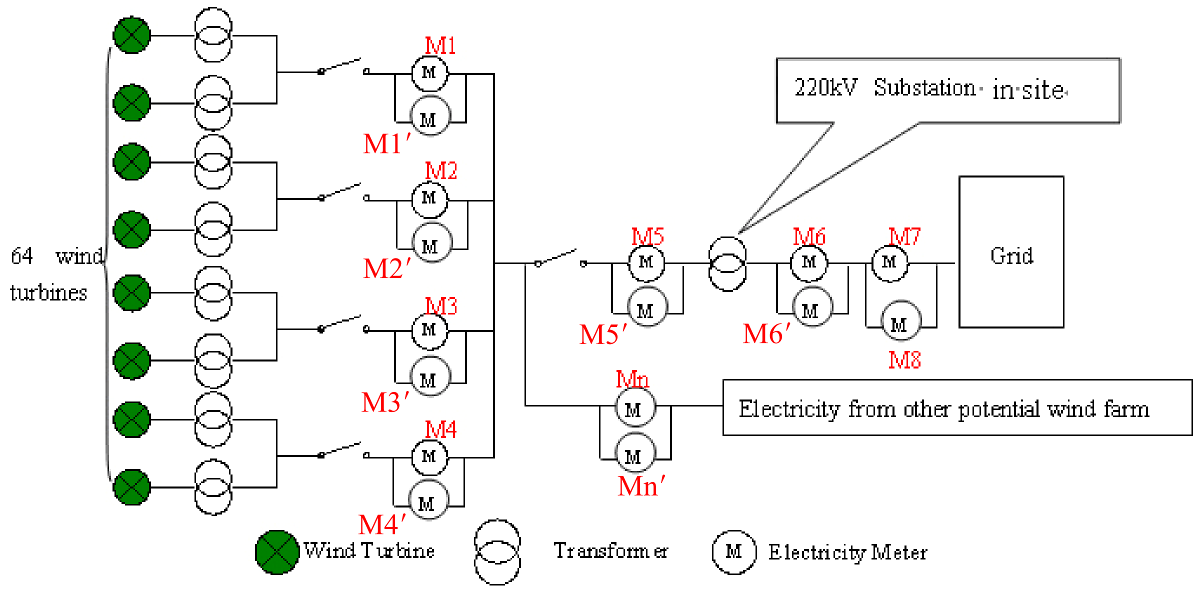

Fig. B-3 The location of Monitoring Equipments

4. Monitoring procedure

The procedures for monitoring are as following:

1) If the potential wind farm doesn't connect to the same transformer substation and shares the same gateway meter with the project activity, meter reading of M7 will be completely used for monitoring $EG_{ext,y}$ and $EG_{im,y}$, both the two directions of the meter reading will be recorded monthly.

2) If the potential wind farm connects to the same transformer substation and shares the same gateway meter with the project activity, the gateway meter M7 and the meters of M1 to M4 together with Mn will be applied to calculate the weighted share of the project activity. Both the project activity and the potential wind farm are belong to the same parent company, therefore all the related meter reading will be accessible to the project activity. The net electricity supplied by the project activity to the grid will be calculated using the following formula:

$$EG_y = (EG_{ex,y} - EG_{im,y}) \times \frac{M1 + M2 + M3 + M4}{M1 + M2 + M3 + M4 + Mn}$$

All the meters will be recorded at the same time of every month so that the calculation of weights is accurate. And the electricity sale invoices will be issued by the host companies of the project activity and the potential wind farm separately, this will allow to cross check the monitored net electricity supplied to the grid by the project activity against the invoices.

5. Quality Assurance & Quality Control

5.1 Calibration of measurement equipment

All the meters used for monitoring will be calibrated annually according to relevant industry standards, and all the records will be maintained according to the requirements of document management.

5.2 Training

All the staff involved in CDM monitoring will receive training to satisfy needs for necessary competence for personnel performing work affecting conformity with requirements, including maintenance, data recording, document management and etc. All the training plan and records will be maintained according to the requirements of document management.

5.3 Troubleshooting procedures

1) The reading of the backup meter (M8) will be applied if the gateway meter (M7) functioned improperly;

2) If both the gateway meter (M7) and its standby (M8) are wrong, other meters in the backup system (M5 or M6) will be used to calculate the electricity exchange considering transmission losses in accordance with the power purchase agreement (PPA) signed with the power grid company;

3) If accurate meter reading from any one of M1, M2, M3, M4 and Mn is not available, the reading of the backup meters will be applied. If any one backup system of them is also performing improperly, the proposed project owner and the grid company shall jointly prepare an estimation of the correct measurements; When backup system are wrong, the emission reduction produced by the related electricity will be considered as zero in a conservative manner.

5.4 Internal review procedure

Monthly net electricity supplied to the grid by the project activity will be reviewed and approved by the CDM Project Manager before it is accepted and stored.

6. Document Management.

At the end of each month, the monitoring data will be filled in a spreadsheet and stored electronically, and all the relevant hard copies should be also archived. Furthermore, the project proponent collects the purchase invoices for the electricity supplied to the grid as a cross-check.

All the data and records will be kept for two years after the end of the last crediting period.

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)

>>

Date of completion of the application of the methodology to the project activity study was 17/03/2008.

Responsible person：

Shujuan Wang, Beijing Jipeng Investment Information & Consultant Ltd.,

Email：wsj@ndrc-jp.cn, Tel: +86-10-63691846.

Emma Chen, Beijing Jipeng Investment Information & Consultant Ltd.,

Email：chenyao@ndrc-jp.cn, Tel: +86-10-63691846.

Xuhua Wang, Beijing Jipeng Investment Information & Consultant Ltd.,

Email：wxh@ndrc-jp.cn, Tel: +86-10-63691513.

Persons and entities as listed above are not project participants involved.

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:

>>

17/01/2008

The earliest equipment purchase agreement of the project activity is the wind turbine purchase contract, it was signed on the January 17, 2008; and the earliest construction contract of the project activity was signed on the July 13, 2008.
Therefore, the project start date is defined as Jan.17 2008 which is in compliance with the Glossary of CDM terms (Version 04).

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

>>
20 years

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

C.2.1. Renewable crediting period

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

>>
01/11/2009 or the date of registration, whichever is later.

C.2.1.2. Length of the first crediting period:

>>
7 years

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

>>
Not applicable

C.2.2.2. Length:

>>
Not applicable

SECTION D. Environmental impacts

>>

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

>>
Environmental Impact Assessment (EIA) of the proposed project has been completed by the Institute of Hydrogeology and Environmental Geology, Cags and approved by the Environmental Protection Bureau of Hebei Province on 23rd, July 2007 (The Approval Document No. Ji Huan Biao [2007] No.208). According to the EIA, during the construction and operation period, the main potential impacts of the proposed project would occur in ecology and environment.

1. The impact of the proposed project on local ecology and environment during the construction period.

Vegetation & Land: The impact on vegetation and land will be limited. The construction will be carried out in a small range. Land for the proposed project site is unused and no tree will be felled. The project owner will cover soil and plant grass on bare land after construction. Land will recover in one year after construction and soil and water loss won't happen.

Birds & Animals: The impact on birds and animals will be little. The construction period is no longer than one year. The activities of birds and animals in local area won't be impact on. Construction points are distant which enable the birds and animals to live as usual in area outside construction points.

Air: Construction won't cause bad impact on local air quality. Dust pollution which is short-term and in small area will disappear after the construction.

Solid Waste: Construction and domestic wastes will be collected by builders and send to the local garbage treatment plant.

Noise: Construction noise won't impact local inhabitants' daily life. Noise will decrease to 45db (A) at 300m away from construction points. The closest village is more than 4000m away from the proposed project.

2.The impact of the proposed project on local ecology and environment during the operation period.

Vegetation & Land : Growth of the vegetation and land in local area won't be impacted on in the operation period because the vegetation will recover after construction.

Birds & Animals : There will be little impact on the birds and animals during the operation period. The distance between the turbines is large and the flight of birds and migration of animals won't be interrupted.

House Refuse: The wastes of daily life in operation period are small quantity and won't pollute the local environment. Waste water produced in operation period will be treated and reuse in site of the proposed project. The garbage will be treated in nearby treatment plant.

Noise: Noise of the proposed project won't impact on the life of local people. Noise will be 43db (A) at 400m away from the turbines. The closest village is more than 4000m away from the proposed project.

From the analysis above, the proposed project have little impact on local ecology and environment during the period of project construction by protection measure and will recover soon after the construction; the project won't have negative impact on the local ecology and 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:

>>

The proposed project is wind power project as renewable energy project. Environmental Impact Assessment (EIA) of the proposed project has been completed by the Institute of Hydrogeology and Environmental Geology, approved by the Environmental Protection Bureau of Hebei Province (The Approval Document No.: Ji Huan Biao[2007] No.208). According to the EIA, the project won't have considerable influence on the environment around

SECTION E. Stakeholders' comments

>>

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

>>

Notices were pasted in the village around the proposed project location in March, 2008. There was a detailed description on basic information of the proposed project proposed project and the comments were collected by mail, telephone and other contact ways in the notice. No negative opinion on construction of the project is heard expressed by stakeholders. The local inhabitants were also invited to attend the stakeholders' meeting in the notice.

Besides the local inhabitants, representatives of local relevant departments were also informed about the proposed project and invited to attend the stakeholders' meeting. The meeting on investigating stakeholders' comments on the proposed project was held in April 17th, 2008. First of all, staff of the

project proponent described the basic information of the proposed project to the representatives. Then, the staff handed out the well designed questionnaires to the representatives.

The questionnaires include the following sections:
1. Basic information of the proposed project;
2. Basic information of the persons being investigated;
3. View on the proposed project of the persons being investigated:
   1) Knowledge or understanding on wind farm projects;
   2) Relationship with the proposed project;
   3) Influence of the proposed project on the environment around in construction period;
   4) Influence of the proposed project on the environment around in operation period;
   5) Benefit of the proposed project to the local inhabitants' life;
   6) Sideway of the proposed project to the local inhabitants' life;
   7) The issues of the proposed project they concern most ;
   8) Opinion to the foundation of the proposed project;
4. Suggestions and comments to the proposed project
5. Signature and time

Finally, 42 questionnaires were given back and 37 questionnaires were valid. The outcome of the consultation is described in section E.2.

E.2. Summary of the comments received:

>>

Among the 37 persons, 32 persons is male and 5 persons is female; 26 of them are local residents, 11 of them are representatives of local relevant departments.The summary of their opinion is as follow.

Among the 37 respondents,

Item	Questions	Answers	Quantity of person	Percentage
1	Knowledge of wind farm projects	Know very well	10	27%
		Had some information	27	73%
2	Influence on the environment around in construction period	No	28	75.7%
		A little	8	21.6%
		Certain	1	2.7%
3	Influence on the environment around in operation period	No	35	94.6%
		A little	1	2.7%
		Certain	1	2.7%
4	Benefit to the local inhabitants' life	Improvement of quality of life	22	59.5%
		Income increasing	19	51.3%
		Creating jobs	8	21.6%
5	Sideway to the local inhabitants' life	No	29	78.4%
		Land occupied	8	21.6%
6	Impact to global warming	Positive impact	31	83.8%
		No impact	3	8.1%
		No idea	3	8.1%
7	Question of the proposed project they pays most attention to	Economic benefit	34	91.9%
		Environment benefit	7	18.9%
		Job opportunity	3	8.1%
8	Opinion to the foundation of the proposed project	Support	35	94.6%
		Relative support	1	2.7%

		No idea	1	2.7%

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

>>
From the outcome of the results of questionnaire statistics, we can know that some people express their concerns about the environmental impact and land occupation. The environmental impact and land occupation of the proposed project were well studied in the EIA report. In addition, the requirements in the EIA report to mitigate noise influence will be strictly conducted by the project proponent and be supervised by the municipal environmental protection bureau.

Stakeholders of the project location generally understood and supported the construction of the Project. Therefore, there has been no need to modify the proposed project.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Project proponent: China Resource Wind Power (Chengde) Company

Organization:	China Resources Wind Power (Chengde) Co., Ltd.
Street/P.O.Box:	14th Floor, Huaqiao Commercial Bank Building, 127 Jinsha East Road, Shantou City, Guangdong Province, P.R. China, 515041
Building:	
City:	Shantou City
State/Region:	Guangdong Province
Postfix/ZIP:	515041
Country:	P.R.China
Telephone:	+86-754-8732519
FAX:	+86-754-8732510
E-Mail:	liurixin@windpowerchina.com
URL:	
Represented by:	Liu Rixin
Title:	General Manager
Salutation:	Mr.
Last Name:	Rixin
Middle Name:	-
First Name:	Liu
Department:	GM Office
Mobile:	+86-13502732200
Direct FAX:	+86-754-8732509
Direct tel:	+86-754-8732510
Personal E-Mail:	rxliu@crp.net.cn

CERs Purchaser: Vitol S.A.

Organization:	Vitol S.A.
Street/P.O.Box:	Boulevard du Pont-d'Arve 28, CH1205, Geneva , Switzerland
Building:	
City:	Geneva
State/Region:	
Postfix/ZIP:	1205
Country:	Switzerland
Telephone:	(+)41-22-322-1166
FAX:	(+)41-22-322-1111
E-Mail:	jul@vitol.com
URL:	
Represented by:	
Title:	
Salutation:	
Last Name:	Julien
Middle Name:	
First Name:	Lagalisse
Department:	
Mobile:	
Direct FAX:	(+)41-22-322-1111
Direct tel:	(+)41-22-322-1166
Personal E-Mail:	jul@vitol.com

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

There is no public funding for the proposed project.

Annex 3
BASELINE INFORMATION

1. The data and calculation of Simple OM Emission Factor in NCPG

1）The CO_2 emission of all kinds of fuels in NCPG in the latest 3 years

Tab.3-1 Calculation of the CO_2 emission of all kinds of fuels in NCPG in 2004

Fuel Types	Unit	Beijing A	Tianjin B	Hebei C	Shanxi D	Inner Mongolia E	Shandong F	Sub Total G=A+B+C+D+E+F	EF_{co2} (tc/TJ) H	NCV (MJ/t,km^3) I	CO_2 Emission（tCO_2e）K=G*H*I*44/12/10^2 (Quantity) K=G*H*I*44/12/10 (Volume)
Coal	10^4t	823.09	1410	6299.8	5213.2	4932.2	8550	**27228.29**	25.8	20908	538,547,477
Washed coal	10^4t						40	**40**	25.8	26344	996,857
Other washed coal	10^4t	6.48		101.04	354.17		284.22	**745.91**	25.8	8363	5,901,191
Coke	10^4t					0.22		**0.22**	29.2	28435	6,698
Coke oven gas	10^8m^3	0.55		0.54	5.32	0.4	8.73	**15.54**	12.1	16726	1,153,187
Other gas	10^8m^3	17.74		24.25	8.2	16.47	1.41	**68.07**	12.1	5227	1,578,574
Crude oil	10^4t							**0**	20	41816	0
Gasoline	10^4t								18.9	43070	0
Diesel	10^4t	0.39	0.84	4.66				**5.89**	20.2	42652	186,070
Fuel oil	10^4t	14.66		0.16				**14.82**	21.1	41816	479,451
LPG	10^4t							**0**	17.2	50179	0
Refinery gas	10^4t		0.55	1.42				**1.97**	15.7	46055	52,229
Natural gas	10^8m^3		0.37		0.19			**0.56**	15.3	38931	122,306
Other oil product	10^4t							**0**	20	38369	0
Other coked product	10^4t							**0**	25.8	28435	0
Other energy	10^4t Standardized Coal	9.41		34.64	109.73	4.48		**158.26**	0	0	0
Total											**549,024,041**

Data source: *China Energy Statistical Yearbook (2005), page 202-221, page 258-261.*

Tab.3-2 Calculation of the CO_2 emission of all kinds of fuels in NCPG in 2005

Fuel Types	**Unit**	**Beijing A**	**Tianjin B**	**Hebei C**	**Shanxi D**	**Inner Mongolia E**	**Shandong F**	**Sub Total G=A+B+C +D+E+F**	**EF_{co2} (tc/TJ) H**	**NCV ($MJ/t,km^3$) I**	**CO_2 Emission （tCO_2e）K=G*H*I*44/12/10^2 (Quantity) K=G*H*I*44/12/10 (Volume)**
Coal	10^4t	897.75	1675.2	6726.5	6176.45	6277.23	10405.4	**32158.53**	25.8	20908	636,062,536
Washed coal	10^4t						42.18	**42.18**	25.8	26344	1,051,186
Other washed coal	10^4t	6.57		167.45	373.65		108.69	**656.36**	25.8	8363	5,192,725
Coke	10^4t					0.21	0.11	**0.32**	29.2	28435	9,742
Coke oven gas	10^8m^3	0.64	0.75	0.62	21.08	0.39		**23.48**	12.1	16726	1,742,396
Other gas	10^8m^3	16.09	7.86	38.83	9.88	18.37		**91.03**	12.1	5227	2,111,027
Crude oil	10^4t					0.73		**0.73**	20	41816	22,385
Gasoline	10^4t			0.01				**0.01**	18.9	43070	298
Diesel	10^4t	0.48		3.54		0.12		**4.14**	20.2	42652	130,786
Fuel oil	10^4t	12.25		0.23		0.06		**12.54**	21.1	41816	405,690
LPG	10^4t							**0**	17.2	50179	0
Refinery gas	10^4t			9.02				**9.02**	15.7	46055	239,141
Natural gas	10^8m^3	0.28	0.08		2.76			**3.12**	15.3	38931	681,417
Other oil product	10^4t							**0**	20	38369	0
Other coked product	10^4t							**0**	25.8	28435	0
Other energy	10^4t Standardized Coal	8.58		32.35	69.31	7.27	118.9	**236.41**	0	0	0
Total											**647,649,331**

Data source: *China Energy Statistical Yearbook (2006), page 126-145, page*182-185.

Tab.3-3 Calculation of the CO_2 emission of all kinds of fuels in NCPG in 2006

Fuel Types	**Unit**	**Beijing A**	**Tianjin B**	**Hebei C**	**Shanxi D**	**Inner Mongolia E**	**Shandong F**	**Sub Total G=A+B+C +D+E+F**	**EF_{co2} (tc/TJ) H**	**NCV (MJ/t,km^3) I**	**CO_2 Emission (tCO_2e) $K=G*H*I*44/12/10^2$ (Quantity) $K=G*H*I*44/12/10$ (Volume)**
Coal	10^4t	796.63	1,639.20	6,867.99	6,968.88	8,404.05	10,930.66	35,607.41	25.8	20,908.00	704,277,822.95
Washed coal	10^4t						39.77	39.77	25.8	26,344.00	991,125.03
Other washed coal	10^4t	6.36		214.13	371.14	61.77	544.60	1,198.00	25.8	8,363.00	9,477,854.80
Moulded Coal		7.97					27.77	35.74	26.6	20,908.00	728,819.71
Coke	10^4t						3.23	3.23	29.2	28,435.00	98,335.43
Coke oven gas	10^8m^3	0.38	0.63	5.80	22.32	0.64	5.79	35.56	12.1	16,726.00	2,638,825.34
Other gas	10^8m^3	20.66	6.58	69.72	13.79	22.76	7.22	140.73	12.1	5,227.00	3,263,592.97
Crude oil	10^4t					0.74		0.74	20.0	41,816.00	22,692.15
Gasoline	10^4t			0.01				0.01	18.9	43,070.00	298.48
Diesel	10^4t	0.21		3.01		0.07	6.32	9.61	20.2	42,652.00	303,588.69
Fuel oil	10^4t	6.38		0.08			4.10	10.56	21.1	41,816.00	341,633.37
LPG	10^4t						0.01	0.01	17.2	50,179.00	316.46
Refinery gas	10^4t			2.43			2.32	4.75	15.7	46,055.00	125,933.56
Natural gas	10^8m^3	3.41	0.73		0.53			4.67	15.3	38,931.00	1,019,941.59
Other oil product	10^4t						0.28	0.28	20.0	38,369.00	7,878.43
Other coked product	10^4t							0.00	25.8	28,435.00	0.00
Other energy	10^4t Standardized Coal	6.83		47.11	230.76	12.51	132.29	429.50	0.0	0.00	0.00
Total											**723,298,659**

Data source: *China Energy Statistical Yearbook (2007), page 126-145, page 182-185.*

2）**Thermal Power Generation in NCPG in the latest 3 years**

Tab.3-4 Thermal Power Generation in NCPG in 2004

Province	Power Generation (10^8kWh)	Self Usage Rate (%)	Power Supply (10^8kWh)
Beijing	185.79	7.94	171.04
Tianjin	339.52	6.35	317.96
Hebei	1,249.70	6.5	1,168.47
Shanxi	1,049.26	7.7	96,8.47
Inner Mongolia	804.27	7.17	746.60
Shandong	1,639.18	7.32	1,519.19
Total			4,891.73

Data source: *China Electric Power Yearbook 2005, page472，474.*

Tab.3-5 Thermal Power Generation in NCPG in 2005

Province	Power Generation (10^8kWh)	Self Usage Rate (%)	Power Supply (10^8kWh)
Beijing	208.80	7.73	192.66
Tianjin	369.93	6.63	345.40
Hebei	1,343.48	6.57	1,255.21
Shanxi	1,287.85	7.42	1,192.29
Inner Mongolia	923.45	7.01	858.72
Shandong	1,898.80	7.14	1,763.23
Total			5,607.51

Data source: *China Electric Power Yearbook 2006, page559, 568.*

Tab.3-6 Thermal Power Generation in NCPG in 2006

Province	Power Generation (10^8kWh)	Self Usage Rate (%)	Power Supply (10^8kWh)
Beijing	207.05	7.51	191.50
Tianjin	359.24	6.86	334.60
Hebei	1438.88	6.63	1,343.48
Shanxi	1502.5	7.45	1,390.56
Inner Mongolia	1395.93	7.58	1,290.12
Shandong	2309.22	7.12	2,144.80
Total			6,695.06

Data source: *China Electric Power Yearbook 2007, page627, 638.*

3) **Collection of Power Supply and CO_2 emission in NCPG in the latest 3 years**

Tab.3-7 Power Supply and CO_2 emission in NCPG in the latest 3 years

Year	Power Supply (MWh)	CO_2 Emission (tCO_2e)
2004	489,173,110	549,024,041
2005	560,751,013	647,649,331
2006	669,506,473	723,298,659

4) The CO_2 emission of all kinds of fuels in NECPG in the latest 3 years

Tab.3-8 Calculation of the CO_2 emission of all kinds of fuels in NECPG in 2004

Fuel Types	**Unit**	**Liaoning A**	**Jilin B**	**Heilongjiang C**	**Sub Total D=A+B+C**	**EF_{co2} （tc/TJ） E**	**NCV （MJ/t,km^3） F**	**CO_2 Emission （tCO_2e） H= D*E*F*44/12/10^2 （Quantity） H= D*E*F*44/12/10 (Volume)**
Coal	10^4t	4144.2	2310.9	3084.8	**9539.9**	25.8	20908	188,689,377
Washed coal	10^4t	84.75	1.09	4.88	**90.72**	25.8	26344	2,260,872
Other washed coal	10^4t	577.67	14.26	61	**652.93**	25.8	8363	5,165,589
Coke	10^4t				**0**	29.2	28435	0
Coke oven gas	10^8m^3	4.83	2.91		**7.74**	12.1	16726	574,367
Other gas	10^8m^3	57.33	4.19		**61.52**	12.1	5227	1,426,677
Crude oil	10^4t				**0**	20	41816	0
Gasoline	10^4t					18.9	43070	0
Diesel	10^4t	2.04	1.16	0.24	**3.44**	20.2	42652	108,673
Fuel oil	10^4t	12.81	1.78	2.86	**17.45**	21.1	41816	564,536
LPG	10^4t	2.19			**2.19**	17.2	50179	69,305
Refinery gas	10^4t	9.79		1.14	**10.93**	15.7	46055	289,780
Natural gas	10^8m^3		0.03	2.53	**2.56**	15.3	38931	559,111
Other oil product	10^4t				**0**	20	38369	0
Other coked product	10^4t				**0**	25.8	28435	0
Other energy	10^4t Standardized Coal	26.97	5.07		**32.04**	0	0	0
Total								**199,708,287**

Data source: *China Energy Statistical Yearbook (2005), page 222-233.*

Tab.3-9 Calculation of the CO_2 emission of all kinds of fuels in NECPG in 2005

Fuel Types	Unit	Liaoning A	Jilin B	Heilongjiang C	Sub Total D=A+B+C	EF_{co2} (tc/TJ) E	NCV (MJ/t,km^3) F	CO_2 Emission（tCO_2e） H= D*E*F*44/12/10^2 (Quantity) H= D*E*F*44/12/10 (Volume)
Coal	10^4t	4305.41	2446.13	3383.21	**10134.75**	25.8	20908	200,454,896
Washed coal	10^4t				**0**	25.8	26344	0
Other washed coal	10^4t	524.74	19.26	24.16	**568.16**	25.8	8363	4,494,940
Coke	10^4t				**0**	29.2	28435	0
Coke oven gas	10^8m^3	1.03	3.57	0.68	**5.28**	12.1	16726	391,817
Other gas	10^8m^3	12.62	8.37		**20.99**	12.1	5227	486,768
Crude oil	10^4t	1.16			**1.16**	20	41816	35,571
Gasoline	10^4t				**0**	18.9	43070	0
Diesel	10^4t	1.18	1.48	0.57	**3.23**	20.2	42652	102,039
Fuel oil	10^4t	9.32	2.46	1.55	**13.33**	21.1	41816	431,247
LPG	10^4t	0.12			**0.12**	17.2	50179	3,798
Refinery gas	10^4t	5.48		1.32	**6.8**	15.7	46055	180,284
Natural gas	10^8m^3		0.84	2.24	**3.08**	15.3	38931	672,681
Other oil product	10^4t				**0**	20	38369	0
Other coked product	10^4t				**0**	25.8	28435	0
Other energy	10^4t Standardized Coal	16.18			**16.18**	0	0	0
Total								**207,254,040**

Data source: *China Energy Statistical Yearbook (2006), page146-157*

Tab.3-10 Calculation of the CO_2 emission of all kinds of fuels in NECPG in2006

Fuel Types	Unit	Liaoning A	Jilin B	Heilongjiang C	Sub Total D=A+B+C	EF_{co2} (tc/TJ) E	NCV ($MJ/t,km^3$) F	CO_2 Emission (tCO_2e) H= D*E*F*44/12/10^2 (Quantity) H= D*E*F*44/12/10 (Volume)
Coal	10^4t	4681.99	2738.24	3698.29	**11118.52**	25.8	20908	219,912,851
Washed coal	10^4t	0.03			**0.03**	25.8	26344	748
Other washed coal	10^4t	674.74	17.83	96	**788.57**	25.8	8363	6,238,691
Coke	10^4t	3.32			**3.32**	29.2	28435	101,075
Coke oven gas	10^8m^3	2.68	0.16	1.44	**4.28**	12.1	16726	317,609
Other gas	10^8m^3	55.26	1.43		**56.69**	12.1	5227	1,314,667
Crude oil	10^4t	0.49			**0.49**	20	41816	15,026
Gasoline	10^4t				**0**	18.9	43070	0
Diesel	10^4t	0.75	0.39	0.3	**1.44**	20.2	42652	45,491
Fuel oil	10^4t	11.73	0.45	1.44	**13.62**	21.1	41816	440,629
LPG	10^4t				**0**	17.2	50179	0
Refinery gas	10^4t	8.55		4.27	**12.82**	15.7	46055	339,888
Natural gas	10^8m^3		0.19	2.1	**2.29**	15.3	38931	500,143
Other oil product	10^4t				**0**	20	38369	0
Other coked product	10^4t				**0**	25.8	28435	0
Other energy	10^4t Standardized Coal	12.16	17.6	82.77	**112.53**	0	0	0
Total								**229,226,818**

Data source: *China Energy Statistical Yearbook (2007), page 146-157*

5）**Total Power Generation and Supply in NECPG in the latest 3 years**

Tab.3-11 Total Power Generation and Supply in NECPG in 2004

Province	Thermal Power Generation（10^8kWh)	Self Usage Rate（%）	Power Supply（10^8kWh)	Hydropower Generation（10^8kWh)	Self Usage Rate（%）	Power Supply（10^8kWh)	Other（10^8kWh)	Total（MWh)
Liaoning	845.43	7.21	784.47	39.47	1.33	38.95	2.64	
Jilin	332.42	7.68	306.89	61.47	0.75	61.01	0.81	
Heilongjiang	534.82	7.84	492.89	13.38	1.27	13.21	0.46	
Total			1,584.25			113.16	3.91	**170,132,885**

Data Resource: *China Electric Power Yearbook 2005, page472, 474.*

Tab.3-12 Total Power Generation and Supply in NECPG in 2005

Province	Thermal Power Generation（10^8kWh)	Hydropower Generation（10^8kWh)	Other（10^8kWh)	Total Power Generation（10^8kWh)	Self Usage Rate（%）	Power Supply（10^8kWh)	Total（MWh)
Liaoning	836.97	57.26	2.45	896.68	7.03	833.64	
Jilin	352.94	80.02	0.99	433.95	6.59	405.35	
Heilongjiang	580.00	18.00	1.00	599.00	7.96	551.32	
Total						1,790.32	**179,031,569**

Data Resource: *China Electric Power Yearbook 2006, page 559,568.*

Tab.3-13 Total Power Generation and Supply in NECPG in 2006

Province	Thermal Power Generation（10^8kWh)	Hydropower Generation（10^8kWh)	Wind power Generation（10^8kWh)	Other（10^8kWh)	Total Power Generation（10^8kWh)	Self Usage Rate（%）	Power Supply（MWh)
Liaoning	961.84	45.89	2.36	0.44	1,010.53	6.62	94,363,291
Jilin	400.48	51.50	3.02	0.61	455.61	6.78	42,471,964
Heilongjiang	629.82	14.74	1.68		646.24	7.85	59,551,016
Total							**196,386,272**

Data source: *China Electric Power Yearbook 2007, page 627,638.*

6）Average Emission Factor of NECPG in the latest 3 years

Tab.3-14 Average Emission Factor of NECPG in 2004-2006

Year	Power Supply (MWh)	CO_2 Emission (tCO_2e)	Average Emission Factor (tCO_2e/MWh)
2004	170,132,885	199,708,287	1.17384
2005	179,031,569	207,254,040	1.15764
2006	196,386,272	229,226,818	1.16722

Tab.3-15 Total power exports into NCPG from NECPG

Year	Exports into NCPG (MWh)	Average Emission Factor (tCO_2e/MWh)	CO_2 Emission (tCO_2e)
2004	4,514,550	1.17384	5,299,346
2005	3,929,000	1.15764	4,548,366
2006	2,618,060	1.16722	3,055,863

Data source: *China Electric Power Yearbook 2005, page 491.;*
http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File1888.pdf,page4

7) The CO_2 emission of all kinds of fuels in Central China Power Grid in the 2006

Tab.3-16 Calculation of the CO_2 emission of all kinds of fuels in CCPG in 2006

Fuel Types	Unit	Jiangxi A	Henan B	Hubei C	Hunan D	Chong qing E	Sichuan F	Sub Total G=A+B+C	EF_{co2} (tc/TJ) H	NCV (MJ/t,km^3) I	CO_2 Emission (tCO_2e) J=G*H*I*44/12/10^2 (Quantity) J=G*H*I*44/12/10 (Volume)
Coal	10^4t	1926.02	8098.01	3179.79	2454.48	1184.3	3285.22	**20127.82**	25.8	20908	398,107,508
Washed coal	10^4t					5.79		**5.79**	25.8	26344	144,295
Other washed coal	10^4t	4.51	104.12		8.59	79.21		**196.43**	25.8	8363	1,554,036
Moulded Coal	10^4t						0.01	**0.01**	26.6	20908	204
Coke	10^4t		17.23		0.32			**17.55**	29.2	28435	534,299
Coke oven gas	10^8m^3		0.52	1.07	4.24	0.38	0.01	**6.22**	12.1	16726	461,572
Other gas	10^8m^3	12.69	3.95		1.7	4.36	0.01	**22.71**	12.1	5227	526,655
Crude oil	10^4t		0.49					**0.49**	20	41816	15,026
Gasoline	10^4t		0.01					**0.01**	18.9	43070	298
Diesel	10^4t	0.91	2.23	1.41	1.78	0.96		**7.29**	20.2	42652	230,298
Fuel oil	10^4t	0.51	1.26	1.31	0.8	0.57	3.49	**7.94**	21.1	41816	256,872
LPG	10^4t							**0**	17.2	50179	0
Refinery gas	10^4t	0.86	8.1	1	0.97			**10.93**	15.7	46055	289,780
Natural gas	10^8m^3			0.28		0.16	18.63	**19.07**	15.3	38931	4,164,943
Other oil product	10^4t							**0**	20	38369	0
Other coked product	10^4t						0.01	**0.01**	25.8	28435	269
Other energy	10^4t Standardized Coal	17.45	37.36	31.55	18.29	29.35		**134**	0	0	0
Total											406,286,055

Data source: *China Energy Statistical Yearbook (2007), page 178-181,186-197,210-217.*

8）**Total Power Generation and Supply in CCPG in 2006**

Tab.3-17 Total Power Generation and Supply in CCPG in 2006

Province	Thermal Power Generation （10^8kWh)	Hydropower Generation （10^8kWh)	Other （10^8kWh)	Total Power Generation （10^8kWh)	Self Usage Rate （%）	Power Supply （MWh)
Jiangxi	347.46	88.32		435.78	6.17	40,889,237.40
Henan	1,502.26	70.27		1,572.53	7.06	146,150,938.20
Hubei	562.47	750.51		1,312.98	2.75	127,687,305.00
Hunan	471.82	276.40		748.22	4.95	71,118,311.00
Chongqing	234.60	53.00	1.02	288.62	8.45	26,423,161.00
Sichuan	435.93	684.45		1,120.38	4.51	106,985,086.20
Total						519,254,038.80

Data Resource: *China Electric Power Yearbook 2007, page627, 638.*

9）Average Emission Factor of CCPG in the 2006

Tab.3-18 Average Emission Factor of CCPG in 2006

Year	Power Supply (MWh)	CO_2 Emission (tCO_2e)	Average Emission Factor (tCO_2e/MWh)
2006	519,254,039	406,286,055	0.78244

Tab.3-19 Total power exports into NCPG from CCPG and the amount of CO_2 emission

Year	Exports into NCPG (MWh)	Average Emission Factor (tCO_2e/MWh)	CO_2 Emission (tCO_2e)
2006	497,060	0.78244	388,921

Data Resource: http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File1888.pdf,page4

2、Calculation of EF_{OM} of NCPG

Tab.3-20 Calculation of Emission Factor of NCPG

Year	NCPG		NECPG		CCPG	
	Power Supply （MWh）	CO_2 Emission (tCO_2e)	Export （MWh）	CO_2 Emission (tCO_2e)	Export （MWh）	CO_2 Emission (tCO_2e)
2004	489,173,110	549,024,041	4,514,550	5,299,346	0	0
2005	560,751,013	647,649,331	3,929,000	4,548,366	0	0
2006	669,506,473	723,298,659	2,618,060	3,055,863	497,060	388,921
Total	1,719,430,596	1,919,972,031	11,061,610	12,903,575	497,060	388,921

The weighted average emission factor of the three years is as follow:

$EF_{grid,OM,y}$ = （1,919,972,031+12,903,575+388,921）/（1,719,430,596 +11,061,610+497,060）= 1.116855 tCO_2e/MWh

2. The data and calculation of BM Emission Factor in NCPG:

1) Calculation of proportion of CO_2 emitted by the coal, gas, oil used for power generation respectively in the total emission.

Tab.3-21 The CO_2 emission of all kinds of fuels in NCPG in 2006

Fuel Types	Unit	Beijing A	Tianjin B	Hebei C	Shanxi D	Shandong E	Inner Mongolia F	Total G=A+…+F	NCV (MJ/t or 1000m³) H	Emission Factor (tC/TJ) I	Emission (tCO_2e) K=G*H*I*44/12/100
Coal	10^4t	796.63	1639.2	6867.99	6968.88	10930.66	8404.05	35607.41	20908	25.8	704,277,823
Washed coal	10^4t	0	0	0	0	39.77	0	39.77	26344	25.8	991,125
Other washed coal	10^4t	6.36	0	214.13	371.14	544.6	61.77	1198	8363	25.8	9,477,855
Moulded Coal	10^4t	7.97	0	0	0	27.77	0	35.74	20908	26.6	728,820
Coke	10^4t	0	0	0	0	3.23	0	3.23	28435	29.2	98,335
Sub-total											**715,573,958**
Crude Oil	10^4t	0	0	0	0	0	0.74	0.74	41816	20	22,692
Gasoline	10^4t	0	0	0.01	0	0	0	0.01	43070	18.9	298
Kerosene	10^4t	0	0	0	0	0	0	0	43070	19.6	0
Diesel	10^4t	0.21	0	3.01	0	6.32	0.07	9.61	42652	20.2	303,589
Fuel oil	10^4t	6.38	0	0.08	0	4.1	0	10.56	41816	21.1	341,633
Other Oil Products	10^4t	0	0	0	0	0.28	0	0.28	38369	20	7,878
Other Coking Products	10^4t	0	0	0	0	0	0	0	28435	25.8	0
Sub-total											**676,091**
Natural Gas	10^7m^3	34.1	7.3	0	5.3	0	0	46.7	38931	15.3	1,019,942
Coke Oven Gas	10^7m^3	3.8	6.3	58	223.2	57.9	6.4	355.6	16726	12.1	2,638,825
Other Gas	10^7m^3	206.6	65.8	697.2	137.9	72.2	227.6	1407.3	5227	12.1	3,263,593
LPG	10^4t	0	0	0	0	0.01	0	0.01	50179	17.2	316
Refinery Gas	10^4t	0	0	2.43	0	2.32	0	4.75	46055	15.7	125,934
Sub-total											**7,048,610**
Total											**723,298,659**

Data Sources: *China Energy Statistical Yearbook 2007, Page 126-145, 182-185*

Calculate with data provided in Table3-17 as above and formula (4), (5), (6), the results is: λ_{Coal}=98.932%，λ_{Oil}=0.0935%，λ_{Gas}=0.9745%.

2）Calculation of $EF_{Thermal}$

Tab.3-22 Emission Factors of the most advanced technologies for the relevant fuels

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

$EF_{Thermal} = \lambda_{Coal} \times EF_{Coal,Adv} + \lambda_{Oil} \times EF_{Oil,Adv} + \lambda_{Gas} \times EF_{Gas,Adv}$ =0.9083 tCO_2/MW

3) Installed Capacity of NCPG in latest 3 years

Tab.3-23 Installed Capacity of NCPG in 2004 (Unit: MW)

	Beijing	Tianjin	Hebei	Shanxi	Inner Mongolia	Shandong	Total
Thermal Power	3458.5	6008.5	19932.7	17693.3	13641.5	32860.4	93594.9
Hydropower	1055.9	5	783.8	787.3	567.9	50.8	3250.7
Wind Power and Others	0	0	13.5	0	111.7	12.3	137.5
Total	4514.4	6013.5	20730	18480.6	14321.2	32923.5	96983.1

Data Source: *China Electric Power Yearbook 2005, page 473.*

Tab.3-24 Installed Capacity of NCPG in 2005(Unit: MW)

	Beijing	Tianjin	Hebei	Shanxi	Inner Mongolia	Shandong	Total
Thermal Power	3833.5	6149.9	22333.2	22246.8	19173.3	37332	111068.7
Hydropower	1025	5	784.5	783	567.9	50.8	3216.2
Wind Power and Others	24	24	48	0	208.9	30.6	335.5
Total	4882.5	6178.9	23165.7	23029.8	19950.2	37413.4	114620.4

Data Source: *China Electric Power Yearbook 2006, page 571.*

Tab.3-25 Installed Capacity of NCPG in 2006(Unit: MW)

	Beijing	Tianjin	Hebei	Shanxi	Inner Mongolia	Shandon g	Total
Thermal Power	3984	6512	26087	26661	28899	49395	141538
Hydropower	1053	5	785	790	818	553	4004
Wind Power and Others	24	24	218	0	565	106	937
Total	5061	6541	27090	27451	30282	50054	146479

Data Source: *China Electric Power Yearbook 2007, page 637.*

4) Installed Capacity of NCPG in the latest 3 years

Tab.3-26 Installed Capacity of NCPG in the latest 3 years (MW)

	Installed Capacity in 2004	Installed Capacity in 2005	Installed Capacity in 2006	Capacity Additions from 2005 to 2006	Percent in Total Capacity Additions
	A	B	C	D=C-B	
Thermal Power	93594.9	111068.7	141538	30469.3	95.64%
Hydropower	3250.7	3216.2	4004	787.8	2.47%
Wind Power and Others	137.5	335.5	937	601.5	1.89%
Total	**96983.1**	**114620.4**	**146479**	**31858.6**	**100.00%**

$EF_{BM,simple,y}$=0.9083×95.64%= 0.8687 tCO_2/MWh

Since all the data used to determine the emission factor, thus to determine the emission reduction of the project, are obtained from public available data source published by authoritative statistical department and China's DNA, and the potential emission factors and oxidation rates of different fuel types are from Table1.3 and 1.4, Page1.21-1.24, Chapter I, 2006 IPCC Guidelines for National Greenhouse Gas Inventories" Volume 2 Energy.

Annex 4

MONITORING INFORMATION

The monitoring plan will monitor the net electricity which is supplied by the proposed project to the NCPG and the detailed monitoring plan can seethe description in B.7.