



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

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**SECTION A. General description of project activity****A.1. Title of the project activity:**

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Project Title: Inner Mongolia China Water Group Huade Niujiatangzi Wind Farm 49.5MW Project
PDD Version: 1.0
PDD Completion date: 27th May 2011

A.2. Description of the project activity:

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Inner Mongolia China Water Group Huade Niujiatangzi Wind Farm 49.5MW Project (hereafter, the “Project”) is located at Niujiatangzi Wind Farm 14.2 km away from the southwest of Changshun Town, Huade county, Ulanqab City in the Inner Mongolia Autonomous Region of the People’s Republic of China (hereafter, the “Host Country”). The Project is being constructed by China Water Group Huade Wind Power Co., Ltd. (hereafter, “CWG”).

The Project’s baseline scenario, which is the same as the existing scenario prior to implementation of the Project, involves electricity being generated by fossil fuel power plants connected to the North China Power Grid (hereafter, “NCPG”).

The Project will install and operate 33 sets of wind turbines, each of which has a capacity of 1500kW; therefore, the total installed capacity of the Project will be 49.5MW. The full load hours estimated is 2,087 hours per year and the expected net electricity generation supplied to NCPG is 103,297 MWh per year. The Project will reduce greenhouse gas (hereafter, “GHG”) emissions by replacing electricity that would otherwise be generated from coal-fired power plants. The Project’s annual expected emissions reduction is 96,159 tCO₂e.

The Project is consistent with and will contribute to the achievement of the Host Country’s sustainable development objectives. Specifically, the Project will have several positive social and environmental impacts:

- Make full use of Inner Mongolia’s wind energy resources;
- Satisfy increases in demand for electricity in Inner Mongolia;
- Reduce GHG emissions and other pollutants such as SO₂, NO_x and flue gas dust by substituting Project-generated electricity for electricity produced by fossil fuel power plants presently supplying the NCPG;
- Create employment opportunities through the Project’s construction and operation; and
- Provide an attraction for tourism.

A.3. Project participants:

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Name of Party involved (*) ((host) indicates a host Party)	Private and/or public entity(ies) project participants (*) (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant



		(Yes/No)
China (host)	China Water Group Huade Wind Power Co., Ltd.	No
United Kingdom of Great Britain and Northern Ireland	Eco-Tec Asia (UK) Ltd	No

Annex 1 provides detailed information about the Project participants.

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

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A.4.1.1. Host Party(ies):

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People's Republic of China

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

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Inner Mongolia Autonomous Region

A.4.1.3. City/Town/Community etc.:

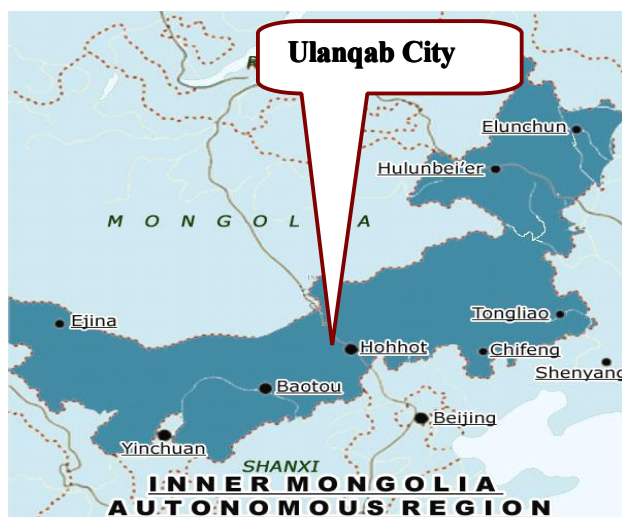
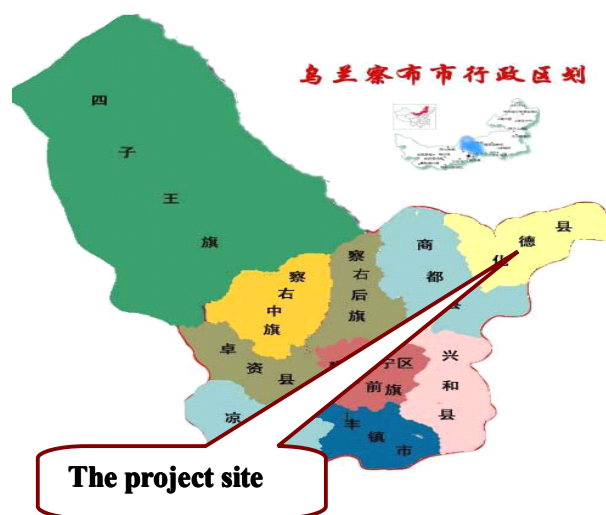
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Huade County, Changshun Town, Ulanqab City

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

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The Project is located at Niujiafangzi Wind Farm 14.2 km away from the southwest of Changshun Town, Huade County, Ulanqab City in the Inner Mongolia Autonomous Region of the People's Republic of China. The centre geographic coordinates of the wind farm is 113°53'00"E, 41°47'00"N. Figure 1 and Figure 2 highlight the location of Inner Mongolia Autonomous Region and Ulanqab City. Figure 3 then shows the Project's location.

**Figure 1 The Location of Inner Mongolia Autonomous Region****Figure 2 The Location of Ulanqab City****Figure 3 The Project Site****A.4.2. Category(ies) of project activity:**



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Category: Renewable electricity in grid connected applications

Sector scope: 01: Energy Industries (renewable resources)

Wind Power Generation

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

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The most important purpose of the Project is to avoid environmental pollution and GHG emissions from fossil fuel power plants, and utilize the wind energy.

The scenario existing prior to the start of the implementation of the Project

The scenario existing prior to the start of the implementation of the Project involves the electricity being generated by fossil fuel power plants connected to the NCPG. This scenario is the same as the Project's baseline scenario. This scenario's main emission sources and GHG is CO₂ emissions from fossil fuel based power plants connected to the NCPG.

The Project scenario

The Project involves the construction and operation of a new wind farm, with the purpose of utilizing wind energy to generate electricity. The Project will install 33 wind turbines, each of which have a capacity of 1500kW and manufactured by Xinjiang Goldwind Technology Co., Ltd., providing a total capacity of 49.5MW. The expected net electricity generation supplied to NCPG is 103,297 MWh per year.

The electricity generated from the Project will first be transmitted to the 220kV booster station built by CWG for Niujiayangzi Wind Farm Project. The Project will involve adding a 100MVA main transformer (Niujiayangzi #1) in Niujiayangzi booster station. After been transmitted to the 220 kV Niujiayangzi booster station through three 35kV transmission lines, the electricity will further be transmitted to Xingguang substation of NCPG 18km away via single 220 kV transmission line.

The key technical specifications of wind turbines used in the Project are listed in Table 1.

Table 1 Key Technical Specifications of Wind Turbines

Parameters		Value
Manufacturer		Xinjiang Goldwind Technology Co., Ltd.
Life Time (Year)		20
Wind Wheel	Diameter (m)	77
	Rated Capacity (kW)	1500
	Cut-in Wind Speed (m/s)	3
	Rated Wind Speed (m/s)	11.5
	Cut-out Wind Speed (m/s)	22
	Operation Temperature(°C)	-30°C ~ +40°C
Type		variable blade



Generator	Type	Direct-drive permanent magnet synchronous generator
	Capacity (kW)	1580
	Rated Voltage (V)	690
	Rated Current (A)	660
Braking System	Main Braking System	pneumatic brake
	Second Braking System	Mechanical brake
Tower	Type	cone
	Hub Height (m)	65

Based on the description above, there is no greenhouse gases involved in the Project.

The energy flows of the equipment included in the Project is listed in Figure 4.

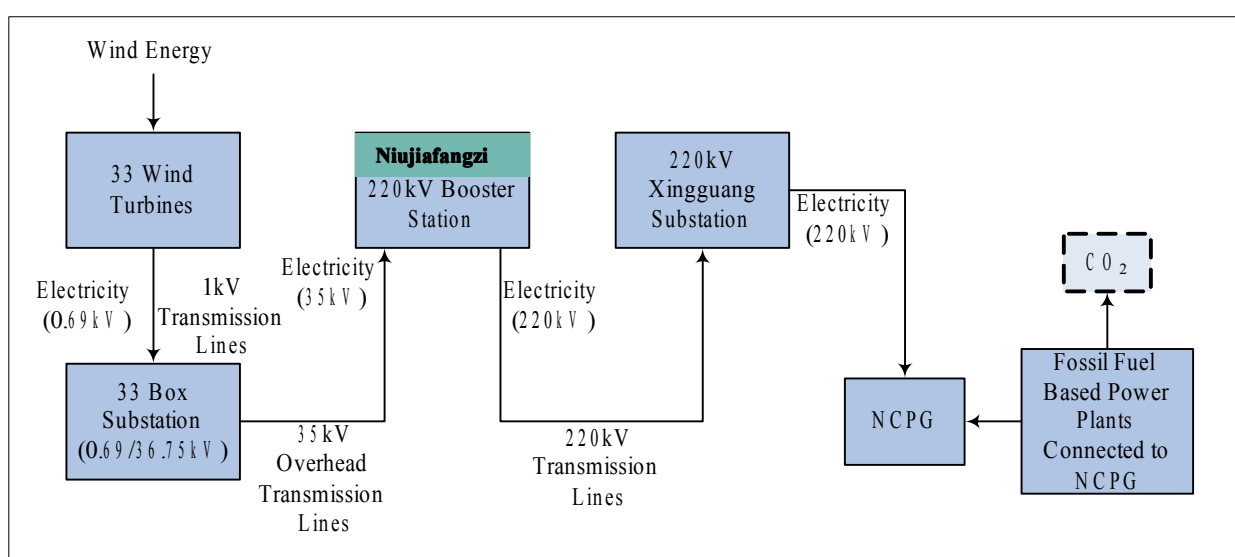


Figure 4 Energy Flows of the Equipment Used in the Project

Two bidirectional electricity meters will be installed to measure net electricity supplied to the NCPG. One electricity meter will be affixed to the output terminal of the Niujiayangzi booster station (the “evaluation electricity meter”). The other electricity meter (the “gateway electricity meter”) will be affixed to the input terminal of the grid company’s substation.

All equipment to be used in the Project has been manufactured domestically. The Project involves no international technology transfer.

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

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A fixed crediting period of 10 is adopted for the Project. The estimated emission reductions of the Project are 96,159 tCO₂e per year during the crediting period of 10 years.

**Table 2 – Estimated Project Emission Reductions**

Years	Annual estimation of emission reductions in tons of CO₂e
1 st January 2012 - 31 st December 2012	96,159
2013	96,159
2014	96,159
2015	96,159
2016	96,159
2017	96,159
2018	96,159
2019	96,159
2020	96,159
1 st January 2021 - 31 st December 2021	96,159
Total estimated reductions (tons of CO₂e)	961,590
Total number of crediting years	10
Annual average over the crediting period of estimated reductions (tons of CO₂e)	96,159

A.4.5. Public funding of the project activity:

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There is no public funding from Parties included in Annex I involved in the 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” (Version 12.1.0, EB 58)

The methodology refers to the following tools:

“Tool for the demonstration and assessment of additionality” (Version 05.2 EB 39)

“Tool to calculate the emission factor for an electricity system” (Version 02.1.0, EB 60)

For more information 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 ACM0002 (Version 12.1.0, EB 58) states the applicability conditions as follows:

- The project activity is the installation or modification/retrofit of a power plant/unit of one of the following types: hydro power plant/unit (either with a run-of-river reservoir or an accumulation reservoir), wind power plant/unit, geothermal power plant/unit, solar power plant/unit, wave power plant/unit or tidal power plant/unit;

The Project involves installation of a new wind power plant at the place where no renewable energy project was operated prior to the implementation of the Project and thus the above condition is met.

- The project activities do not involve switching from fossil fuels to renewable energy sources at the site of the project activity.

The Project is a newly built wind power project and does not involve switching from fossil fuels to renewable energy.

In conclusion, the ACM0002 (Version 12.1.0, EB 58) is applicable to the Project.

B.3. Description of the sources and gases included in The Project boundary:

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ACM0002 (Version 12.1.0, EB 58) states:

“The spatial extent of the project boundary includes the project power plant and all power plants connected physically to the electricity system that the CDM project power plant is connected to.”

The electricity generated by the Project will be supplied to the NCPG. Thus, according to the Tool to calculate the emission factor for an electricity system (Version 02.1.0, EB 60), the electricity system of the Project is defined as the NCPG which can be dispatched without significant transmission constraints. The Project boundary therefore includes all power plants physically connected to the NCPG and the Project power plant itself.



As the Chinese Designated National Authority (thereafter the “DNA”), the National Development and Reform Commission (therefore the “NDRC”) published “2010 Baseline Emission Factors for Regional Power Grids in China”, which stipulates that the NCPG is a regional grid in China including Beijing City Power Grid, Tianjin City Power Grid, Hebei Province Power Grid, Shanxi Province Power Grid, Shandong Province Power Grid and Inner Mongolia Autonomous Region Power Grid.”¹

Figure 5 describes the project boundary of the Project:

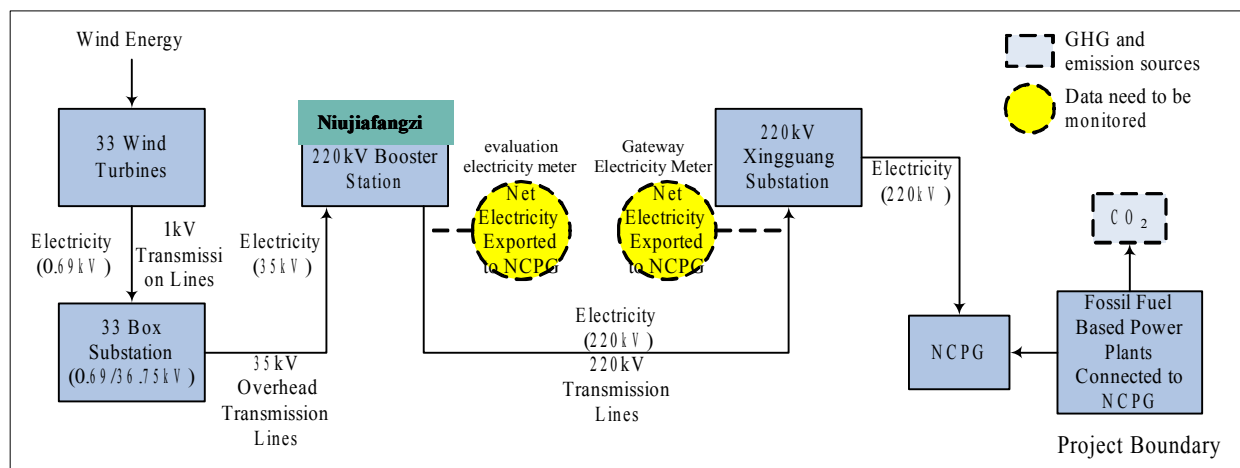


Figure 5 Project Boundary

Table 2 below provides an overview of the inclusion or exclusion of emission sources within the Project boundary.

Table 3 Overview of Project Boundary Inclusion or Exclusion of Emission Sources

	Source	Gas	Included?	Justification / Explanation
Baseline	CO ₂ emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity	CO ₂	Yes	Main emission source in the baseline scenario.
		CH ₄	No	CH ₄ are small compared to CO ₂ emission from fossil fuel firing. Exclusion of this gas is conservative.
		N ₂ O	No	N ₂ O are small compared to CO ₂ emission from fossil fuel firing. Exclusion of this gas is conservative.
Project Activity	The Project	CO ₂	No	According to ACM0002, the project emission of renewable energy project activity is zero.
		CH ₄	No	According to ACM0002, the project emission of renewable energy project activity is zero.
		N ₂ O	No	According to ACM0002, the project emission of renewable energy project activity is zero.

¹ The National Development and Reform Commission, “2010 Baseline Emission Factors for Regional Power Grids in China,” December 20, 2010, December 20, 2010 <<http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File2552.pdf>>

**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 renewable power plant/unit, and is not a modification / retrofit of an existing plant / unit, thus, the baseline scenario, according to methodology ACM0002, is the following:

Electricity delivered to the NCPG by the Project would have otherwise been generated by the operation of grid-connected power plants in the NCPG and by the addition of new generation sources in the NCPG, as reflected in the combined margin (CM) calculation in Section B.6.

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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Serious CDM consideration

The project owner considered CDM revenue from the very beginning of the project implementation. According to the “Guidelines on the Demonstration and Assessment of Prior Consideration on the CDM” (version 03, EB49), *project activity with a starting date on or after 02 August 2008, the project participant must inform a Host Party DNA and the UNFCCC secretariat in writing of the commencement of the project activity and of their intention seek CDM status, and such notification must be made within six months of the project activity start date. Such notification is not necessary if a PDD has been published for global stakeholder consultation before the project activity start date.*

The Project’s start date is 30th May 2010 which is the date of wind turbines purchase contract signed, and the Project have not been published for global stakeholder consultation yet, so the notification is necessary for the Project.

The project owner informed the UNFCCC secretariat of the commencement of the project activity and its intention to seek CDM, the confirmation for the notification from the UNFCCC secretariat was received on 12th October 2010². Meanwhile, the project owner also informed the China’s DNA the commencement of the Project and obtained the confirmation for the notification from the China’s DNA on 9th October 2010. Dates of the two documents are both within 6 months after the Project’s start date, and the related documents will be submitted to the DOE during validation process.

Therefore, as per the “Guidelines on the Demonstration and Assessment of Prior Consideration on the CDM”, it is concluded that the CDM was seriously considered by the project owner in the decision to implement the project activity.

The prior consideration of CDM by the project owner is demonstrated as below:

Table 4. Implementation Timetable of the Project

Date	Key Event
May 30, 2010	The Purchase Contract of Wind Turbines was signed, which is defined as the project activity starting date as per the lated CDM glossary.

² http://cdm.unfccc.int/Projects/PriorCDM/notifications/index_html



October 9, 2010	The notification of prior consideration of CDM was received by DNA of China.
October 12, 2010	The notification of prior consideration of CDM was received by UNFCCC secretariat.
October 20, 2010	The Project received approval of the EIA.
December 9, 2010	The Project received approval of the FSR.
March 7, 2011	The Wind Turbines' Foundation Construction Contract was signed.
April 7, 2011	The ERPA was signed.

The additionality of the project is further demonstrated using the steps described in the “Tool for the demonstration and assessment of additionality” (version 05.2, EB 39) as follows:

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

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

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

According to the Validation and Verification Manual (version 01.2): “105. The PDD shall identify credible alternatives to the project activity in order to determine the most realistic baseline scenario, unless the approved methodology that is selected by the proposed CDM project activity prescribes the baseline scenario and no further analysis is required”. There is no need to further analyze alternatives to the project to assess and demonstrate the additionally, since the ACM0002 prescribes the baseline scenario for the project.

Step2: Investment analysis

The purpose of this investment analysis is to determine whether the Project is not:

- (a) The most economically or financially attractive; or
- (b) Economically or financially feasible, without the revenue from the sale of certified emission reductions (“**CERs**”).

Sub-step 2a: Determine appropriate analysis method

There are three options listed in the “Tool for demonstration and assessment of additionality” (Version 05.2, EB39): simple cost analysis (Option1), investment comparison analysis (Option2) and benchmark analysis (Option3).

The electricity generated from the Project will be delivered to NCPG, it means that beside the additional CERs benefit, benefit from electricity sales can also be achieved; simple cost analysis can be excluded.



Following EB guidance on the assessment of investment analysis³, if the alternative to the Project is the supply of electricity from the grid, this is not considered an investment and a benchmark approach is considered appropriate. Therefore, a benchmark analysis is used to identify whether the project is economically attractive.

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

The likelihood of the development of this Project will be determined by comparing its IRR with the financial benchmark rate of return of 8% of the Project IRR and widely used for electric power industry investment in China, according to the ‘*Interim Rules on Economic Assessment of Electrical Engineering Retrofit Projects*’⁴. The calculation and comparison of financial indicators are carried out in sub-step 2c.

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

(1) Basic parameters for calculation of financial indicators

Table 5 Parameters for financial analysis

series	item	value	remark	data source
	general description			
1	installed capacity	49.5	MW	FSR, page 1-6
2	sales electricity	103,297	MWh/yr	FSR, page 1-7
3	construction period	1	year	FSR, page 15-1
4	operation period	20	year	FSR, page 15-1
5	bus-bar tariff (including VAT)	0.51	RMB/kWh	FSR, page 15-2
6	bus-bar tariff (excluding VAT)	0.47	RMB/kWh	FSR, page 15-2
	investment plan			
	total investment	47445.42	10000RMB	FSR, page 15-4
1	construction investment	46181.33	10000RMB	FSR, page 15-4
2	interest incurred during construction	1115.59	10000RMB	FSR, page 15-4
3	circulating capital	148.50	10000RMB	FSR, page 15-4
	thereinto: initial circulating capital	44.55	10000RMB	FSR, page 15-4
	capital raising			
	total investment	47445.42	10000RMB	FSR, page 15-4
1	self-finance	9459.38	10000RMB	FSR, page 15-4

³ Paragraph 15, ‘Guidance on the assessment of Investment Analysis’(version 02.1), EB41 Annex 45.

⁴ Operation Department of Power Generation and Transmission, State Power Corporation, Interim Rules on Economic Assessment of Electrical Engineering Retrofit Projects (China Electric Power Publishing House, 2003) 2.



1.1	construction capital	9414.83	10000RMB	FSR, page 15-4
1.2	initial circulating capital	44.55	10000RMB	FSR, page 15-4
2	loans	37986.04	10000RMB	FSR, page 15-4
2.1	long-term loans	37882.09	10000RMB	FSR, page 15-4
	thereinto: long-term loans capital	36766.50	10000RMB	FSR, page 15-4
	interest incurred during construction	1115.59	10000RMB	FSR, page 15-4
2.2	loans for circulating capital	103.95	10000RMB	FSR, page 15-4
	interest rate			
1	interest rate of long-term loans	5.94%		FSR,page 1-13
	period of repayment	15	year	FSR,page 1-13
2	interest rate of loans for circulating capital	5.94%		FSR,page 1-13
3	interest rate of short-term loans	5.31%		FSR,page 15-2
	tax			
1	VAT	17%		FSR, page 15-2
2	Recovery of VAT on tariff	50%		FSR, page 15-2
3	income tax	25%		FSR, page 15-2
4	urban maintenance and construction tax	5%		FSR, page 15-2
5	surtax for education	3%		FSR, page 15-2
	O&M cost			
1	material fee rate	3	10000RMB/MW	FSR,page 15-1
2	number of employees	4	person	FSR,page 15-2
3	salary	4	10000RMB/person.yr	FSR,page 15-2
4	welfare allowance rate	41%		FSR,page 15-2
5	repair fee rate	1.0~2.5%		FSR,page 15-1
6	insurance fee rate	0.25%		FSR, page 15-1
7	other expense rate	4	10000RMB/MW	FSR, page 15-1
	CERs revenue			
1	CER price	10.5	Euro/tCO ₂	
2	Exchange rate	9.4	RMB/Euro	
3	Credit years	10	year	
	other			
1	period of depreciation	15	year	FSR, page 15-1



2	rate of residual value	5%		FSR, page 15-1
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(2) Comparison of IRR for the project and the financial benchmark

Table 4 Financial indicators of the project

Item	Without CER revenue	Benchmark	With CER revenue
IRR (total investment after income tax)	6.17%	8%	9.13%

As described in the Table 4, if the Project is not undertaken as a CDM project, the Project IRR is 6.17%, which is lower than benchmark IRR. It means that the project is not financial attractive. However, if the project is undertaken as a CDM, with the CER revenue the project IRR can reach 9.13%. Thus CDM revenue can help the project to conquer investment barriers and make it economically feasible.

Sub-step 2d: Sensitivity analysis

A sensitivity analysis was conducted by altering the following parameters:

- Annual O&M cost;
- Construction investment;
- Electricity tariff (excl. VAT); and
- Annual electricity output.

These parameters were selected as being the most likely to fluctuate over time and have the greatest impact on IRR. Financial analyses were performed altering each of these parameters by $\pm 10\%^5$, and assessing what the impact on the project IRR would be. The analysis shows that the project IRR remains lower than its alternative even in the case where these parameters change in favour of the Project.

Table 7 Sensitivity analysis

	-89.1%	-13.6%	-10.0%	0.0%	+10.0%	+13.8%
Annual O&M cost	8.00%	--	6.39%	6.17%	5.94%	--
Construction investment	--	8.00%	7.48%	6.17%	5.02%	--
Electricity tariff (excl. VAT)	--	--	4.69%	6.17%	7.52%	8.00%
Annual electricity output	--	--	4.69%	6.17%	7.52%	8.00%

⁵ In terms of the guidance on the assessment of investment analysis from EB41, Annex 45, paragraph 17, as a general point of departure variations in the sensitivity analysis should cover a range of +10% and -10%, Past trend may be a guide to determine the reasonable range.

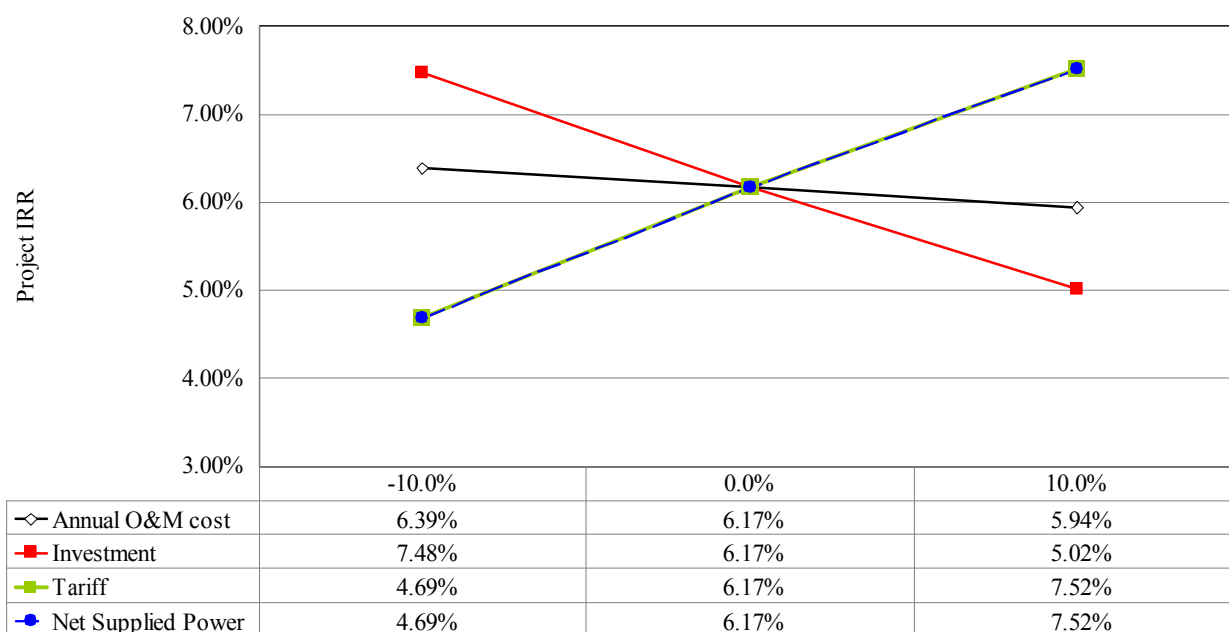


Figure 6 Sensitivity analysis of Project IRR

As shown in the sensitivity analysis, even if the variation range of the uncertain factors reaches +/-10%, the project IRR of the Project, could not reach the benchmark of 8% and the additionality of the Project would not be influenced.

As shown in the above table 7, the IRR of the Project could reach the benchmark if one of the following conditions can be achieved:

- (1) The annual O&M cost would be decreased by at least 89.1%;
- (2) The construction investment would be decreased by at least 13.6%;
- (3) The electricity tariff would be increased by at least 13.8%;
- (4) The annual electricity output would be increased by at least 13.8%.

Based on the explanation and justification below, none of these conditions can be achieved:

- (1) The O&M cost include the repair charge, salary and welfare allowance, material cost, insurance premium and other expenses. These costs are calculated to be based on the industry experience. It is impossible to decrease the O&M cost as much as 89.1%;
- (2) As for the construction investment, the most construction contracts of the Project have been signed in which the contracted capital already exceeds 90% of the adopted fixed investment of about 461.8 million RMB in the project IRR calculation. The actual investment is much more and thus the decrease of the construction investment by 13.6% is impossible;
- (3) As for the electricity tariff, which is regulated by the government authority in China, the wind power project tariff is not possible to rise or drop significantly. According to the Notice regarding Improving Wind Power Electricity Tariff Policy issued by the NDRC on July 20th, 2009, the electricity tariff of the wind power projects constructed in the West Inner Mongolia Autonomous



Region is streamlined as 0.51RMB/kWh (incl. VAT). However, if the electricity tariff increases by 13.8%, it will exceeds 0.58RMB/kWh (incl. VAT). Thus, it is not feasible for the Project to have the tariff increased by 13.8%;

- (4) During the phase of the FSR, the design organization of the FSR collected one year data of the wind energy resources from on-site wind energy measurement point and analyzed more than thirty years of local meteorological data. The Project's electricity generation is estimated based on those wind energy data. Therefore, it is impossible to increase the annual electricity generation by 13.8% throughout the whole lifetime of the Project.

To summarize, the project IRR of the Project could not reach the benchmark according to the sensitivity analysis and the additionality of the Project would not be influenced. The alternative (a) of the Project undertaken without being registered as a CDM project activity is not feasible.

Step3: Barrier analysis

This step is not adopted in this PDD.

Step4: Common practice analysis

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

According to the definitions of other activities similar to the Project in “Tool for the Demonstration and Assessment of Additionality”, the non-CDM activities similar to the Project were selected according to the following rules:

1. In China, provincial governments are authorized to regulate wind power projects in the province by the NDRC⁶. So the investment climate, tariff, land policy, regulations etc. are usually similar for wind power projects in the same province. The location of the Project belongs to Inner Mongolia Autonomous Region. Inner Mongolia Autonomous Region is selected as the geographical scope for the common practice analysis of the Project.
2. In April 2002, China implemented power sector reform to establish a more commercialized power market⁷. As the market condition for wind power project development has changed significantly since 2002, the common practice analysis starts from 2002.
3. The installed capacity of activities should be more than 15MW. Projects less than 15MW belong to small-scale projects.

Therefore, the similar projects are defined as the projects with the capacity larger than 15 MW operated after 2002 in Inner Mongolia Autonomous Region where the Project located. The non-CDM similar projects are listed in Table 8 below.

⁶ “Notice of the NDRC’s requirement on the regulation of the wind power projects construction (FAGAINENGYUAN [2005] 1204),” July 4, 2005, July 2, 2009 <http://www.sdpc.gov.cn/nyjt/nyzywx/t20050810_41378.htm>.

⁷ “China’s State Council approved to implement the reform of China’s electricity structure system” April 11, 2002, July 2, 2009 <http://www.ndrc.gov.cn/xwfb/t20050708_28096.htm>.1

**Table 8 Similar Grid-Connected Inner Mongolian Wind Farms**

Name	Capacity (MW)	Operation Date	Note
Keshiketeng Qi Dali Phase III wind power project ⁸ (Dali III)	31.2	2003.12 (10.2MW) 2004.4 (21MW)	Supported by National Debt Special Fund as a demonstration project of the domestication of wind turbines
Bailingmiao 50MW wind power project ⁹ (Bailingmiao)	50	2007.12 (35MW) 2008.2 (15MW)	Registered as Voluntary Emission Reduction under Golden Standard Voluntary Carbon Standard

Source: *Statistics of Windfarm Installed Capacities in China 2009*, Chinese Wind Energy Association.
http://www.cwea.org.cn/download/display_info.asp?cid=2&sid=&id=25
 UNFCCC: <http://cdm.unfccc.int/Projects/projsearch.html>
 NDRC China: <http://cdm.ccchina.gov.cn/web/index.asp>

(Note: According to "Tool for the Demonstration and Assessment of Additionality (version 05.2)", "Other CDM project activities (registered project activities and project activities which have been published on the UNFCCC website for global stakeholder consultation as part of the validation process) are not to be included in this analysis". Therefore, the wind power projects which are either registered or applying for CDM are not listed in the above table.)

The above Table indicates that two wind projects are implemented in the Inner Mongolia Autonomous Region without the assistance of CDM. The Sub-step 4b below is for a further discussion of essentially difference between those two projects and the project.

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

Wind farms with comparable capacity to the project activity that are currently being developed are mostly developed under the CDM. Only two wind farms mentioned in the above table, namely, the Dali Phase III project and the Balingmiao are exceptional. The Dali Phase III project was funded by the National Debt Specific Fund to demonstrate the domestic manufacture of the wind turbines. Thus it does not have the investment barriers as the project does. The Bailingmiao project is invested by the foreign investors therefore it was not eligible to be considered as CDM project. Meanwhile, it has also sought and obtained additional financial support from the carbon market by its registration of Voluntary Emission Reduction under Golden Standard Voluntary Carbon Standard, to overcome the investment barrier.

From the above analysis it can be concluded that the Project is not common practice in the Inner Mongolia Autonomous Region therefore sub-steps 4a and 4b of the tool for the demonstration and assessment of additionality are satisfied.

In conclusion, all the steps above are satisfied, the Project not implemented as a CDM project is not the baseline scenario, and the Project is additional

B.6. Emission reductions:

⁸ "National Debt Fund 30MW Project in Keshiketeng Banner," December 22, 2008, July 14, 2009
<http://www.chifeng.gov.cn/html/2008-11/3130.shtml>.

⁹ http://www.honitonenergy.com/chinese/honiton/news_more.php?news_id=52



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B.6.1. Explanation of methodological choices:

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The emission reductions of the Project are calculated according to the following methods:

Baseline emissions

$$BE_y = EG_{PJ,y} * EF_{grid,CM,y} \quad (1)$$

Where:

BE_y	=	Baseline emissions in year y, tCO ₂ /yr
$EG_{PJ,y}$	=	Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y, MWh/yr
$EF_{grid,CM,y}$	=	Combined margin CO ₂ emission factor for grid connected power generation in year y calculated using the latest version of the “Tool to calculate the emission factor for an electricity system”, tCO ₂ /MWh

Calculation of $EG_{PJ,y}$

$$EG_{PJ,y} = EG_{facility,y} \quad (2)$$

Where:

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

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

The “Tool to calculate the emission factor for an electricity system” (version 02.1.0, EB60) determines the CO₂ emission factor for the displacement of electricity generated by power plants in an electricity system, by calculating the “combined margin” emission factor (CM) of the electricity system. The CM is the result of a weighted average of two emission factors pertaining to the electricity system: the “operating margin” (OM) and the “building margin” (BM). The operating margin is the emission factor that refers to the group of existing power plants whose current electricity generation would be affected by the proposed CDM project activity. The build margin is the emission factor that refers to the group of power plants whose construction and future operation would be affected by the proposed CDM project activity.

The “Tool to calculate the emission factor for an electricity system” (version 02) provides procedures to determine the following parameters:

Parameter	SI Unit	Description
$EF_{CM,grid,y}$	tCO ₂ /MW.h	Combined margin CO ₂ emission factor for the project electricity system



		in year y.
$EF_{BM,grid,y}$	tCO ₂ /MW.h	Build margin CO ₂ emission factor for the project electricity system in year y.
$EF_{OM,grid,y}$	tCO ₂ /MW.h	Operating margin CO ₂ emission factor for the project electricity system in year y.

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

STEP 1: Identify the relevant electricity systems.

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

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

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

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

STEP 6: Calculate the build margin emission factor.

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

Step 1. Identify the relevant electric power system

As described in the section B.3, the Project boundary includes all power plants physically connected to the NCPG and the Project power plant itself. The NCPG is an electricity system which is defined by the spatial extent of the power plants that can be dispatched without significant transmission constraints.

According to instructions from China's DNA, the NCPG consists of Shandong Provincial Power Grid, Beijing City Power Grid, Tianjin City Power Grid, Hebei Provincial Power Grid, Shanxi Provincial Power Grid and Inner Mongolia Autonomous Region Power Grid. The NCPG has imported electricity from Northeast Power Grid (NEPG) and Central China Power Grid (CCPG). The electricity transfers from the NEPG and the CCPG to the NCPG are therefore taken into account when calculating the grid emission factor.

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

Project participants may choose between the following two options to calculate the operating margin and build margin emission factor:

Option I: Only grid power plants are included in the calculation.

Option II: Both grid power plants and off-grid power plants are included in the calculation.

For the Project, the Option I is selected to calculate emission factor of the NCPG.

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

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

- (a) Simple OM, or
- (b) Simple adjusted OM, or
- (c) Dispatch Data Analysis OM, or
- (d) Average OM.



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

The Project is connected to the NCPG which is dominated by coal-fired power generation. Low-cost/must run power resources such as hydro, geothermal, wind, solar, nuclear and low cost biomass power only account for 0.75%, 0.79%, 0.88%, 1.21% and 3.00% of the total electricity generated by the NCPG in each respective year from 2005 to 2009¹⁰. Because the low-cost/must-run resources constitute less than 50% of total grid generation in the average of the five most recent years prior to the start of the Project, the Simple OM can be used.

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

- (a) Ex ante option: If the ex ante option is chosen, the emission factor is determined once at the validation stage, thus no monitoring and recalculation of the emissions factor during the crediting period is required. For grid power plants, use a 3-year generation-weighted average, based on the most recent data available at the time of submission of the CDM-PDD to the DOE for validation.
- (b) Ex post option: If the ex post option is chosen, the emission factor is determined for the year in which the project activity displaces grid electricity, requiring the emissions factor to be updated annually during monitoring. If the data required to calculate the emission factor for year y is available later than six months after the end of year y, the emission factor of the previous year (y-1) may be used. If the data is available 18 months after the end of year y, the emission factor of the year proceeding the previous year (y-2) may be used. The same data vintage (y, y-1 or y-2) should be used throughout all crediting periods.

For the project, ex ante option (a) is chosen to calculate the emission factor.

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

The simple OM emission factor is calculated as the generation-weighted average CO₂ emissions per unit net electricity generation (tCO₂/MWh) of all generating power plants serving the system, not including low-cost/must-run power plants/units. It can be calculated in one of the following ways:

- Option A: Based on the net electricity generation and a CO₂ emission factor of each power unit;
- Option B: Based on the total net electricity generation of all power plants serving the system and the fuel types and total fuel consumption of the Project electricity system.

The Option B can only be used if:

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

¹⁰ China Electric Power Yearbook Editorial Board, China Electric Power Yearbook (2006~2010 Version) (China Electric Power Publishing House, 2006~2010).



2).

As the above three requirements are met, the Option B is used to calculate the Project's simple OM.

$$EF_{grid,OMsimple,y} = \frac{\sum_i FC_{i,y} \times NCV_{i,y} \times EF_{CO2,i,y}}{EG_y} \quad (3)$$

$EF_{grid,OMsimple,y}$	=	Simple operating margin CO ₂ emission factor in year y, tCO ₂ /MWh
$FC_{i,y}$	=	Amount of fossil fuel type i consumed in the project electricity system in year y (mass or volume unit)
$NCV_{i,y}$	=	Net calorific value (energy content) of fossil fuel types 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, t CO ₂ /GJ
EG_y	=	Net electricity generated and delivered to the grid by all power sources serving the system, not including low-cost/ must-run power plants/ units, in year y, MWh
i	=	All fossil fuel types combusted in power sources in the project electricity system in year y
y	=	Either the most recently three years for which data is available at the time of submission of the CDM-PDD to the DOE for validation, following the guidance on data vintage in step 2

Based on the amount of different fuels consumed, the power generation, the net caloric value, the oxidation rate and the emission factor, we can calculate the $EF_{grid,OM,y}$ of the year 2006-2008. The average emission factor is the 3-year generation-weighted average. For the Project, we adopt the $EF_{grid,OM,y}$ published by the Chinese DNA. It has a value of 0.9914 tCO₂/MWh. The details are shown in Annex 3.

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

As per the emission factor tool, the sample group of power units m used to calculate the build margin consists of either:

- The set of five power units that have been built most recently, or
- The set of power capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently.

Project participants should use the set of power units that comprise the larger annual generation.

However, in China it is very difficult to obtain the data of the five existing power plants built most recently or the power plants capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that were built most recently.

In terms of vintage of data, project participants can choose between one of the following two options:



- Option 1. For the first crediting period, calculate the build margin emission factor *ex-ante* based on the most recent information available on units already built for sample group *m* at the time of CDM-PDD submission to the DOE for validation. For the second crediting period, the build margin emission factor should be updated based on the most recent information available on units already built at the time of submission of the request for renewal of the crediting period to the DOE. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used. This option does not require monitoring the emission factor during the crediting period.
- Option 2. For the first crediting period, the build margin emission factor shall be updated annually, *ex-post*, including those units built up to the year of registration of the Project activity or, if information up to the year of registration is not yet available, including those units built up to the latest year for which information is available. For the second crediting period, the build margin emissions factor shall be calculated *ex-ante*, as described in option 1 above. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used.

The Project uses the Option 1 to calculate the build margin emission factor *ex-ante* based on the most recent information available on units already built for sample group *m* at the time of CDM-PDD submission to the DOE for validation.

Step 6. Calculate the build margin emission factor

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

$$EF_{grid,BM,y} = \frac{\sum_m EG_{m,y} \times EF_{EL,m,y}}{\sum_m EG_{m,y}} \quad (4)$$

$EF_{grid,BM,y}$	=	Build margin CO ₂ emission factor in year <i>y</i> , tCO ₂ /MWh
$EG_{m,y}$	=	Net quantity of electricity generated and delivered to the grid by power unit <i>m</i> in year <i>y</i> , MWh
$EF_{EL,m,y}$	=	CO ₂ emission factor of power unit <i>m</i> in year <i>y</i> , tCO ₂ /MWh
<i>m</i>	=	Power units included in the build margin
<i>y</i>	=	Most recent historical year for which power generation data is available

As there is insufficient information to perform the above calculation the Project calculates $EF_{grid,BM,y}$ using the following conservative alternative method agreed by the CDM Executive Board¹¹.

¹¹ “Request for clarification on use of approved methodology AM0005 for several projects in China”, 28 December 2009

http://cdm.unfccc.int/UserManagement/FileStorage/AM_CLAR_QEJWJEF3CFBP1OZAK6V5YXPQKK7WYJ

**Sub-step 6a. The corresponding percentage of the CO₂ emissions from the power generation using coal, oil and gas**

$$\lambda_{Coal,y} = \frac{\sum_{i \in COAL,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,j,y}}{\sum_{i,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,j,y}} \quad (5)$$

$$\lambda_{Oil,y} = \frac{\sum_{i \in OIL,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,j,y}}{\sum_{i,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,j,y}} \quad (6)$$

$$\lambda_{Gas,y} = \frac{\sum_{i \in GAS,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,j,y}}{\sum_{i,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,j,y}} \quad (7)$$

$F_{i,j,y}$ = The amount of fuel i consumed by relevant power sources j province in year y, t or m³

$NCV_{i,y}$ = Net calorific value of fossil fuel type i in year y, GJ/t or m³

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

COAL, OIL and GAS represent the groups of solid, liquid and gas fuels respectively.

Sub-step 6b. Calculation of $EF_{Thermal,y}$

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

$EF_{Coal,Adv,y}$, $EF_{Oil,Adv,y}$ and $EF_{Gas,Adv,y}$ are the emission factors of COAL, OIL, GAS-fired power with the best practised commercialized technology.

Sub-step 6c: Calculation of BM

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

$CAP_{Total,y}$ = The total incremental installed capacity of various power sources in the grid

$CAP_{Thermal,y}$ = The incremental installed capacity of fuel-fired power

According to NDRC's "2010 Announcement about Confirming Baseline Emission Factors for Factor of Regional Power Grids in China", the Project assumes the weighted average coal consumption of the 30 lowest consuming 2008 built coal-fired power plants with a total installed capacity of 600MW as the best



practice coal power technology. The estimated coal consumption of such a power plant 600MW is 314.35gce/kWh, corresponding to 39.08% electricity generation efficiency.

According to the statistics of the China Electricity Council (CEC) about the 2008 built gas and oil power plant, the 200MW combined-cycle power plant are defined as the best practice gas and oil power technology, and select the gas and oil power plant with actual highest power supply efficiency for the estimation of the best practice technology. The coal consumption of the gas and oil plant is 238.74gce/KWH. This corresponds to 51.46 electricity generation efficiency.

On the basis of the above-mentioned calculation process, the $EF_{grid,BM,y}$ of the Project is calculated as 0.7495tCO₂/MWh. Further details are provided in Annex 3.

Step 7: Calculate the combined margin emissions factor

The combined margin emissions factor is calculated as follows:

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

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

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

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

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

AS for the Project, in the crediting period, we adopt $w_{OM}=0.75$ and $w_{BM}=0.25$. Including the $EF_{grid,OM,y}$ and $EF_{grid,BM,y}$ calculated above, we get $EF_{grid,CM,y}=0.9309$ tCO₂/MWh.

Project Emissions

According to ACM0002 (Version 12.1.0, EB 58), the Project emissions is zero.

Leakage

No leakage effects need to be accounted under this methodology.

Emission Reduction

Emission reductions are calculated as follows:

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

Where:

ER_y = Emission reductions in year y, tCO₂e/yr

BE_y = Baseline emissions in year y, tCO₂e/yr



PE_y = Project emissions in year y, tCO₂e/yr

Since PE_y is zero, ER_y can be calculated as follows:

$$ER_y = BE_y = EG_{PJ,y} * EF_{grid,CM,y} = EG_{facility,y} * EF_{grid,CM,y} \quad (12)$$

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

Data / Parameter:	NCV _{i,y}
Data unit:	MJ/t or km ³
Description:	Net calorific value (energy content) of fossil fuel types i consumed in the coal fired power plant connected to NCPG in year y
Source of data used:	China Energy Statistics Yearbook 2007-2009
Value applied:	Details can be seen in annex3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Published by China's DNA
Any comment:	

Data / Parameter:	OXID _i
Data unit:	%
Description:	Oxidation factor of the fuel i.
Source of data used:	IPCC 2006 Guidelines for National Greenhouse Gas Inventories
Value applied:	Details can be seen in annex3
Justification of the choice of data or description of measurement methods and procedures actually applied :	IPCC default value.
Any comment:	

Data / Parameter:	EF _{CO₂,i,y}
Data unit:	tC/GJ
Description:	CO ₂ emission factor of fossil fuel type i consumed in the coal fired power plant connected to NCPG in year y
Source of data used:	IPCC 2006 Guidelines for National Greenhouse Gas Inventories
Value applied:	Details can be seen in annex3
Justification of the choice of data or description of measurement methods and procedures actually applied :	IPCC default value.
Any comment:	



Data / Parameter:	FC_{i,y}
Data unit:	t or m ³
Description:	Amount of fossil fuel type i consumed in the project electricity system in year y
Source of data used:	China Energy Statistics Yearbook 2007-2009
Value applied:	Details can be seen in annex3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Published by China's DNA
Any comment:	

Data / Parameter:	EG_y
Data unit:	MWh
Description:	Net electricity generated and delivered to the NCPG by all power sources serving the system, not including low-cost/ must-run power plants/ units, in year y
Source of data used:	China Electric Power Yearbook 2007-2009
Value applied:	Details can be seen in annex3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Published by China's DNA
Any comment:	

Data / Parameter:	F_{i,j,y}
Data unit:	t
Description:	The amount of fuel i consumed by relevant power sources j province of the NCPG in year y
Source of data used:	China Energy Statistics Yearbook 2009
Value applied:	Details can be seen in annex3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Published by China's DNA
Any comment:	

Data / Parameter:	CAP_{Thermal,y}
Data unit:	MW
Description:	The incremental installed capacity of fuel-fired power in the NCPG
Source of data used:	China Electric Power Yearbook 2007-2009
Value applied:	Details can be seen in annex3
Justification of the	Published by China's DNA



choice of data or description of measurement methods and procedures actually applied :	
Any comment:	

Data / Parameter:	CAP_{Total,y}
Data unit:	MW
Description:	The total incremental installed capacity of various power sources in the NCPG
Source of data used:	China Electric Power Yearbook 2007-2009
Value applied:	Details can be seen in annex3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Published by China's DNA
Any comment:	

Data / Parameter:	EF_{Coal,Adv,y}
Data unit:	%
Description:	Commercially available coal-fired power plant corresponding to the best practice in terms of efficiency
Source of data used:	Chinese DNA "Bulletin on Baseline Emission Factors of the China's Regional Grids-the calculations of baseline Build Margin emission factor for the China Regional Grids"
Value applied:	39.08%
Justification of the choice of data or description of measurement methods and procedures actually applied :	National specific value
Any comment:	

Data / Parameter:	EF_{Oil,Adv,y}/EF_{Gas,Adv,y}
Data unit:	%
Description:	Commercially available oil and gas power plant corresponding to the best practice in terms of efficiency
Source of data used:	Chinese DNA "Bulletin on Baseline Emission Factors of the China's Regional Grids-the calculations of baseline Build Margin emission factor for the China Regional Grids"
Value applied:	51.46%
Justification of the choice of data or description of measurement methods and procedures actually applied :	National specific value



Any comment:

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

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The baseline combined margin CO₂ emission factor for grid connected power generation ($EF_{grid,CM,y}$) during the first crediting period is 0.9309 tCO₂e / MWh as detailed in annex 3 below. In addition, based on the FSR, the Project will supply 103,297MWh electricity to the NCPG annually. The emission reduction by the Project during a giving year y is calculated as follows:

$$ER_y = EG_{facility,y} \times EF_{grid,CM,y} = 103,297 MWh \times 0.9309 tCO_2 / MWh = 96,159 tCO_2$$

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

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The following table summaries the results of the ex-ante estimation of emission reductions:

Year	Estimation of project activity emissions (tonnes of CO ₂ e)	Estimation of baseline emissions (tonnes of CO ₂ e)	Estimation of leakage (tonnes of CO ₂ e)	Estimation of overall emission reductions (tonnes of CO ₂ e)
1 st January 2012-31 st December 2012	0	96,159	0	96,159
2013	0	96,159	0	96,159
2014	0	96,159	0	96,159
2015	0	96,159	0	96,159
2016	0	96,159	0	96,159
2017	0	96,159	0	96,159
2018	0	96,159	0	96,159
2019	0	96,159	0	96,159
2020	0	96,159	0	96,159
1 st January 2021-31 st December 2021	0	96,159	0	96,159
Total (tonnes of CO₂e)	0	961,590	0	961,590

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

Data / Parameter:	EG_{facility,y}
Data unit:	MWh/yr
Description:	Quantity of net electricity generation supplied by the Project to the grid in year y
Source of data to be used:	Electricity meters



Value of data applied for the purpose of calculating expected emission reductions in section B.5	103,297
Description of measurement methods and procedures to be applied:	Two bidirectional electricity meters will be installed to continuously measure net electricity supplied to the NCPG. One electricity meter will be affixed to the output terminal of the booster station (the “evaluation electricity meter”). The other electricity meter (the “gateway electricity meter”) will be affixed to the input terminal of the grid company’s substation. The metering instruments will be calibrated regularly in accordance with the “Technical administrative code of electric energy metering (DL/T448-2000)”, monitoring result will be recorded monthly. The data will be monthly recorded and archived during project plus 2 years.
QA/QC procedures to be applied:	Meters will be calibrated and checked yearly by qualified third party for accuracy in accordance with national standards. Meter data measurements will be cross-checked with electricity sales receipts. The accuracy of the meters meets the national standards, and the metering equipments shall have sufficient accuracy so that any error resulting from such equipments shall not exceed 0.5%.
Any comment:	See section B.7.2 for more details.

B.7.2. Description of the monitoring plan:

>>

The monitoring plan aims to ensure that the emission reduction is realized during the crediting period. ACM0002 requires all data collected as part of the monitoring plan to be archived and kept for at least two years after the end of the crediting period.

1. Monitoring Structure

The project owner will appoint a CDM manager with responsibility for monitoring the data related to the calculation of emission reductions. Technical and financial teams will also be organized to assist the CDM manager, as displayed in Figure 7 below.

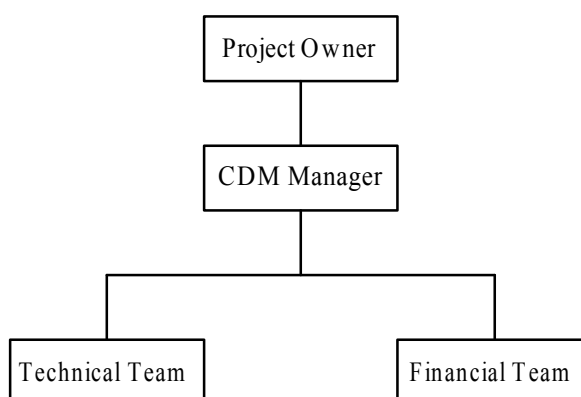


Figure 7 The monitoring structure



The CDM manager will have full responsibility for matters relating to the CDM, including:

- Tracking the development of CDM;
- Supervising and checking the process of measuring record, data collection, and calculation of emission reductions;
- Ensuring monitoring data integrity and accuracy; and
- Performing CER-issuance related tasks.

The **technical team** will be responsible for the calibration and maintenance of meters, data recording and verification, archive management and periodic data summaries as required by the CDM manager.

The **financial team** will be responsible for the preparation, custody and drafting of relevant financial documents.

2. Monitored Data

During the ten years crediting period, only the net electricity supplied to NCPG ($EG_{facility,y}$) will be monitored and recorded.

3. Installation of Monitoring Equipment

Two bidirectional electricity meters (a main meter and a backup meter) will be installed to continuously measure the net electricity supplied to the NCPG ($EG_{facility,y}$). One electricity meter will be affixed to the output terminal of the Changshun booster station (the “evaluation electric meter”). The other electricity meter (the “gateway electric meter”) will be affixed to the input terminal of the grid company’s substation. Both the two electricity meters are used to measure electricity supplied to and imported from the NCPG, and if there is something wrong with the gateway electricity meter, data from the evaluation electricity meter will be adopted for the calculation.

4. Calibration

An agreement about the quality control procedures of electricity meters’ measurement and calibration to ensure accuracy will be signed between the project owner and the grid company. The electricity meters will be calibrated and checked annually for accuracy in accordance with the *Technical Administrative Code of Electric Energy Metering* (DL/T448-2000)¹². Calibration will be carried out by the grid company. The grid company will supply calibration records to the project owner, which will be retained. The electricity meters will be jointly inspected and sealed by the parties concerned and not be interferred by either party except in the presence of the other party.

All installed meters will be tested by a third party within ten days after:

- The detection of a difference larger than the allowable error in the readings of both meters;

¹² State Economic and Trade Commission of the People’s Republic of China, Technical Administrative Code of Electric Energy Metering (DL/T448-2000) ([China Electric Power Publishing House](#), April 1, 2004).



- The repair of a meter caused by the failure of one or more parts to operate in accordance with the specifications.

5. Data Collection

- CWG and the grid company will read and record the data both from the electricity meters on the last day of every month. This data will then be checked by each respective party.
- The grid company will provide NCPG electricity supply data to CWG. CWG will provide invoices to the grid company, storing copies of the invoices.
- CWG will finally provide the data record reading from the gateway electricity meter and retain copies of the invoices to DOE.

If electricity meter errors exceed national or trade standard allowance levels, the quantity of electricity supplied to the NCPG will be calculated as follows:

- The quantity of electricity supplied to the NCPG will be calculated according to the evaluation electricity meter reading and the historical line loss rate, unless either party doubts the meter's accuracy.
- If the evaluation electricity meter does not have an acceptable level of precision, CWG and the grid company will design a reasonable and conservative evaluation method together. In this event, CWG will provide sufficient evidence to demonstrate the method's rationality and conservatism during the validation and verification processes.
- If CWG and the grid company are unable to agree on the evaluation method, they will participate in an arbitration process to ensure the consistency of the evaluation method as provided for by their agreement.

6. Data Management

The monitoring data will be archived in both electronic and paper format at the end of each month, and will be preserved for two years after the end of the crediting period. Electronic files will be backed up onto CDs or disks, and paper files will be printed out. The CDM manager will collect the data in both written and electronic format on a monthly basis, and store additional copies of the data in a secure location to ensure its availability upon request.

The CDM manager will also provide documents about the Project and the index of monitoring report to facilitate the DOE's acquisition of information related to the Project's emission reductions. Paper files, such as maps, drawings, and EIA report will be referred to in conjunction with the monitoring plan in order to validate the information supplied.

7. The Monitoring Report

The Project's monitoring report will be submitted to the DOE upon completion. This will include information relating to the monitoring of the export and import of electricity to and from the power grid, emissions reduction calculations and the calibration and maintenance of monitoring equipment.

**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):**

>>

Completion Date: 27th May 2011.
Responsible Person: Wu Xin.
Responsible Entity: Eco-tec Asia (Beijing) Co., Ltd.
Address: 18A Zhong Guan Chun South Street, B1505, New Logo International Building, Haidian District, Beijing.
Postcode: 100081.
Telephone: (86)-10-6215 6001 ext 811.
Facsimile: (86)-10-6215 6006.
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The person / entity is not a project participant.

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:**

>>

The Project's starting date is 30th May 2010, the date of wind turbines purchase contract signed. This is the earliest date on which the project participant has committed to expenditures related to the implementation or related to the construction of the Project.

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:**

>>

Not applicable

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

>>

Not applicable

C.2.1.2. Length of the first crediting period:

>>

Not applicable

C.2.2. Fixed crediting period:**C.2.2.1. Starting date:**

>>



1st January 2012¹³

C.2.2.2. Length:

>>

Ten years

SECTION D. Environmental impacts

>>

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

The project's Environmental Impact Assessment ("EIA") was compiled by Ulanqab Environmental Protection Science Research Institute. The EIA was then approved by the Environmental Protection Bureau of Inner Mongolia Autonomous Region on 20th October 2010. A summary of the environmental impacts contained in the EIA is presented below.

Construction Phase

Air

The Project's impacts on the air will mainly occur during construction phase. The main sources of air pollution will be powdery material stack and transportation. Measures taken to mitigate this air pollution will include:

- Forbidding to construct in strong windy days;
- Reducing the disturbed area on the ground;
- Slowing down the speed of the vehicles;

Water

Waste water generated in the construction phase will include construction waste water and domestic sewage. Construction waste water will be generated from washing and maintenance of the vehicles and machines, whose key pollution are SS and petroleum. Domestic sewage will be generated from the daily life of the builders, whose key pollution are COD_{Cr}、BOD₅、SS, animal and vegetable oils. Measures taken to mitigate this water pollution will include:

Construction waste water

- Construction waste water will be treated by oil separating tank and sedimentation tank, from which the supernatant can be discharged directly and the mud will be transported to the landfill with other construction solid wastes.

¹³ If the registration date is later than 1st January 2012, the registration date will be adjusted to be the crediting period's start date.



- Temporary settling basins will be built in backfill stacking site and construction mud sources. Muddy water will be discharged after be treated by settling basins.

Domestic sewage

- Canteen sewage will be treated by oil separating tank.
- Other domestic sewage will be treated by septic tank.

Noise

Construction machinery will generate noise. The main noise sources are pneumatic drill and concrete mixer. The noise of the Project will not have great negative effect on neighborhoods and wildlife according to the noise source intensity attenuation calculation.

Solid Waste

Solid waste generated by the builders' daily life, sludge generated by the waste water treatment facilities and spoil generated by the Project construction are included in the construction phase. Measures taken to mitigate this solid waste pollution will include:

- Solid waste generated by the builders' daily life will be collected and delivered to the approved landfill.
- Sludge also will be collected and delivered to the approved landfill after being dehydrated, concentrated and desiccated.
- Spoil will be delivered to the approved spoil ground.

Ecology

The main ecological impacts of the Project include soil erosion and water loss since ground vegetation be destroyed. According to analysis in the EIA, the Project has limited impacts on local vegetation and soil after grass being planted.

Operation Phase

Air

The Project has no negative impacts on the air during operation phase.

Water

Waste water generated in the operation phase mainly refers to domestic sewage. The domestic sewage will be treated by integrated sewage treatment instrument, such as LDZ-48 and the effluent can meet the discharge standard.

**Noise**

The main noise is sourced from the rotation of wind turbines during the operation phase. The noise of the Project will not have great negative effect on neighborhoods and wildlife according to the noise source intensity attenuation calculation.

Solid waste

The solid waste is mainly generated by the daily life of the workers during the operation phase and will be collected and delivered to the approved landfill.

Electromagnetic radiation

According to the analogical monitoring data, the power frequency electric field and magnetic field intensities fluctuation range of the 220kV substation (booster stations) are 1.22~1.25V/m and 0.015~0.985 μ T during the operation phase respectively, both of which are far below the recommended standard (power frequency electric field intensity: 4kV/m; power frequency magnetic field intensity: 0.1mT) of the *Technical Regulations On Environmental Impact Assessment of Electromagnetic Radiation Produced By 500kV Ultrahigh Voltage Transmission and transfer power Engineering* (HJ/T24-1998)¹⁴.

Ecology**Grassland biomass**

The grassland biomass will reduce due to the construction of the Project. After the Project is completed, the area been temporary occupied will be re-planted and the vegetation coverage will be larger than before. Therefore, the Project will not have great negative impacts on local eco-environmental quality.

Wild life

The project's impacts on birds mainly exist in two aspects: one is the rotation of the blades, the other is the noise generated by wind turbines. Measures taken to mitigate the impacts on birds will include:

- Enforcing the observation of birds' activity characteristics and adjusting the wind turbines operation plan.
- Adding lamplight to the wind turbines.

Landscape

The wind turbines and the beautiful natural landscape will constitute a unique human landscape after the construction of the Project. The local landscape will be improved greatly and bring opportunities for the development of the tourism industry, and promote the local economic and environmental development.

¹⁴ [State Environmental Protection Administration](#), *Technical Regulations On Environmental Impact Assessment of Electromagnetic Radiation Produced By 500kV Ultrahigh Voltage Transmission and transfer power Engineering* (HJ/T24-1998) (November 19, 1998).

**Conclusion**

The Project's impacts on the environment will be controlled and mitigated in every respect. Overall the Project is not expected to have significant impact on the 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 EIA approved by the Environmental Protection Bureau of Inner Mongolia Autonomous Region states that the project's environmental impact is not considered being significant.

SECTION E. Stakeholders' comments

>>

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

>>

CWG released an announcement in nearby villages on 8th March 2010 and invited local stakeholders to comment at a meeting about the Project on 15th March 2010. Thirty five stakeholders attended the meeting and asked to complete questionnaires. The composition of the stakeholders present at the meeting is displayed in Table 9 to Table 11 below.

Table 9 Stakeholder Composition by Occupation

Occupation	Number	Percentage
Government Official	5	14.29%
Labour	11	31.43%
Farmer	8	22.86%
Teacher	2	5.71%
Student	3	8.57%
Others	6	17.14%

Table 10 Stakeholder Composition by Age

18-25 years	5	14.29%
26-45 years	26	74.29%
46+ years	4	11.42%

Table 11 Stakeholder Composition by Education Level

Junior high school and below	15	42.86%
Senior high school	8	22.86%
Undergraduate and above	12	34.28%

The questionnaire asked the following six questions:



- Do you have any knowledge or understanding about wind farm projects?
- What is your attitude towards the Project?
- How will the Project affect your quality of living, studying and working?
- Will the Project have a negative impact on the environment?
- Will the Project have a negative impact on the ecosystem?
- How will the project impact on the local economy?

E.2. Summary of the comments received:

>>

Thirty five questionnaires were distributed to local stakeholders and all of the questionnaires were returned. The respondents' comments can be summarized as follows:

1. 71.42% of the respondents understand the information about wind farm project and the other 28.58% of the respondents know a little about that;
2. 97.14% of the respondents supported the construction of the Project and the other 2.86% of the respondents do not care about whether the Project is constructed or not;
3. 85.71% of the respondents believed that the construction of the Project would improve the quality of living, studying and working for local residents and the other 14.29% of the respondents think the Project's impact on improving the quality of living, studying and working for local residents is very limited;
4. 100% of the respondents believed the Project's construction would have no negative impact on the local environment;
5. 100% of the respondents believed the Project's construction would have no negative impact on the local ecosystem;
6. 91.43% of the respondents believed that the construction of the Project would assist local economic development and the other 8.57% of the respondents think the project's impact on assisting local economic development is very limited.

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

>>

No negative comments were received from the local stakeholders. Therefore, the Project's design has not been modified.

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

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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

There is no public funding from Annex I countries involved in the Project.



Annex 3

BASELINE INFORMATION

Table A1-A6 below shows the data and calculation process of the OM emission factor of NCPG. Table A7-A12 show data used to calculation BM emission factor of NCPG.



Table A1 Operation Margin Emission Factor of NCPG in 2006

Fuel Type	Unit	Beijing	Tianjin	Hebei	Shanxi	Inner Mongolia	Shandong	Sub-total	Carbon content (tC/TJ)	OXID (%)	Fuel emission factor (kgCO ₂ /TJ)	NCV (MJ/t, km ³)	CO ₂ emission(tCO ₂ e)
		A	B	C	D	E	F	G=A+B+C+D+E+F	H	I	J	K	L=G×J×K/100000 (mass unit) L=G×J×K/10000 (volume unit)
Coal	10 ⁴ t	796.63	1639.2	6867.99	6968.88	8404.05	10930.66	35607.41	25.8	100	87,300	20,908	649,930,803
Cleaned coal	10 ⁴ t						39.77	39.77	25.8	100	87,300	26,344	914,643
Other washed coal	10 ⁴ t	6.36		214.13	371.14	61.77	544.6	1198	25.8	100	87,300	8,363	8,746,477
Coke	10 ⁴ t	7.97					27.77	35.74	26.6	100	87,300	20,908	652,351
Coke oven gas	10 ⁸ m ³						3.23	3.23	29.2	100	95,700	28,435	87,896
Other gas	10 ⁸ m ³	0.38	0.63	5.8	22.32	0.64	5.79	35.56	12.1	100	37,300	16,726	2,218,517
Crude oil	10 ⁴ t	20.66	6.58	69.72	13.79	22.76	7.22	140.73	12.1	100	37,300	5,227	2,743,772
Gasoline	10 ⁴ t					0.74		0.74	20	100	71,100	41,816	22,001
Diesel	10 ⁴ t			0.01				0.01	18.9	100	67,500	43,070	291
Fuel oil	10 ⁴ t	0.21		3.01		0.07	6.32	9.61	20.2	100	72,600	42,652	297,577
LPG	10 ⁴ t	6.38		0.08			4.1	10.56	21.1	100	75,500	41,816	333,391
Refinery gas	10 ⁴ t						0.01	0.01	17.2	100	61,600	50,179	309
Natural gas	10 ⁸ m ³			2.43			2.32	4.75	15.7	100	48,200	46,055	105,443
Other oil product	10 ⁴ t	3.41	0.73		0.53			4.67	15.3	100	54,300	38,931	987,216
Other coking product	10 ⁴ t						0.28	0.28	20	100	75,500	41,816	8,840
Other energy	10 ⁴ tce							0	25.8	100	95,700	28,435	0
		6.83		47.11	230.76	12.51	132.29	429.5	0	0	0	0	0
												Sub-total	667,049,525

<China Energy Statistics Yearbook 2007>

**Table A2 Thermal Power Generation of NCPG in 2006**

Item	Electricity generation (10 ⁸ kWh)	Electricity generation (MWh)	Auxiliary electricity consumption (%)	Electricity delivered to the grid (MWh)
Beijing	207.05	20,705,000	7.51	19,150,055
Tianjin	359.24	35,924,000	6.86	33,459,614
Hebei	1438.88	143,888,000	6.63	134,348,226
Shanxi	1502.5	150,250,000	7.45	139,056,375
Inner Mongolia	1395.93	139,593,000	7.58	129,011,851
Shandong	2309.22	230,922,000	7.12	214,480,354
Total		721,282,000		669,506,473

<China Electric Power Yearbook 2007>

In addition, in year 2006, Northeast China Power Grid supplied 2,618,060MWh electricity to NCPG and the emission factor of Northeast China Power Grid was 1.14972; Central China Power Grid supplied 497,060MWh electricity to NCPG and the emission factor of Central China Power Grid was 1.12157. Therefore, total CO₂ emission of NCPG in 2006 is 670,617,037 tCO₂, total electricity delivered to NCPG is 672,621,593MWh, and thus the emission factor in 2006 is 0.99702.



Table A3 Operation Margin Emission Factor of NCPG in 2007

Fuel Type	Unit	Beijing	Tianjin	Hebei	Shanxi	Inner Mongolia	Shandong	Sub-total	Carbon content (tC/TJ)	OXID (%)	Fuel emission factor (kgCO ₂ /TJ)	NCV (MJ/t, km ³)	CO ₂ emission(tCO ₂ e)
		A	B	C	D	E	F	G=A+B+C+D+E+F	H	I	J	K	L=G×J×K/100000 (mass unit) L=G×J×K/10000 (volume unit)
Coal	10 ⁴ t	816.17	1753.99	7716.13	7510.06	10434.25	11884.83	40115.43	25.8	100	87,300	20,908	732,214,267
Cleaned coal	10 ⁴ t						18.43	18.43	25.8	100	87,300	26,344	423,859
Other washed coal	10 ⁴ t	5.76		156.89	478.81	48.57	756.84	1446.87	25.8	100	87,300	8,363	10,563,452
Coke	10 ⁴ t	7.93					42.86	50.79	26.6	100	87,300	20,908	927,054
Coke oven gas	10 ⁸ m ³			0.02			4.09	4.11	29.2	100	95,700	28,435	111,843
Other gas	10 ⁸ m ³	0.07	0.72	3.13	25.46	2.58	13.61	45.57	12.1	100	37,300	16,726	2,843,020
Crude oil	10 ⁴ t	11.8	7.6	88.38	72.8	28.17	29.64	238.39	12.1	100	37,300	5,227	4,647,821
Gasoline	10 ⁴ t							0	20	100	71,100	41,816	0
Diesel	10 ⁴ t			0.01				0.01	18.9	100	67,500	43,070	291
Fuel oil	10 ⁴ t	0.33		2.35		0.62	5.08	8.38	20.2	100	72,600	42,652	259,490
LPG	10 ⁴ t	4.74		0.18			2.35	7.27	21.1	100	75,500	41,816	229,522
Refinery gas	10 ⁴ t							0	17.2	100	61,600	50,179	0
Natural gas	10 ⁸ m ³	0.06		2.85			1.65	4.56	15.7	100	48,200	46,055	101,225
Other oil product	10 ⁴ t	5.03	0.73		0.54	4.22	0.01	10.53	15.3	100	54,300	38,931	2,225,993
Other coking product	10 ⁴ t	1.72						1.72	20	100	75,500	41,816	54,302
Other energy	10 ⁴ t ce	4.74						4.74	25.8	100	95,700	28,435	128,986
		11.94		77.25	360.26	30.75	163.48	643.68	0	0	0	0	0
												Sub-total	754,731,124

<China Energy Statistics Yearbook 2008>

**Table A4 Thermal Power Generation of NCPG in 2007**

Item	Electricity generation (10 ⁸ kWh)	Electricity generation (MWh)	Auxiliary electricity consumption (%)	Electricity delivered to the grid (MWh)
Beijing	223	22,300,000	7.51	20,625,270
Tianjin	399	39,900,000	6.53	37,294,530
Hebei	1633	163,300,000	6.67	152,407,890
Shanxi	1734	173,400,000	7.99	159,545,340
Inner Mongolia	1801	180,100,000	7.77	166,106,230
Shandong	2591	259,100,000	7.23	240,367,070
Total		838,100,000		776,346,330

<China Electric Power Yearbook 2008>

In addition, in year 2007, Northeast China Power Grid supplied 1,789,750MWh electricity to NCPG and the emission factor of Northeast China Power Grid was 1.08186; Central China Power Grid supplied 803,000MWh electricity to NCPG and the emission factor of Central China Power Grid was 1.10197. Therefore, total CO₂ emission of NCPG in 2007 is 757,552,268 tCO₂, total electricity delivered to NCPG is 778,939,080MWh, and thus the emission factor in 2007 is 0.97254.



Table A5 Operation Margin emission factor of NCPG in 2008

Fuel Type	Unit	Beijing	Tianjin	Hebei	Shanxi	Inner Mongolia	Shandong	Sub-total	Carbon content (tC/TJ)	OXID (%)	Fuel emission factor (kgCO ₂ /TJ)	NCV (MJ/t, km ³)	CO ₂ emission(tCO ₂ e)
		A	B	C	D	E	F	G=A+B+C+D+E+F	H	I	J	K	L=G×J×K/100000 (mass unit) L=G×J×K/10000 (volume unit)
Coal	10 ⁴ t	755.75	1800.12	7353.33	7854.39	12607.82	12360.75	42732.16	25.8	100	87,300	20,908	779,976,613
Cleaned coal	10 ⁴ t						23.88	23.88	25.8	100	87,300	26,344	549,200
Other washed coal	10 ⁴ t	5.05		134.52	582.39	66.2	691.21	1479.37	25.8	100	87,300	8,363	10,800,731
Coke	10 ⁴ t	5.66			32.49		45.38	83.53	26.6	100	87,300	20,908	1,524,647
Coke oven gas	10 ⁸ m ³			0.02			6.07	6.09	29.2	100	95,700	28,435	165,723
Other gas	10 ⁸ m ³	0.11	0.86	8.37	24.55	3.55	16.2	53.64	12.1	100	37,300	16,726	3,346,491
Crude oil	10 ⁴ t	10.4	9.08	187.54	36	34.32	29.76	307.1	12.1	100	37,300	5,227	5,987,440
Gasoline	10 ⁴ t					0.02		0.02	20	100	71,100	41,816	595
Diesel	10 ⁴ t							0	18.9	100	67,500	43,070	0
Fuel oil	10 ⁴ t	0.15		3.08		0.35		3.58	20.2	100	72,600	42,652	110,856
LPG	10 ⁴ t	2.56		0.25				2.81	21.1	100	75,500	41,816	88,715
Refinery gas	10 ⁴ t							0	17.2	100	61,600	50,179	0
Natural gas	10 ⁸ m ³	0.44		2.93				3.37	15.7	100	48,200	46,055	74,809
Other oil product	10 ⁴ t	11.09	0.7		0.97	2.12		14.88	15.3	100	54,300	38,931	3,145,563
Other coking product	10 ⁴ t	1.45						1.45	20	100	72,200	41,816	43,777
Other energy	10 ⁴ t ce	7.97		7.61				15.58	25.8	100	95,700	28,435	423,968
		4.9	2.34	61.02	466	63.72	141.71	739.69	0	0	0	0	0
Sub-Total													806,239,126

<China Energy Statistics Yearbook 2009>

**Table A6 Thermal Power Generation of NCPG in 2008**

Item	Electricity generation (10 ⁸ kWh)	Electricity generation (MWh)	Auxiliary electricity consumption (%)	Electricity delivered to the grid (MWh)
Beijing	243	24,300,000	7.14	22,564,980
Tianjin	397	39,700,000	7.05	36,901,150
Hebei	1580	158,000,000	6.9	147,098,000
Shanxi	1762	176,200,000	8.22	161,716,360
Inner Mongolia	2008	200,800,000	7.96	184,816,320
Shandong	2689	268,900,000	7.14	249,700,540
Total		867,900,000		802,797,350

<China Electric Power Yearbook 2009>

In addition, in year 2008, Northeast China Power Grid supplied 5,286,140MWh electricity to NCPG and the emission factor of Northeast China Power Grid was 1.10489. Therefore, total CO₂ emission of NCPG in 2008 is 812,079,707 tCO₂, total electricity delivered to NCPG is 808,83,490MWh, and thus the emission factor in 2005 is 1.00495.

According to the analysis above, the weighted average operation margin emission factor of NCPG is 0.99142.

**Table A7 Share of Emission from Coal, Oil and Gas Fuel in Electricity Generation in NCPG**

Fuel type	Unit	Beijing A	Tianjin B	Hebei C	Shanxi D	Shandong E	Inner Mongolia F	Total G=A+...+F	NCV H	Emission factor I	OXID J	Emission K=G * H * I * J/100,000
Coal	10 ⁴ t	755.75	1,800.12	7,353.33	7,854.39	12,360.75	12,607.82	42,732.16	20,908	87,300	1	779,976,613
Cleaned coal	10 ⁴ t	0	0	0	0	23.88	0	23.88	26,344	87,300	1	549,200
Other washed coal	10 ⁴ t	5.05	0	134.52	582.39	691.21	66.2	1,479.37	8,363	87,300	1	10,800,731
Model coal	10 ⁴ t	5.66	0	0	32.49	45.38	0	83.53	20,908	87,300	1	1,524,647
Coke	10 ⁴ t	0	0	0.02	0	6.07	0	6.09	28,435	95,700	1	165,723
Other coking product	10 ⁴ t	7.97	0	7.61	0	0	0	15.58	28,435	95,700	1	423,968
Sub-total								44,340.61				793,440,881
Crude oil	10 ⁴ t	0	0	0	0	0	0.02	0.02	41,816	71,100	1	595
Gasoline	10 ⁴ t	0	0	0	0	0	0	0	43,070	67,500	1	0
Diesel	10 ⁴ t	0.15	0	3.08	0	0	0.35	3.58	42,652	72,600	1	110,856
Fuel oil	10 ⁴ t	2.56	0	0.25	0	0	0	2.81	41,816	75,500	1	88,715
Other oil product	10 ⁴ t	1.45	0	0	0	0	0	1.45	41,816	72,200	1	43,777
Sub-total								7.86				243,942
Natural gas	10 ⁷ m ³	110.9	7	0	9.7	0	21.2	148.8	38,931	54,300	1	3,145,563
COG	10 ⁷ m ³	1.1	8.6	83.7	245.5	162	35.5	536.4	16,726	37,300	1	3,346,491
Other gas	10 ⁷ m ³	104	90.8	1875.4	360	297.6	343.2	3,071	5,227	37,300	1	5,987,440
LPG	10 ⁴ t	0	0	0	0	0	0	0	50,179	61,600	1	0
Refinery gas	10 ⁴ t	0.44	0	2.93	0	0	0	3.37	46,055	48,200	1	74,809
Sub-total								3,759.57				12,554,302
Total												806,239,126

<China Energy Statistics Yearbook 2009>

Based on table A7 and related formulas described in the PDD, $\lambda_{Coal,y}=98.41\%$, $\lambda_{Oil,y}=0.03\%$, $\lambda_{Gas,y}=1.56\%$ are obtained.

**Table A8 Emission Factor of Best Technology**

Variables		Electricity supply efficiency (%) A	Emission factor of fuels (kgCO ₂ /TJ) B	OXID C	Emission factor (tCO ₂ /MWh) D=3.6/A/1,000,000×B×C
Coal-based power plants	$EF_{Coal,Adv}$	39.08	87,300	1	0.8042
Gas-based power plants	$EF_{Gas,Adv}$	51.46	75,500	1	0.5282
Oil-based power plants	$EF_{Oil,Adv}$	51.46	54,300	1	0.3799

Thus, the emission factor of thermal power is:

$$EF_{Thermal,y} = \lambda_{Coal,y} \times EF_{Coal,Adv,y} + \lambda_{Oil,y} \times EF_{Oil,Adv,y} + \lambda_{Gas,y} \times EF_{Gas,Adv,y} = 0.7975 \text{ tCO}_2/\text{MWh}$$

Table A9 Installed Capacity of NCPG in 2008

Installed capacity	Unit	Beijing	Tianjin	Hebei	Shanxi	Inner Mongolia	Shandong	Total
Thermal power	MW	4,760	7,490	29,870	35,250	45,740	55,930	179,040
Hydro power	MW	1,050	0	1,540	790	830	1,050	5,260
Nuclear power	MW	0	0	0	0	0	0	0
Wind power and other	MW	0	0	700	0	2,300	370	3,370
Total	MW	5,810	7,490	32,110	36,040	48,860	57,350	187,660

<China Electric Power Yearbook 2009>

Table A10 Installed Capacity of NCPG in 2007

Installed capacity	Unit	Beijing	Tianjin	Hebei	Shanxi	Inner Mongolia	Shandong	Total
Thermal power	MW	3,900	6,920	29,020	30,950	39,870	54,140	164,800
Hydro power	MW	1050	10	780	790	830	1,050	4,510
Nuclear power	MW	0	0	0	0	0	0	0
Wind power and other	MW	2.7	0	410	0	1,096.5	210	1,719.2
Total	MW	4,952.7	6,930	30,210	31,740	41,796.5	55,400	171,029.2

<China Electric Power Yearbook 2008>

Table A11 Installed Capacity of NCPG in 2006

Installed capacity	Unit	Beijing	Tianjin	Hebei	Shanxi	Inner Mongolia	Shandong	Total
Thermal power	MW	3,984	6,512	26,087	26,661	28,899	49,395	141,538



Hydro power	MW	1,053	5	785	790	818	553	4,004
Nuclear power	MW	0	0	0	0	0	0	0
Wind power and other	MW	24	24	218	0	565	106	937
Total	MW	5,061	6,541	27,090	27,451	30,282	50,054	146,479

<China Electric Power Yearbook 2007>

Table A12 Calculation of BM Emission Factor of NCPG

	Unit	Installed capacity in 2006 A	Installed capacity in 2007 B	Installed capacity in 2008 C	Capacity additions from 2006 to 2008 D=C-A	Capacity additions from 2007 to 2008 D=C-B	Share in total capacity additions
Thermal power	MW	141,538	164,800	179,040	46,111	17,847	93.98%
Hydro power	MW	4,004	4,510	5,260	520	9	1.06%
Nuclear power	MW	0	0	0	0	0	0.00%
Wind power and other	MW	937	1,719.2	3,370	2,433	1,651	4.96%
Total	MW	146,479	171,029.2	187,660	49,064	19,508	100.00%
Share in total installed capacity of 2008					26.15%	10.40%	

In conclusion, $EF_{grid,BM,y} = 0.7975 \times 93.98\% = 0.7495 \text{ tCO}_2/\text{MWh}$

Thus, the baseline emission factor of NCPG is $EF_{grid,y} = 0.75 \times 0.9914 + 0.25 \times 0.7495 = 0.9309 \text{ tCO}_2/\text{MWh}$



Annex 4

MONITORING INFORMATION

There is no supplementary information.
