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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Beijing Guanting Wind Power Project Phase II and Phase II addition

Version number of the document: 05.4

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Revision history of this document

Version number	Date	Description and reason of revision
01	14/09/2009	Draft PDD for LoA application
02	18/09/2009	PDD for global stakeholder consultation (GSC)
03	26/03/2010	Revised PDD as per DOE comments
04	20/05/2010	Revised PDD as per DOE comments
05	10/11/2010	Revised PDD as per DOE comments
05.1	22/11/2010	Revised PDD as per DOE comments
05.2	20/12/2010	Revised PDD as per DOE comments
05.3	27/12/2010	Revised PDD as per DOE comments
05.4	13/01/2011	Revised PDD as per DOE comments

A.2. Description of the project activity:

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Beijing Guanting Wind Power Project Phase II and Phase II addition (hereafter referred to as the Project) is sited on northwest side of Beijing, the north bank of Guanting Reservoir which situated in south-east side of Langshan wind valley in Huailai County, Hebei Province, invested and operated by Beijing Jingneng Energy Technology Investment Co., Ltd.

The Project consists of two projects as follows:

1) Beijing Guanting Wind Power Project Phase II (hereafter referred to as the Guanting Phase II), the purpose of Guanting Phase II is to install 33 sets of wind turbines, with unit capacity of 1,500kW and the total installed capacity of which is 49.5MW. It is estimated that the feed-in electricity is approximately 92.784GWh[1] per year.

2) Beijing Guanting Wind Power Project Phase II addition (hereafter referred to as the Phase II addition), the purpose of Phase II addition is to install 24 sets of wind turbines, with unit capacity of 1,500kW and the total installed capacity of which is 36MW. It is estimated that the feed-in electricity is approximately 68.335GWh per year.

A total of 57 sets of wind turbines are to be installed in the Project, with a total installed capacity of 85.5MW. It is estimated that the feed-in electricity is approximately 161.119GWh per year, which will be sold into North China Power Grid (NCPG) via an existed 110kV circuit after boosted by the No.2 main transformer of the 110kV substation of Beijing Guanting Wind Farm. The Project is a renewable energy

[1] The feed-in electricity in the FSR is 92.76GWh per year, but calculated by the average theoretical annual power generation and corrective factors, the feed-in electricity is 92.784GWh, so, the 92.784GWh was used for conservativeness.

project and it will achieve greenhouse gas (GHG) emission reductions of 153,099 tCO_2e annually by displacing power generation of those fossil fuel-fired power plants delivered to the NCPG under the baseline scenario.

The development and implementation of the Project fits into the priority areas of the development of China's energy industry. The Project will not only supply renewable electricity to grid, but also contribute to sustainable development of the local community, the host country by means of:

- Compared to conventional power generation, reducing the emission of other pollutants resulting from the power generation industry in China, the preliminary estimate of which can reach pollutant reduction of 1,932.9t of SO_2, 768.33t of NO_x[2];
- Helping to stimulate the growth of the wind power industry in China, encouraging and promoting the technological progress and commercial popularization of renewable energy generating technologies in China;
- Creating local employment opportunities during assembling and installing the generating equipment and during the project construction and operation period as well as simulating the development of local tourism industry;
- Providing 20 long-term positions during the operation of the Project.

A.3. Project participants:

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Name of Party involved (*) ((host) indicates a host Party)	Private and/or public entity(ies) project participants (*) (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
P. R. of China (host)	Beijing Jingneng Energy Technology Investment Co., Ltd.	Yes

More detailed contact information on the project participants is provided in Annex 1.

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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Beijing City and Hebei Province

A.4.1.3. City/Town/Community etc:

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Yanqing County, Beijing City and Huailai County, Hebei Province

[2] FSRs of the Guanting Phase II and Phase II addition.

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

The Project is sited on Northwest side of Beijing, the north bank of Guanting Reservoir which situated in south-east side of Langshan wind valley in Huailai County, Hebei Province, with geographical coordinates of north latitude of 40.3192°~40.3507° and east longitude of 115.6112°~115.6999° for Guanting Phase II and with north latitude of 40.3263°~40.3499° and east longitude of 115.5734~115.6144° for Phase II addition. The central geographical coordinates for Guanting Phase II are north latitude 40.3375° and east longitude 115.6750°, while the central geographical coordinates for Phase II addition are north latitude 40.3381° and east longitude 115.6029°.

Figure 1 shows the location of Beijing and Hebei Province, and Figure 2 shows the location of the Project.

Figure 1. Map showing the location of Beijing City and Hebei Province

Figure 2. Map showing the location of the Project

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

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This category would fall within sectoral scope 1: energy industries (Renewable sources).

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

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According to the meteorological data of the Huailai Meteorological Station of Hebei Province and the area at which the Wind farm sited, the project site has abundant wind resource. The annual average wind speed at 65m height is 6.38m/s with stable prevailing wind direction, so it is suitable for building grid-connected wind power projects.

According to the Feasibility Study Reports (FSR), the Project will install 57 set of wind turbines, with unit capacity of 1,500kW. According to the wind resource conditions and topography features of the site, the designation of the Project is as follows:

1) 33 sets of wind turbines employed by the Guanting Phase II are placed in strip along the bank of Guanting Reservoir. Wind turbine is vertical to NW-SE direction, which are deployed in the area with Dagu elevation of 476m-479m of north bank of Guanting Reservoir. The hub height is 65m, the estimated annual feed-in electricity of 33 sets of wind turbines is 92.784GWh, the annual operation hour and the load factor of the Guanting Phase II is 1,874h and 0.2140 respectively.

2) 24 sets of wind turbines employed by the Phase II addition are placed in rows vertical to NW-SE direction, i.e., along NE-SW direction. The hub height is 65m, the estimated annual feed-in electricity of 24 sets of wind turbines is 68.335GWh, the annual operation hour and the load factor of the Phase II addition is 1,898h and 0.2167 respectively.

The electricity generated by the Project will be sold into NCPG via an existed 110kV circuit after boosted by the 110kV substation of Beijing Guanting wind farm. It is estimated that the Project will achieve GHG emission reductions of 153,099 tCO_2e annually by displacing equivalent power generation of those fossil fuel-fired power plants delivered into the NCPG under the baseline scenario.

A new 100MVA set-up transformer i.e., No. 2 main transformer was installed for the electricity delivery of the Project and Beijing Yanqing Low Wind-speed Pilot Wind power Project (hereafter referred to Yanqing Project). Because the Project will share gateway meters with Yanqing Project and Beijing 48 MW Guanting Wind Power Project (hereafter referred to as Guanting Project), the project owner will install two electricity meters (one main and one backup) for each line in order to separate the feed-in electricity and the electricity supplied by the NCPG to each project.

Wind turbines and generators employed by the Project are manufactured by Xinjiang Goldwind Science and Technology Co., Ltd., so no technology transfer is involved. And major technical parameters of the key equipments employed by the Project are illustrated in Table 1 and Table 2.

Table 1. Major technical parameters of the Guanting Phase II

Item		Unit	
Wind turbine	Type		Goldwind 82/1500
	Rated power	kW	1,500

	Blade number		3
	Rotor diameter	m	82
	Rotor swept area	m^2	5,282
	Cut in wind speed	m/s	3
	Rated wind speed	m/s	10.3
	Cut out wind speed	m/s	22
	Survival wind speed	m/s	37.5
	Hub height	m	65
Generator	Type		Permanent-magnet synchronous generator
	Rated power	kW	1,500
	Power factor	---	~0.95
	Rated voltage	V	690

Table 2. Major technical parameters of the Phase II addition

Item		Unit	
Wind turbine	Type		Goldwind 82/1500
	Rated power	kW	1,500
	Blade number		3
	Rotor diameter	m	82
	Rotor swept area	m^2	5,282
	Cut in wind speed	m/s	3
	Rated wind speed	m/s	10.3
	Cut out wind speed	m/s	22

	Survival wind speed	m/s	37.5
	Hub height	m	65
Generator	Type		Permanent-magnet synchronous generator
	Rated power	kW	1,500
	Power factor	---	~0.95
	Rated voltage	V	690

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

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The project activities choose renewable crediting period. It is expected that the project activity will generate emission reductions for 1,071,695tCO_2e over the first renewable crediting period (from March, 2011 to February 2018).

Years	**Annual estimation of emission reductions in tonnes of CO_2e**		
	Guanting Phase II	Phase II addition	Total
01/03/2011-29/02/2012	88,166	64,934	153,099[3]
01/03/2012-28/02/2013	88,166	64,934	153,099
01/03/2013-28/02/2014	88,166	64,934	153,099
01/03/2014-28/02/2015	88,166	64,934	153,099
01/03/2015-29/02/2016	88,166	64,934	153,099
01/03/2016-28/02/2017	88,166	64,934	153,099
01/03/2017-28/02/2018	88,166	64,934	153,099
Total estimated reductions (tonnes of CO_2e)	**617,160**	**454,535**	**1,071,695**
Total number of crediting years	**7**	**7**	**7**
Annual average over the crediting period of estimated reductions (tonnes of CO_2e)	88,166	64,934	153,099

A.4.5. Public funding of the project activity:

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[3] The annual estimation of emission reductions of Guanting Phase II is 88,165.681tCO_2e, the annual estimation of emission reductions of Phase II addition is 64,933.63tCO_2e, the total annual estimation of emission reductions of Project is 153,099.30tCO_2e. The inconsistency in the table was incurred due to rounding.

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

SECTION B. Application of a baseline and monitoring methodology

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

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Approved consolidated baseline and monitoring methodology ACM0002 version 12.1.0- "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" will be employed by the Project.

The approved *Tool for the Demonstration and Assessment of Additionality* version 05.2 and the approved *Tool to calculate the emission factor for an electricity system* version 02 will also be employed for the calculation of emission factor.

The project activity is the installation of a new grid-connected renewable power plant, the baseline scenario was prescribed in ACM0002 (version 12.1.0) and the *Combined tool to identify the baseline and demonstrate additionality* (version 02.2) does not need to be applied in the case of Greenfield projects as per ACM0002.

No fossil fuel will be consumed by the project activity, so, the *Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion* (version 02) was not applied.

The methodology and tools can be found from:
http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html

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

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Wind power generation technology is one kind of renewable electricity generation technologies which displaces fossil fuel-fired power generation technology to supply electricity to the grid. Therefore the Project applies the consolidated methodology ACM0002 approved by CDM EB to determine the baseline and to calculate GHG emission reductions achieved by wind power generation. The methodology ACM0002 is applicable to the project activities, for:

No.	Applicability criteria	Explain
1	This methodology is applicable to grid-connected renewable power generation project activities that (a) install a new power plant at a site where no renewable power plant was operated prior to the implementation of the project activity (Greenfield plant); (b) involve a capacity addition; (c) involve a retrofit of (an) existing plant(s); or (d) involve a replacement of (an) existing plant(s).	The project activity belongs to (a) i.e. the installation of a new power plant at a site where no renewable power plant was operated prior to the implementation of the project activity (Greenfield plant).
2	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 activity is the installation of a new wind power plant.

3	In the case of capacity additions, retrofits or replacements (except for wind, solar, wave or tidal power capacity addition projects which use Option 2: on page 10 to calculate the parameter ($EG_{PJ,y}$): the existing plant started commercial operation prior to the start of a minimum historical reference period of five years, used for the calculation of baseline emissions and defined in the baseline emission section, and no capacity expansion or retrofit of the plant has been undertaken between the start of this minimum historical reference period and the implementation of the project activity;	The project activity is the installation of a new grid connected wind power plant. So it doesn't need to consider this applicability condition.
4	In case of hydro power plants: .The project activity is implemented in an existing reservoir, with no change in the volume of reservoir; .The project activity is implemented in an existing reservoir, where the volume of reservoir is increased and the power density of the project activity, as per definitions given in the Project Emissions section, is greater than 4 W/m^2; .The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the Project Emissions section, is greater than 4 W/m^2.	The Project is not a hydro power plant, so it doesn't need to consider this applicability condition.
5	The methodology is not applicable to the following: .Project activities that involve switching from fossil fuels to renewable energy sources at the site of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site; .Biomass fired power plants; .Hydro power plants that result in new reservoirs or in the increase in existing reservoirs where the power density of the power plant is less than 4W/m^2.	The Project is a new grid-connected wind power plant, therefore: .The Project doesn't involve switching from fossil fuels to renewable energy sources at the site of the project activity; .The Project isn't a biomass fired power plant; .The Project isn't a hydro power plant. So it doesn't need to consider this applicability condition.

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

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The spatial extent of the project boundary includes two wind power plants included in the Project, No. 2 main transformer of the 110kV substation of Beijing Guanting wind farm. Electricity generated by the Project will be delivered to the NCPG, which according to the latest guideline[4] issued by Chinese DNA on July 2 of 2009, is composed of Beijing Power Grid, Tianjin Power Grid, Hebei Power Grid, Shanxi Power Grid, Shandong Power Grid and Inner Mongolia Power Grid. Therefore, the spatial extent of the project boundary also includes all the power plants physically connected into the NCPG.

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[4] *Notification on 2009 Baseline Emission Factors for Regional Power Grids in China, issued by China on July 2,2009 http://qhs.ndrc.gov.cn/qjfzjz/t20090703_289357.htm*

Where determine baseline or project emission, the greenhouse gases and emission sources included in or excluded from the project boundary are shown in Table 3.

Table 3. Emissions sources included in or excluded from the project boundary

	Source	Gas	Included?	Justification/Explanation
Baseline	CO_2 emissions from electricity generation in fossil fuel fired power plants connected into the NCPG that are displaced due to the project activity	CO_2	Yes	Main emission source.
		CH_4	No	Minor emission source.
		N_2O	No	Minor emission source.
Project activity	Project emission.	CO_2	No	The project emissions should not be considered as per the requirement of methodology.
		CH_4	No	The project emissions should not be considered as per the requirement of methodology.
		N_2O	No	The project emissions should not be considered as per the requirement of methodology.

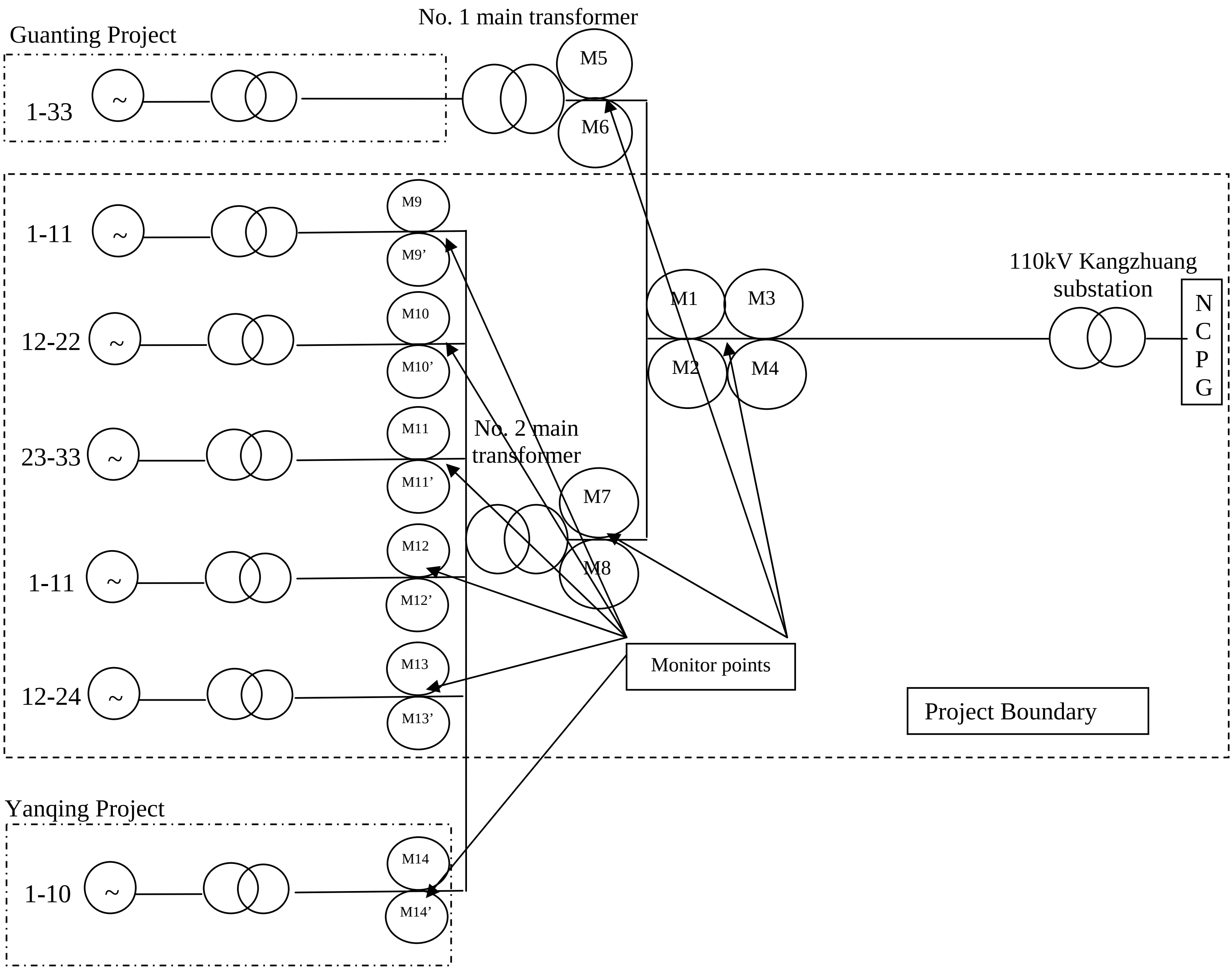

Figure 3. Boundary of the Project

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

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As the project activity is the installation of a new grid-connected wind power plant, as per the methodology ACM0002, the baseline scenario of the Project is identified as follows:

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

Grid the electricity generated by the Project delivered to is NCPG, therefore, in the absence of the project activities, the feed-in electricity supplied by the Project will be supplied by the operation of other grid-connected power plants and by the addition of new generation sources in the NCPG. The approved “Tool to calculate the emission factor for an electricity system” (Version 02) will be employed for the calculation of the CM. See the parameters assumed in calculation of the CM of the NCPG at Annex 3.

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

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Evidences supporting the prior consideration for CDM development of the Project

The CDM revenue was a key factor in influencing the decision of making investment in the Project. The owner of the Project has seriously considered the CDM revenue when the FSR of the Project was in the preparation stage. The project activity is kind of project activities with a starting date on or after 02 August 2008, the project owner submitted the CDM development confirmation letter by email to UNFCCC on 08 June 2009 as per the GUIDANCE ON THE DEMONSTRATION AND ASSESSMENT OF PRIOR CONSIDERATION OF THE CDM(Annex 46, EB 41) within six months of the project activity start date(20 Jun 2009), and received a confirmation reply of EB on 18 June, 2009. So it is clearly demonstrated that the CDM revenue was given serious consideration in making the investment decision before the implementation of the Project.

The milestone and main events for construction and CDM development of the Project are listed as follows:

For Guanting Phase II:

Milestone Date	Event	Source	Document no.
Mar, 2008	The FSR of the Guanting Phase II was compiled	The FSR of the Guanting Phase II	
Oct 17, 2008	The Environment Impact Assessment (EIA) Form of the Guanting Phase II was approved	The EIA Form of the Guanting Phase II was approved by Environmental Protection Agency of Beijing	JHS[2008]1081
Dec 1, 2008	Project owner made a CDM development board resolution on the Guanting Phase II	Minutes of board meetings of Beijing Jingneng Energy Technology Investment Co., Ltd.	
Dec 15, 2008	The FSR of the Guanting Phase II was	The Approval of the Guanting Phase II	JFG[2008]2073

	approved		
May 26, 2009	The CDM service contract was signed	The CDM service contract	
Jun 8, 2009	The CDM Development Confirmation Letter was submitted to CDM EB	The CDM Development Confirmation Letter and the email	
Jun 18, 2009	CDM EB Registration accepted the CDM Development Confirmation Letter	The emails and the website of UNFCCC.	
Jun 20, 2009	A contract of basement Construction of the Guanting Phase II was signed, *the contract is the first contract of all construction Contracts of the Guanting Phase II*	Contract of basement Construction of the Guanting Phase II	
Jun 25, 2009	Contract of wind turbine-generators purchase for the Guanting Phase II was signed, *the contract is the first contract of all equipment Contracts of the Guanting Phase II*	Contract of wind turbine-generators purchase for the Guanting Phase II	GOLDWIND-1500-2009010
Jul 1, 2009	Construction permission of Guanting Phase II was issued	Construction permission of Guanting Phase II	
Aug 15,2009	Wind turbine and corresponding equipments Installation contract	Wind turbine and corresponding equipments Installation contract	
Sep 24, 2009	The project owner was noticed to participate the 68th DNA review meeting of LoA application	The Notice of the 68th DNA review meeting of LoA application	http://cdm.ccchina.gov.cn/ WebSite/CDM/UpFile/File2340.doc
Nov 26, 2009	The Project was listed as one of those projects passing DNA review meeting of LoA application	The newest approved CDM project up to Nov. 13, 2009	http://cdm.ccchina.gov.cn/ WebSite/CDM/UpFile/File2393.pdf
Dec 10, 2009	The LoA of the Project was issued	The LoA of the Project	No. 2018

For Phase II addition:

Milestone Date	Event	Source	Document no.
Jan, 2009	The FSR of the Phase II addition was compiled	The FSR of the Phase II addition	
May 8, 2009	Project owner made a CDM development board resolution on the Phase II addition	Minutes of board meetings of Beijing Jingneng Energy Technology Investment Co., Ltd.	
May 25, 2009	The EIA Form of the Phase II addition was approved	The EIA Form of the Guanting Phase II addition was approved by Environmental Protection Agency of Beijing	JHS[2009]616
May 26, 2009	The CDM service contract was signed	The CDM service contract	
May 31, 2009	The FSR of the Phase II addition was approved	The Approval of the Phase II addition	JFG[2009]1065
Jun 8, 2009	The CDM Development Confirmation Letter was submitted to CDM EB	The CDM Development Confirmation Letter and the email	
Jun 18, 2009	CDM EB Registration accepted the CDM Development Confirmation Letter	The emails and the website of UNFCCC	
Jun 25, 2009	Contract of wind turbine-generators purchase for the Phase II addition was signed, *the contract is the first contract of all equipment Contracts of the Phase II addition*	Contract of wind turbine-generators purchase for the Phase II addition.	GOLDWIND-1500-2009015
July, 2009	A contract of wind turbine foundation and temporary roads Construction of the Phase II addition was signed, *the contract is the first contract of construction Contracts of the Phase II addition*	Contract of wind turbine foundation and temporary roads Construction of the Phase II addition	

Aug 7, 2009	Construction permission of Phase II addition was issued	Construction permission of Phase II addition	
Sep 24, 2009	The project owner was noticed to participate the 68th DNA review meeting of LoA application	The Notice of the 68th DNA review meeting of LoA application	http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File2340.doc
Oct 10, 2009	Wind turbine and corresponding equipments Installation contract	Wind turbine and corresponding equipments Installation contract	
Nov 26, 2009	The Project was listed as one of those projects passing DNA review meeting of LoA application	The newest approved CDM project up to Nov. 13, 2009	http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File2393.pdf
Dec 10, 2009	The LoA of the Project was issued	The LoA of the Project	No. 2018

Demonstration and assessment of additionality

Identify whether the Project has additionality by using the *Tool for the Demonstration and Assessment of Additionality* approved by CDM EB.

Step 1. Identification of alternatives to the project activity consistent with current laws and regulations
The objective of Step 1 is to define realistic and credible alternatives to the project activity that can be (part of) the baseline scenario through the following sub-steps:

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

As per paragraph 105 of *CLEAN DEVELOPMENT MECHANISM VALIDATION AND VERIFICATION MANUAL version 01.2*：

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.

As per *Tool for the Demonstration and Assessment of Additionality* version 05.2:

Project activities that apply this tool in context of approved consolidated methodology ACM0002, only need to identify that there is at least one credible and feasible alternative that would be more attractive than the proposed project activity.

As the project activity is the installation of a new grid-connected wind power plant, as per the methodology ACM0002, the baseline scenario of the Project is identified as follows:

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

So, plausible and credible alternatives available to the Project that provide outputs or services comparable to the proposed CDM project activity is:

Alternative I: Provision of an equivalent amount of annual power output by the NCPG into which the Project is connected.

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

Alternative I (Provision of an equivalent amount of annual power output by the NCPG into which the Project is connected) is prevailing practice which satisfies China's regulations.

Step 2. Investment Analysis

Sub-step 2a. Determine appropriate analysis method

The *Tool for the Demonstration and Assessment of Additionality* suggests three analysis methods which are simple cost analysis (Option I), investment comparison analysis (Option II) and benchmark analysis (Option III). In addition to CDM revenue, the Project also benefits from electricity sales, so a simple cost analysis (Option I) does not apply.

Since the Project is a grid-connected wind power project, and the baseline scenario is the provision of equivalent amount of annual electricity by the NCPG, benchmark analysis (Option III).is selected for the Project in accordance with *Guidelines on the Assessment of Investment Analysis* (annex 58, EB51).

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

According to the "Economical assessment and parameters for construction project, 3rd edition", a project will be financially acceptable when the Financial Internal Return Rate (FIRR) is better than the sectoral benchmark FIRR[5].

According to the *Measures on Compiling the Feasibility Study Report of Wind Power Plant Project*, the annex to *Provisional Measures on the Administration of the Preparatory Work of Wind Power Plant Project* (NDRC energy [2005]899), the sectoral benchmark for wind power projects is 8% for the project IRR.

Given the fact that *Provisional Measures on the Administration of the Preparatory Work of Wind Power Plant Project* is currently the official guideline for the wind power project design, the FIRR of 8% is adopted by the Project as the benchmark for the project IRR. On the basis of above benchmark, calculation and comparison of financial indicators are carried out in sub-step 2c.

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

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5 *"Economical assessment and parameters for construction project, 3rd edition",p15*

Basic parameters for calculation of financial indicators of the Project are shown in Table 4.

Table 4. Basic parameters for calculation of financial indicators

Parameter	Unit	Value		Source of data
		Guanting Phase II	Phase II addition	
Installed capacity	MW	49.5	36	Guanting Phase II FSR179, Phase II addition FSR 172
Annual feed-in electricity	MWh	92,784	68,335	Guanting Phase II FSR179, Phase II addition FSR 172
Project lifetime	Year	21	21	Guanting Phase II FSR179, Phase II addition FSR 172
total static investment:	Million CNY	555.2537[6]	435.7465[7]	Guanting Phase II FSR179, Phase II addition FSR 172
Equity: loan		20%:80%	20%:80%	Guanting Phase II FSR180, Phase II addition FSR173
Expected bus-bar tariff (VAT included)	CNY/kWh	0.75	0.75	Guanting Phase II FSR182, Phase II addition FSR175
Maintenance fee rate	Of fixed assets	1.50%	1.50%	Guanting Phase II FSR180, Phase II addition FSR173
Insurance fee rate	Of fixed assets	2.5‰	2.5‰	Guanting Phase II FSR181, Phase II addition FSR174
Material fee	CNY/MWh	15	15	Guanting Phase II FSR181, Phase II addition FSR174
Other fees	CNY/MWh	25	25	Guanting Phase II FSR181, Phase II addition FSR174
Average annual salary	CNY/person	50,000	50,000	Guanting Phase II FSR181, Phase II addition FSR173
Rate of employee welfare		45%	45%	Guanting Phase II FSR181, Phase II addition FSR174
Staff	Person	10	10	
VAT rate		17%, with 50% refund	17%, with 50% refund	The VAT policy Notice of comprehensive utilization of resources and value-added tax policies for other products issued by Financial Department and State Taxation

6 As per FSR of Guanting Phase II, the total static investment, including the R&D Centre cost CNY 42 million, was CNY 597.2537 million. For conservative, the investment cost, CNY 42 million, of the R&D Centre was deducted from the total static investment, so the total static investment in PDD and IRR calculation sheet= 597.2537-42= CNY 555.2537 million.

7 As per FSR of Phase II addition, the total static investment, including the R&D Centre cost CNY 0.3716 million, was CNY 436.1181 million. For conservative, the investment cost, CNY 0.3716 million, of the R&D Centre was deducted from the total static investment, so the total static investment in PDD and IRR calculation sheet= 436.1181- 0.3716= CNY 435.7465 million.

				Administration (Document no.Caishui[2008]156)
Income tax rate		25%	25%	Guanting Phase II FSR182, Phase II addition FSR175
City maintenance and construction tax rate	Of VAT	5%	5%	Guanting Phase II FSR182, Phase II addition FSR175
Education tax	Of VAT	4%	4%	Guanting Phase II FSR182, Phase II addition FSR175
Depreciation rate[8]		4.75%	4.75%	Guanting Phase II FSR180, Phase II addition FSR173
Residual value ratio[9]	Of fixed asset	5%	5%	Confirming Effective time of Enterprises Adjustment of the Residual Value Rate (GSH[2005]883)

Based on the data above, without the revenue from CERs sales, the Guanting Phase II IRR is 6.29%, the Phase II addition IRR is 5.40%, both are lower than the benchmark (8%). The Project is not financially attractive.

Calculated by 13 Euro/tCO_2e, with a renewable 7 year *3 crediting period, revenue from CERs sales can enhance the project IRR of the Guanting Phase II to reach 9.08%, and the project IRR of the Phase II addition to reach 8.08%, higher than the benchmark 8%, which show that revenue from CERs sales can significantly improve the financial indicators, making the Project financially comparable to the baseline scenario project.

Table 5. Comparison of financial indicators

Project	Project IRR		
	Without CERs	Benchmark	With CERs
The Guanting Phase II	6.29%	8%	9.08%
The Phase II addition	5.40%	8%	8.08%

Justification of calculation of annual feed-in electricity of the Project

The Guanting Phase II

The description of calculation of annual feed-in electricity of the Guanting Phase II is from chapter 5.3 of the FSR of the Guanting Phase II as follow:

Based on the data of wind speed, wind direction from the anemometer tower of the Project and, the software WindPRO2.5 was used to calculate the theoretical annual power generation of 33 set of WTG 1.5MW turbines, and the result is 132,328 MWh, means the average theoretical annual power generation per turbine is 4,009.94 MWh.

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8 4.75% of depreciation rate and 5% of residual value rate means 20 years of depreciation period and use the linear depreciation method.

9 The residual value ratio was not considered in the FSRs of the Project, the 5% of residual value ratio is as per Notice Confirming Effective time of Enterprises Adjustment of the Residual Value Rate (GSH[2005]883) issued by State Administration of Taxation.

As the theoretical annual power generation of wind farms did not consider the impact of factors such as utilization efficiency of units, etc, on power generation, it is necessary that estimating the real feed-in electricity after discounting the theoretical annual power generation of wind farm by the following factors:

A) Air density and wake effect
The air density of the Project is 1.1 kg/m^3, which is lower than air density used in the power curve calculation, so it needs to be revised. The impacts of wind turbine clusters on wind turbine efficiency should be considered. According to the WindPRO2.5, the corrective factor of air density and wake effect is 97.3%.

B) Impact of blade contamination
Blade surface pollution results in increasing the roughness of the blade surface, aerodynamic characteristics of airfoil reduced, as a result making the power generation decline. Pollution in areas nearby the Project is small, so here, take corrective factor of blade pollution as 95%.

C) Availability rate of wind turbine
Considering those factors such as the wind turbine failure or, maintenance, and power blackouts and other factors, and integration of the current manufacturing level of wind turbine and experience on operation management and maintenance of wind farm, availability rate of wind turbine can be assumed as about 96%.

D) The guarantee ratio of power curve
Considering the relevant equipment supplier's specification, the guarantee ratio of the power curve is assumed as 96%.

E) Climate impact
Low temperature, or other adverse weather conditions make the units shut down, here take corrective factor of climate impact as 96%.

F) Control and turbulence discount
The turbulence intensity is the project site is low, so the corrective factor of control and turbulence discount is assumed as 95%.

G) Self-use electricity consumption, line losses and other energy loss
Comprehensive considerate cables, step-up transformer and output circuit losses, as well as wind power plants self-use consumption, and the characteristics of local grid, the corrective factor of this part is assumed as 95%.

H) Other factors
Take 95% as the corrective rate of other factors. The other factors may includes yawing loss, error in software calculation, frequency fluctuation effect and access restriction of grid, wake effect of large scale wind farms etc.

Corrective factor=Corrective factor of air density and wake effect* Corrective factor of blade pollution * availability rate of wind turbine *the guarantee ratio of power curve * corrective factor of climate impact * corrective factor of control and turbulence discount *corrective rate of self-use electricity consumption line losses and other energy loss * corrective rate of other factors.
=97.3%*95%*96%*96%*96%*95%*95%*95%=70.117%.

The feed-in electricity=132,328*70.117%=92,784MWh

The Phase II Addition

The description of calculation of annual feed-in electricity of the Phase II Addition is from section 5.3 of the FSR of the Phase II Addition as follow:

Based on the data of wind speed, wind direction from the anemometer tower of the Project and, the software WindPRO2.6 was used to calculate the theoretical annual power generation of 24 set of WTG 1.5MW turbines, and the result is 92,109 MWh, means the average theoretical annual power generation per turbine is 3,837.88 MWh.

As the theoretical annual power generation of wind farms did not consider the impact of factors such as utilization efficiency of units, etc, on power generation, it is necessary that estimating the real feed-in electricity after discounting the theoretical annual power generation of wind farm by the following factors:

A) Air density and wake effect
The air density of the Project is 1.1 kg/m^3, which is lower than air density used in the power curve calculation, so it needs to be revised. The impacts of wind turbine clusters on wind turbine efficiency should be considered. According to the WindPRO2.6, the corrective factor of air density and wake effect is 94.76%.

B) Impact of blade contamination
Blade surface pollution results in increasing the roughness of the blade surface, aerodynamic characteristics of airfoil reduced, as a result making the power generation decline. Pollution in areas nearby the Project is small, so here, take corrective factor of blade pollution as 97%.

C) Availability rate of wind turbine
Considering those factors such as the wind turbine failure or, maintenance, and power blackouts and other factors, and integration of the current manufacturing level of wind turbine and experience on operation management and maintenance of wind farm, availability rate of wind turbine can be assumed as about 95%.

D) The guarantee ratio of power curve
Considering the relevant equipment supplier's specification, the guarantee ratio of the power curve is assumed as 95%.

E) Climate impact
Low temperature, or other adverse weather conditions make the units shut down, here take corrective factor of climate impact as 97%.

F) Control and turbulence discount
The turbulence intensity is the Project site is low, so the corrective factor of control and turbulence discount is assumed as 98%.

G) Self-use electricity consumption, line losses and other energy loss

Comprehensive considerate cables, step-up transformer and output circuit losses, as well as wind power plants self-use consumption, and the characteristics of local grid, the corrective factor of this part is assumed as 96%.

H) Yawing factors
With stable wind direction, the yawing factor is assumed as 98%.

Corrective factor=Corrective factor of air density and wake effect* Corrective factor of blade pollution * availability rate of wind turbine *the guarantee ratio of power curve * corrective factor of climate impact * corrective factor of control and turbulence discount *corrective rate of self-use electricity consumption line losses and other energy loss *yawing factor.
=94.76 %*97%*95%*95%*97%*98%*96%*98%=74.189%.

The feed-in electricity=92,109*74.189%=68,335MWh

Justification of Total static investment

The total static investment mainly includes equipment cost, cost of construction and installation and other cost. A comparison with the breakdown of major items in the FSRs of the Project and signed contracts was shown in Table 6. According the Table 6, the sum of contracted value of the major items is a little higher the sum of estimated value of the major items in FSRs. So, it is a reasonable conclusion that the real investment of the Project will be much near to estimated total static investment of the Project.

Table 6. Comparison with the breakdown of major items of the total static investment of the Project

Item	FSR Value					Contract value	Source
Item	The Guanting Phase II	Source	The Phase II addition	Source	Total	Total	Total
Unit	*CNY*	*Page in FSR*	*CNY*	*Page in FSR*	*CNY*	*CNY*	*CNY*
1 equipment	*419,571,230*		*307,459,400*	*P165*	727,030,630	684,206,782	Turbine-generators purchase contract and Other equipment contracts
1.1 turbines and generators	*346,295,700*	*P171*	*251,851,400*	*P165*	598,147,100		
1.2 other equipment	*73,275,530*	*P171*	*55,608,000*	*P165*	128,883,530		
2 cost of construction and installation	*80,103,513*	*P169*	*78,068,073*	*P164*	158,171,586	224,888,140.21	Contracts of construction and installation
3 design cost	*6,900,000*	*P169*	*11,172,000*	*P164*	18,072,000	10,241,668.50	Design contracts
Sum	506,574,743		396,699,473		903,274,216	919,336,590.71	
Account for *estimated* total static investment	*91.23%*		*91.04%*		*91.15%*	92.77%	

Note: some contracts of construction and installation included Guanting Phase II and Phase II addition together, so, it is impossible to divide contracts of construction and installation for two projects. Some design contracts included Guanting Phase II and Phase II addition together, so, it is impossible to divide design contracts for two projects.

Justification of Annual Operation cost

The annual operation costs mainly include maintenance cost, insurance cost, salary and welfare, material cost and other costs. The annual operation cost accounts for 2.43% of total static investment for Guanting Phase II and 2.44% for Phase II addition. According to PART 3: ECONOMICS OF WIND POWER[10] , the operation cost made up 2%-3% of total investment costs for first two years, then increases slightly less than 5% of total investment costs after six years. So, the constant operation cost applied in the project is reasonable and conservative.

Justification of other critical input value used in the Project

Table 7. Justification of other critical input value used in the Project

Parameters	Value adopted in PDD	Data source	Justification
Bus-bar tariff (including VAT) (CNY/ kWh)	0.75	FSR	The constant bus-bar tariff of CNY 0.75 /kWh is from the tariff approval of Guanting Project[11] which is most recent available information during time of investment decision. According to P85 in *Financial Assessment Methods and Parameters for Construction* which was issued by the National Development and Reform Commission and the Ministry of Construction, "it is hard either to predict the future price level in the preliminary study phase or to ensure the reliability of the predicted result due to the long-term operation period. So usually, the price level of the project input and project output in the first year of operation period should be predicted and this price level should be fixed in the investment analysis during the operation period". According to paragraph 6 of *Guidelines on the Assessment of Investment Analysis* (version 03.1) (EB51, Annex58), "Guidance: Input values used in all investment analysis should be valid and applicable at the time of the investment decision taken by the project participant. … Rationale: …This decision will therefore be based on the relevant information available at the time of the investment decision and not information available at an earlier or later point. …". The tariff used for this investment analysis was valid and applicable at the time of the investment decision. In addition, as per further explanation in the guidance, no information from a later point should be the basis for the investment decision. Furthermore, the application of non-fixed, fluctuating input values would not be in line with this guidance, because at that time, any information on the variation of these input values over the following 20 years was simply not available.
VAT (%)	17%, with 50%		The VAT rate is 17% according to the State Tax Laws (Ref.: State Council Order[1993] no.134).(http://www.gov.cn/banshi/2005-08/19/content_24733.htm)

10 http://www.wind-energy-the-facts.org/documents/download/Chapter3.pdf
11 www.bjpc.gov.cn/tztg/200808/P020080821350882142273.doc, the www.bjpc.gov.cn is official website of Beijing DRC

	refund		The VAT is refunded by half in accordance with the VAT policy Notice of comprehensive utilization of resources and value-added tax policies for other products issued by Financial Department and State Taxation Administration (Document no.Caishui[2008]156) http://www.ndrc.gov.cn/rdzt/jsjyxsh/t20081216_251941.htm
City Construction surtax: (% of VAT)	5	FSR	The tax rate for the Project is valid and consistent with the State Tax Laws (Ref.: PRC City Construction and Maintenance Regulation GuoFa[1985]19) http://www.chinaacc.com/new/63/67/102/1985/2/ad19211101118258915951c.htm
Education Tax (% of VAT)	4	FSR	The education Tax is composed of the national and regional tax. And the applied tax rate is consistent with the State Council Order (Ref.: State Council Order[2005] no.448, http://www.gov.cn/gongbao/content/2005/content_91662.htm) and Implementation Measures of Education Tax in Hebei province(JiZhengZi[1986]no 81, http://dsgk.hd.gov.cn/viewfile/newsview/5/sj200512136.shtml)
Income Tax (%)	25	FSR	It is consistent with State Tax Law[12] (Ref.: President of the People's Republic of China Order [2007] no.63). The corporation income tax rate is announced to be 25% from 16th March 2007 and comes effective on 1st January 2008. Thus, it is applicable to this Project.
Depreciation rate	4.75%		4.75% of depreciation rate and 5% of residual value rate means 20 years of depreciation period. And in the calculation the Project use the linear depreciation method and 5% of residual value.
Residual value rate (of fixed asset)	5%		As per Notice Confirming Effective time of Enterprises Adjustment of the Residual Value Rate (GSH[2005]883) issued by State Administration of Taxation.

Sub-step 2d. Sensitivity analysis

As per *Guidelines on the Assessment of Investment Analysis* (version 03.1), only variables that constitute more than 20% of either total project costs or total project revenues should be subjected to reasonable variation. For the Project, the following financial parameters were taken as uncertain factors for sensitive analysis of financial attractiveness:

- Total static investment
- Annual operation cost
- Annual feed-in electricity
- Bus-bar tariff

The justification of parameters selection is as follow:

	The Guanting Phase II	The Phase II addition
Parameter	Justification	Justification
Static total	75.10% cost of total production cost	75.24% cost of total production cost

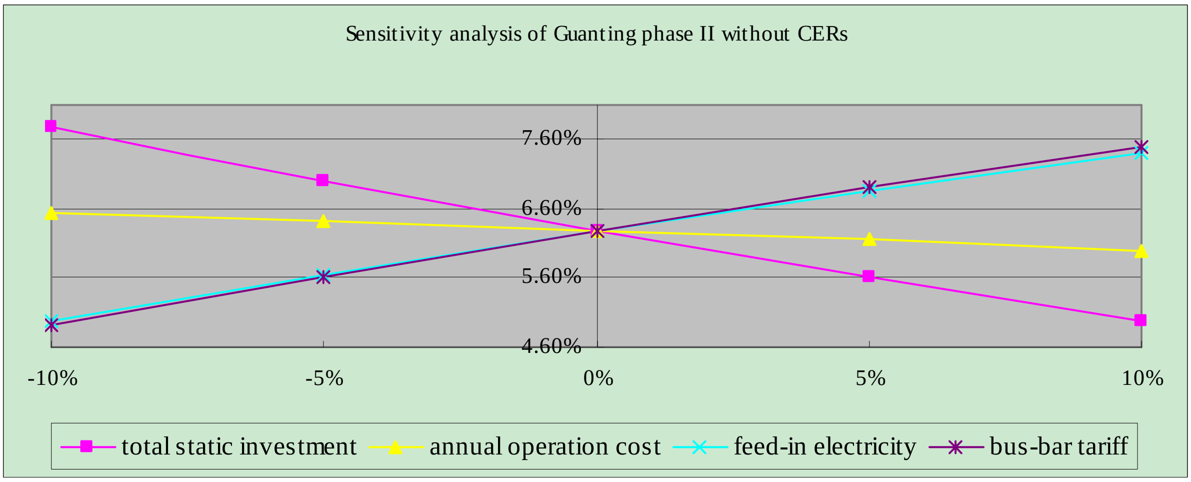
[12] Enterprise Income Tax Law of the People's Republic of China, (http://www.gov.cn/gongbao/content/2007/content_609907.htm)

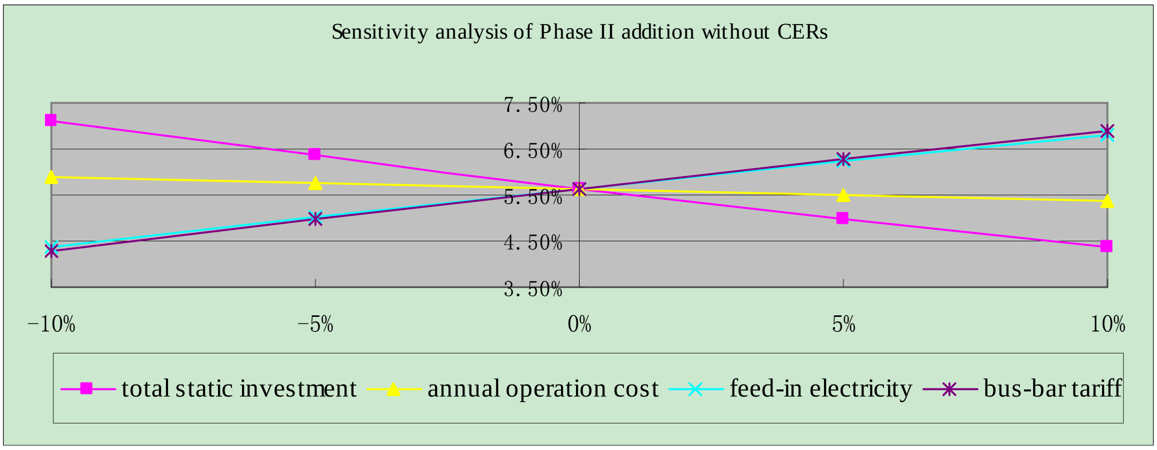
investment	(depreciation and interests)	(depreciation and interests)
Annual operation cost	24.90% of total production cost	24.76% of total production cost
Annual feed-in electricity	100% of the total annual project revenues= Bus-bar tariff×Annual feed-in electricity	100% of the total annual project revenues= Bus-bar tariff×Annual feed-in electricity
Bus-bar tariff	100% of the total annual project revenues= Bus-bar tariff×Annual feed-in electricity	100% of the total annual project revenues= Bus-bar tariff×Annual feed-in electricity

Guidelines on the Assessment of Investment Analysis (version 03.1) clearly pointed out that departure variations in sensitivity analysis should at least cover a range of +10% and-10%, so assume that the four indicators change within the range of at least -10%-+10%, the corresponding impact on the project IRR is shown in Table 8.

Table 8. Sensitivity analysis of the financial indicators of the Project
(Project IRR, without the revenue from CDM)

Item	The Guanting Phase II					The Phase II addition				
Range / Parameter	-10%	-5%	0	5%	10%	-10%	-5%	0	5%	10%
Total static investment (%)	7.79%	7.01%	6.29%	5.61%	4.99%	6.87%	6.11%	5.40%	4.76%	4.14%
Annual operation cost (%)	6.56%	6.42%	6.29%	6.15%	6.00%	5.70%	5.55%	5.40%	5.26%	5.11%
Annual feed-in electricity (%)	4.99%	5.66%	6.29%	6.88%	7.42%	4.12%	4.78%	5.40%	6.00%	6.58%
Bus-bar tariff (%)	4.91%	5.62%	6.29%	6.91%	7.49%	4.04%	4.74%	5.40%	6.04%	6.64%





It can be seen from the Table 8 that when the four key parameters change within the range of -10%-+10%, the IRR of the Project still can not reach the benchmark 8%. Therefore, the conclusion of the additionality of the Project is robust.

Critical Value Analysis

The Guanting phase II

The total static investment decreases by 11.30%, the project IRR can reach 8.00%. But as per Table 6, the actual total static investment will be much near to the estimated total static investment in the FSR of the Project, so, the situation that total static investment decreases by 11.30% will be small probability event.

The annual operation cost decreases by 69.50%, the project IRR can reach 8.00%. The annual operation costs mainly include maintenance cost, salary and welfare, material cost and other costs. The annual operation cost accounts for 2.43% of total static investment, it is conservative according to PART 3: ECONOMICS OF WIND POWER, therefore, the possibility for the operation cost to deduce 69.50% is very slight.

If annual feed-in electricity increases by 15.55%, the project IRR can reach 8.00%. However, long term large variation of annual feed-in electricity is also impossible. As per the National Standard of GB/T 18710-2002 and GB/T 18709-2002, the project owner conducted wind resource measurements for one year (from 01/07/2005 to 30/06/2006).The data from above wind resource measurement was adjusted based on the historical meteorological data of 30 years (from 1971 to 2000), provided by local weather station, then were input the professional WindPro2.5 software to calculate the annual theoretical electricity output. Considering impacts of some factors like air density, trailing stream on the annual theoretical electricity output, comprehensive discount was carried out. The final result from comprehensive discount is feed-in electricity. The method of calculating feed-in electricity is also approved by the government and is widely used in China for wind energy. Therefore, it is not credible to assume that feed-in electricity from the Guanting phase II would increase by 15.55% or more over the lifetime of the Guanting phase II in order the reach the benchmark 8%.

As for the bus-bar tariff, when it increases by 14.65%, the project IRR is 8.00%. The expected tariff for the Guanting phase II is from the approved tariff for the registered CDM project, Guanting Project (i.e. Beijing 48 MW Guanting Wind Power Project, ref. no. 1749), CNY 0.75 /kWh (VAT included), which is the highest tariff for wind power projects in Beijing and much higher than the highest tariff, CNY 0.65/kWh(stipulated by Information note on the highest tariffs applied by the executive board on its decisions on registrations on registration of projects in the People's Republic of China, Version 01) in Hebei Province. So, it is minor possible that the tariff would be increased by 14.65%.

The Phase II addition

The total static investment decreases by 16.65%, the project IRR can reach 8.00%. But as per Table 6, the actual total static investment will be much near to the estimated total static investment in the FSR of the Project, so, the situation that total static investment decreases by 16.65% will be small probability event.

Even the annual operation cost decreases by 100%, the project IRR can not reach 8.00%.

If annual feed-in electricity increases by 24.10%, the project IRR can reach 8.00%. However, long term large variation of annual feed-in electricity is also impossible. As per the National Standard of GB/T 18710-2002 and GB/T 18709-2002, the project owner conducted wind resource measurements for one year (from 01/07/2005 to 30/06/2005).The data from above wind resource measurement was adjusted based on the historical meteorological data of 30 years (from 1971 to 2000), provided by local weather station, then were input the professional WindPRO2.6 software to calculate the annual theoretical electricity output. Considering impacts of some factors like air density, trailing stream on the annual theoretical electricity output, comprehensive discount was carried out. The final result from comprehensive discount is feed-in electricity. The method of calculating feed-in electricity is also approved by the government and is widely used in China for wind energy. Therefore, it is not credible to assume that feed-in electricity from the Phase II addition would increase by 24.10% or more over the lifetime of the Phase II addition in order to reach the benchmark 8%.

As for the bus-bar tariff, when it increases by 22.70%, the project IRR is 8.00%. The expected tariff for the Phase II addition is from the approved tariff for the registered CDM project, Guanting Project (i.e. Beijing 48 MW Guanting Wind Power Project, ref. no. 1749), CNY 0.75 /kWh (VAT included), which is the highest tariff for wind power projects in Beijing and much higher than the highest tariff, CNY 0.65/kWh(stipulated by Information note on the highest tariffs applied by the executive board on its decisions on registrations on registration of projects in the People's Republic of China (Version 01) in Hebei Province. So, it is minor possible that the tariff would be increased by 22.70%.

Step 3. Barrier analysis

Since Step 2 has fully demonstrated the additionality of the Project, step 3 did not be applied.

Step 4. Common practice analysis

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

First of all, qualify other projects similar to the Project as follows:

1) As wind power technology will be applied by the Project, other similar projects should fall into this type.

2) As the Project is located in Beijing City and Hebei Province, define the boundary of common practice analysis as the areas where Beijing City and Hebei Province covered.

3) As China power system made Market-oriented reforms[13] and initially established commercial electricity Market in Apr 2002, China power system had a fundamental change. So only analysis projects which put into operation after Apr 2002 in the PDD.

4) As the installed capacity of the Project is more than 15MW(the threshold of small renewable CDM project), therefore wind power plants with the installed capacity equal to or less than 15MW are excluded from the common practice analysis

According to the List of Installed Capacity of China's Wind Power Plant[14] prepared by Professor Shi Pengfei, who works at the China Wind Energy Association, and China DNA official CDM website (http://cdm.ccchina.gov.cn), other projects similar to the Project defined by the above five conditions within the region where Beijing City and Hebei Province covered are as follows:

Table 9. Wind power projects similar to the Project within the region where Beijing City and Hebei Province covered

Project	Launch of operation	Region	Installed capacity (MW)	Project ID
Chengde Hongsong Windfarm Project	09/2004	Hebei Province	51.3	VCS61
Shangyi Manjing Windfarm Project	01/09/2005	Hebei Province	34.5	135

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

Chengde Hongsong Windfarm Project[15] and Shangyi Manjing Windfarm Project[16] have been successfully registered for VCS VER projects. *Tool for the Demonstration and Assessment of Additionality* was used to demonstrate the additionality of both projects. It is must be noted that the investment analysis and 8% of benchmark IRR was applied by both projects. The project IRR of Chengde Hongsong Windfarm Project is 6.9% without VCU revenue and the project IRR of Shangyi Manjing Windfarm Project is 6.3% without VCU revenue, so, both projects are not financially attractive and need the support of carbon finance instrument. Thus, both projects can be considered as additional and can be excluded from common practice.

In conclusion, the wind power projects similar with the Project without carbon finance instrument are not the common practice in Beijing City and Hebei Province and will not affect the additionality of the Project.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

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This section includes the following parts:
·Calculate the baseline GHG emissions;
·Calculate the project GHG emissions;

[13] http://www.ndrc.gov.cn/xwfb/t20050708_28096.htm
[14] Shi Pengfei, Statistics on the Installed Capacity of Wind Power Plant in China (2005,2006,2007)
[15] https://vcsregistry1.apx.com/mymodule/ProjectDoc/EditProjectDoc.asp?id1=61
[16] https://vcsprojectdatabase1.apx.com/mymodule/ProjectDoc/EditProjectDoc.asp?id1=135

·Calculate the project leakage;
·Calculate the emission reductions.

I. Calculate baseline GHG emissions

1. Calculate the baseline emission factor

As per the methodology ACM0002, *Tool to calculate the emission factor for an electricity system* (Version 02) is applied to calculate the baseline emission factor.

According to the methodological tool, the baseline emission factor is calculated in the following seven steps:

STEP 1. Identify the relevant electricity systems

The electricity generated by the Project will be supplied to the NCPG, in the absence of the project activity, the installed capacity of the NCPG for both the existing power plants and the power plants to be built in a foreseeable future would supply electricity comparable to that supplied by the Project.,as per *2009 Baseline Emission Factors for Regional Power Grids in China* published by China DNA on July 2, 2009, the NCPG includes provincial grid spatial extent of Beijing Power Grid, Tianjin Power Grid, Hebei Power Grid, Shanxi Power Grid, Shandong Power Grid, and Inner Mongolia Power Grid.

The NCPG has imported electricity from the Northeast China Power Grid(NECG) and the Central China Power Grid(CCG), as per the methodological tool, referred to *2009 Baseline Emission Factors for Regional Power Grids in China*, option (c), the simple operating margin emission factor of the grid the electricity exported from and calculated *as described in step 3* (a): was selected to determine the CO_2 emission factor for net electricity imports ($EF_{grid,import,y}$) from the Northeast China Power Grid and the Central China Power Grid .

So NCPG is the connected power grid of the Project, and NEPG and CCPG are the power grids which NCPG is connected to.

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.
The Option I was selected for the Project.

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

The "Tool to calculate the emission factor for an electricity system" (Version 02) offers four options for the calculation of the Operating Margin emission factor(s) ($EF_{grid,OM,y}$). Low-cost/must run resources[17]

[17] 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,

constitute less than 50%[18] of total amount of grid generating output from 2003 to 2007 in the NCPG, referred to *2009 Baseline Emission Factors for Regional Power Grids in China* issued by China DNA on July 2, 2009, Method (a) Simple OM emission factor was selected. According to the methodological tool, Ex-ante Margin (OM) emission factor was selected. According to the methodological tool, following data vintages was selected:

Ex ante option: A 3-year generation weighted average, based on the most recent data available at the time of submission of the CDM-PDD for validation, without requirement to monitor and recalculate the emissions factor during the crediting period.

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 CO_2 emissions per unit net electricity generation (tCO_2e/MWh) of all generating power plants serving the NCPG, not including low-cost/must-run power/units. The "Tool to calculate the emission factor for an electricity system" (Version 02) offers two options for the calculating of the Simple OM.

- Option A: Based on the net electricity generation and a CO_2 emission factor of each power unit, or
- Option B: Based on the total net electricity generation of all power plants serving the system and the fuel types and total fuel consumption of the project electricity system.

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 2).

Option A should be preferred and must be used if fuel consumption data is available for each power plant/unit. As the fuel consumption data for each power plant/unit is not available in China, Option A is not reasonable. While total net electricity generation of all power plants serving the NCPG and the fuel types and total fuel consumption of the NCPG are available from *China Electric Power Yearbook* and *China Energy Statistical Yearbook, and* satisfy that
(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 2).

So, the Project uses Option B for calculating the simple OM emission factor as follows:

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

Where

$EF_{grid,OMsimple,y}$ Simple operating margin CO_2 emission factor in year *y* (tCO_2e/MWh);

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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.

[18] 0.862%, 0.708%, 0.749%, 0.745% and 0.78% from 2003 to 2007 respectively.

$FC_{i,y}$ Amount of fossil fuel type *i* consumed in the NCPG 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_2e/TJ);
EG_y Net electricity generated and delivered to the grid by all power sources serving the NCPG, not including low-cost/must-run power plants/units, in year *y* (MWh);
i All fossil fuel types combusted in power sources in the NCPG in year y;
y the three most recent years, as per the data vintage chosen in Step 3, for which data is available at the time of submission of the CDM-PDD to the DOE for validation (ex ante option) because the Project is a windpower project.
Here:

$$EG_y = GEN_y \times (1 - AER_y) \qquad (2)$$

Where:
GEN_y Electricity generated by all power sources serving the NCPG, not including low-cost/must-run power plants/units, in year *y* (MWh);
AER_y The average auxiliary electricity consumption rate(%) of all power sources serving the NCPG, not including low-cost/must-run power plants/units, in year y.

Referred to *2009 Baseline Emission Factors for Regional Power Grids in China*, the Simple operating Margin CO_2 emission factor ($EF_{grid,OMsimple,y}$) of the NCPG is 1.0069 tCO_2e/MWh (see Annex 3 for details).

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

According to the methodological tool, the sample group of power units *m* included in the build Margin consists of either:
a) The set of five power units that have been built most recently, or
b) The set of power capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently[19]

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

As per the methodological tool, if group of power units, not registered as CDM project activity, identified for estimating the build Margin emission factor do not include power unit(s) that is(are) built more than 10 years ago, power plant registered as CDM project activities should be excluded from the sample group *m*.

In terms of vintage of data, project participants choose Option 1:

[19] If 20% falls on part capacity of a plant, that plant is fully included in the calculation

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.

In china it is difficult to get the data of five power plants that have been put into operation most recently or the newly built power plant capacity additions in the electricity system(in MWh) that comprise 20% of the system generation. In allusion to the situation, CDM EB accepts the following deviation[20] in application of methodology.
1) Use of capacity additions during the last 1~3 years for estimating the build Margin emission factor for grid electricity.
2) Use of weights estimated using installed capacity in place of annual electricity generation.

And it is suggested to use the efficiency level of the best technology commercially available in the provincial/regional or national grid of China, as a conservative proxy.

STEP 6. Calculate the build Margin emission factor

The build Margin emissions factor is the generation-weighted average emission factor (tCO_2e/MWh) of all power units *m* during the most recent year *y* for which power generation data is available, calculated as follows:

$$EF_{grid,BM,y} = \frac{\sum_m EG_{m,y} \times EF_{EL,m,y}}{\sum_m EG_{m,y}} \quad (3)$$

Where

$EF_{grid,BM,y}$ Build Margin CO_2 emission factor in year y (tCO_2e/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_2e /MWh);

m Power units included in the build Margin;

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

As per the methodology deviation, China DNA published the BM calculation method as follow:

Because current statistics data can’t separate installed capacity of coal, oil and gas fueled power generation, the method adopted for BM calculation as follow:

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[20] See “Request for guidance: Application of AM0005 and AMS-I.D in China”, refer to http://cdm.unfccc.int/UserManagement/FileStorage/6POIAMGYOEDOTKW25TA20EHEKPR4DM.

firstly make use of the latest energy balance data to calculate all sorts of emission scale in total emission from coal, oil and gas fueled power generation; then based on the emission factor under the business best technology, calculated the fueled power emission factor of the grid; last multiply the fuelled power emission factor and fuelled power proportion of the total power, it's the BM of the grid.

Detailed step and formula as follow:

Sub-step 1. Calculation of the share of CO_2 emissions from solid, liquid and gaseous fuels

$$\lambda_{Coal,y} = \frac{\sum\limits_{i \in COAL,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO2,i,j,y}}{\sum\limits_{i,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO2,i,j,y}} \quad (4)$$

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

$$\lambda_{Gas,y} = \frac{\sum\limits_{i \in GAS,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO2,i,j,y}}{\sum\limits_{i,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO2,i,j,y}} \quad (6)$$

Where

$F_{i,j,y}$ The consumption of fuel i in province j in year y (unit of mass or volume);

Coal, Oil and Gas is the foot-index for solid fuels, liquid fuels and gas fuels.

Sub-step 2. Calculation of the emission factor of thermal power

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

$EF_{Coal,Adv,y}$, $EF_{Oil,Adv,y}$ and $EF_{Gas,Adv,y}$ are emission factors of the best efficiency commercial available coal-fired, oil-fired and gas-fired generation technologies.

Sub-step 3. Calculation of the BM in the Grid

$$EF_{grid,BM,y} = \frac{\Delta CAP_{Thermal}}{\Delta CAP_{Total}} \times EF_{Thermal,y} = \frac{CAP_{Thermal,y} - CAP_{Thermal,y-N}}{CAP_{Total,y} - CAP_{Thermal,y-N}} \times EF_{Thermal,y} \quad (8)$$

$CAP_{Total,y}$ The total installed capacity(MW) in the NCPG in year y, $CAP_{Thermal,y}$ The total installed capacity(MW) of thermal power in the NCPG in year y. N is the shortest vintage that the added installed capacity nearest to 20% of total installed capacity in the NCPG.

The requiring data on calculation of the Build Margin Emission Factor ($EF_{grid,BM,y}$), fuel consumption of the electricity generation and lower calorific value of generation fuel are available from *China Electric Power Yearbook.*

The data on emission Factor *and oxidation rate of Fuel classified* by species of fuel are available from“2006 IPCC Guidelines for National Greenhouse Gas Inventories” Volume 2 Energy.

Based on 2009 Baseline Emission Factors for Regional Power Grids in China, the Build Margin Emission Factor ($EF_{grid,BM,y}$) of the NCPG could be obtained to be: 0.7802tCO_2e/MWh(see Annex 3 for details)

STEP 7. Calculate the combined Margin(CM) emissions factor

The CM emissions factor is calculated as follows:

$$EF_{grid,CM,y} = EF_{grid,OM,y} \times W_{OM} + EF_{grid,BM,y} \times W_{BM} \tag{9}$$

Where

$EF_{grid,CM,y}$ CM CO_2 emission factor in year y (tCO_2e/MWh);

W_{OM} Weighting of operating Margin emissions factor;

W_{BM} Weighting of build Margin emissions factor.

2. Calculate baseline GHG emissions

Baseline emissions include only CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity. ACM0002 assumes that all project electricity generation above baseline levels would have been generated by existing grid-connected power plants and the addition of new grid-connected power plants. The baseline emissions are to be calculated as follows:

$$BE_y = EG_{PJ,y} \times EF_{grid,CM,y} \tag{10}$$

Where

BE_y Baseline emission in year y (tCO_2e/y);

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

The project activity is the installation of a new grid-connected renewable power plant at a site where no renewable power plant was operated prior to the implementation of the project activity, then:

$$EG_{PJ,y} = EG_{facility,y} \tag{11}$$

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

so

$$BE_y = EG_{facility,y} \times EF_{grid,CM,y} \tag{12}$$

Where

$$EG_{facility,y} = EG_{PJtoGrid,y} - EG_{GridtoPJ,y} \tag{13}$$

So

$$BE_y = (EG_{PJtoGrid,y} - EG_{GridtoPJ,y}) \times EF_{grid,CM,y} \tag{14}$$

Where

$EG_{PJtoGrid,y}$ Electricity supplied to the grid by the Project in year y (MWh);

$EG_{GridtoPJ,y}$ Electricity consumed by the Project bought from the grid in year y (MWh).

II. Calculate the project GHG emissions

The Project is a wind power plant, and according to the methodology ACM0002 the project emissions should not be considered, $PE_y = 0$ tCO_2e.

III. Calculate Leakage GHG emissions

As per the methodology ACM0002, no leakage needs to be considered in the Project, $LE_y = 0$ tCO_2e.

IV. Calculate the emission reductions

The Project activity will generate GHG emission reductions by avoiding CO_2 emissions from electricity generation by displacing fossil fuel power plants. The emission reduction (ER_y) during a given year y is calculated as follows:

$$ER_y = BE_y - PE_y \tag{15}$$

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

Data / Parameter:	$FC_{i,y}$
Data unit:	mass or volume unit
Description:	Amount of fossil fuel type *i* consumed in the NCG in year y.
Source of data used:	*China Energy Statistical Yearbooks,2006-2008*
Value applied:	see Annex 3 for details
Justification of the choice of data or description of measurement methods and procedures actually applied :	The data obtained from the official publication *China Energy Statistical Yearbook*, satisfying the requirement of latest version of Tool to calculate the emission factor for an electricity system.
Any comment:	The three most recent years for which data is available at the time of submission of the CDM-PDD to the DOE for validation

Data / Parameter:	NCV_i
Data unit:	GJ/mass or volume unit

Description:	Net calorific value (energy content) of fossil fuel type i in year y.
Source of data used:	*China Energy Statistical Yearbook, 2006-2008*
Value applied:	see Annex 3 for details
Justification of the choice of data or description of measurement methods and procedures actually applied :	The data obtained from the official publication *China Energy Statistical Yearbook,* satisfying the requirement of latest version of Tool to calculate the emission factor for an electricity system.
Any comment:	-

Data / Parameter:	$EF_{CO2,i,y}$
Data unit:	tCO_2e/GJ
Description:	CO_2 emission factor of fossil fuel type *i* in year y.
Source of data used:	*2006 IPCC Guideline for National Greenhouse Gas Inventories, Volume 2 Energy, table2.2-table 2.5*
Value applied:	see Annex 3 for details
Justification of the choice of data or description of measurement methods and procedures actually applied :	Regional or national average default values are unavailable, so IPCC default values are used, satisfying the requirement of latest version of Tool to calculate the emission factor for an electricity system.
Any comment:	-

Data / Parameter:	GEN_y
Data unit:	MWh
Description:	Electricity generated by all power sources serving the North China Grid, Northeast China Power Grid and Central China Power Grid, in year *y*, not including low-cost/must-run power plants/units.
Source of data used:	*China Electric Power Yearbook, 2006-2008*
Value applied:	see Annex 3 for details
Justification of the choice of data or description of measurement methods and procedures actually applied :	The data obtained from the official publication *China Electric Power Yearbook,* satisfying the requirement of latest version of Tool to calculate the emission factor for an electricity system.
Any comment:	The three most recent years for which data is available at the time of submission of the CDM-PDD to the DOE for validation

Data / Parameter:	AER_y
Data unit:	%
Description:	The auxiliary electricity consumption rate of all power sources serving the North China Grid, the Northeast China Power Grid and the Central China Power Grid.
Source of data used:	*China Electric Power Yearbook, 2006-2008*
Value applied:	see Annex 3 for details

Justification of the choice of data or description of measurement methods and procedures actually applied :	The data obtained from the official publication *China Electric Power Yearbook*, satisfying the requirement of latest version of Tool to calculate the emission factor for an electricity system.
Any comment:	The three most recent years for which data is available at the time of submission of the CDM-PDD to the DOE for validation

Data / Parameter:	$F_{i,j,y}$
Data unit:	mass or volume unit
Description:	The consumption of fuel i in province j in year y.
Source of data used:	*China Energy Statistical Yearbook, 2006-2008*
Value applied:	see Annex 3 for details
Justification of the choice of data or description of measurement methods and procedures actually applied :	The data obtained from the official publication *China Energy Statistical Yearbook*, satisfying the requirement of latest version of Tool to calculate the emission factor for an electricity system.
Any comment:	

Data / Parameter:	$Eff_{Coal,Adv,y}$
Data unit:	%
Description:	Electricity supply efficiency of the best efficiency commercial coal-fired generation technology.
Source of data used:	*2009 Baseline Emission Factors for Regional Power Grids in China* published by China DNA
Value applied:	38.10
Justification of the choice of data or description of measurement methods and procedures actually applied :	The data obtained from the China DNA, satisfying the requirement of latest version of Tool to calculate the emission factor for an electricity system.
Any comment:	-

Data / Parameter:	$Eff_{Oil,Adv,y}$
Data unit:	%
Description:	Electricity supply efficiency of the best efficiency commercial oil-fired generation technology.
Source of data used:	*2009 Baseline Emission Factors for Regional Power Grids in China* published by China DNA
Value applied:	49.99
Justification of the choice of data or description of measurement methods	The data obtained from the China DNA, satisfying the requirement of latest version of Tool to calculate the emission factor for an electricity system.

and procedures actually applied :	
Any comment:	-

Data / Parameter:	$Eff_{Gas,Adv,y}$
Data unit:	%
Description:	Electricity supply efficiency of the best efficiency commercial gas-fired generation technology.
Source of data used:	*2009 Baseline Emission Factors for Regional Power Grids in China* published by China DNA
Value applied:	*49.99*
Justification of the choice of data or description of measurement methods and procedures actually applied :	The data obtained from the China DNA, satisfying the requirement of latest version of Tool to calculate the emission factor for an electricity system.
Any comment:	-

Data / Parameter:	$CAP_{Total,y}$
Data unit:	MW
Description:	The total installed capacity in the North China Grid in year y
Source of data used:	*China Electric Power Yearbook, 2006-2008*
Value applied:	see Annex 3 for details
Justification of the choice of data or description of measurement methods and procedures actually applied :	The data obtained from the official publication *China Electric Power Yearbook,* satisfying the requirement of latest version of Tool to calculate the emission factor for an electricity system.
Any comment:	For calculating the added capacity comprised 20% of the NCPG.

Data / Parameter:	$CAP_{Thermal,y}$
Data unit:	MW
Description:	The total installed capacity of thermal power in the North China Grid in year y
Source of data used:	*China Electric Power Yearbook, 2006-2008*
Value applied:	see Annex 3 for details
Justification of the choice of data or description of measurement methods and procedures actually applied :	The data obtained from the official publication *China Electric Power Yearbook,* satisfying the requirement of latest version of Tool to calculate the emission factor for an electricity system.
Any comment:	-

B.6.3 Ex-ante calculation of emission reductions:

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I. Calculate the baseline GHG emissions

1. Calculate the baseline emission factor

According to the methodological tool, the W_{OM} and the W_{BM} take 0.75 and 0.25 respectively as default in the first crediting period. Therefore the combined baseline emission factor:

$$EF_{grid,CM,y} = 1.0069 \times 0.75 + 0.7802 \times 0.25 = 0.950225 \text{tCO}_2\text{e/MWh}$$

2. Calculate baseline GHG emissions

Annual baseline emission of the Project is:

Project	Feed-in electricity	Emission factor	Baseline emission
Unit	MWh	MWh/tCO_2e	tCO_2e
	(1)	(2)	(3)=(1)×(2)
The Guanting Phase II	92,784	0.950225	88,166
The Phase II addition	68,335	0.950225	64,934
Total	161,119	0.950225	153,099

II. Estimate project activity emissions:

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

III. Estimate project leakage emissions:

As per the methodology ACM0002, no leakage needs to be considered in the Project, $LE_y = 0$ tCO_2e.

IV. Estimate emission reductions

As per formula in section B.6.1, the annual emission reductions of the Project are 153,099 tCO_2e.

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

It is expected that the project activities will generate emission reductions for about 153,099 tCO_2e per year over the first 7-year renewable crediting period from March, 2011 to February, 2018.

Year	Estimation of project activity emissions (tonnes of CO_2e)	Estimation of baseline emissions (tonnes of CO_2e)	Estimation of leakage (tonnes of CO_2e)	Estimation of overall emission reductions (tonnes of CO_2e)
01/03/2011-29/02/2012	0	153,099	0	153,099
01/03/2012-28/02/2013	0	153,099	0	153,099
01/03/2013-28/02/2014	0	153,099	0	153,099
01/03/2014-28/02/2015	0	153,099	0	153,099
01/03/2015-29/02/2016	0	153,099	0	153,099
01/03/2016-28/02/2017	0	153,099	0	153,099

01/03/2017-28/02/2018	0	153,099	0	153,099
Total (tCO_2e)	0	**1,071,695**	0	**1,071,695**

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

B.7.1 Data and parameters monitored:

The Project adopts the ex-ante calculation of emission factor of the grid, so only the electricity supplied to the grid generated by the Project and the electricity consumed by the Project from the grid need be monitored during the crediting period.

Because the Project will share gateway meters with Yanqing Project and Guanting Project, the project owner will install two electricity meters (one main and one backup)for each line in order to separate the feed-in electricity and the electricity supplied by the NCPG to each project, as shown in Figure 5.

Data and parameters monitored include:

Data / Parameter:	$EG_{Line1totrans,y}$
Data unit:	MWh
Description:	Electricity supplied by line 1 of the Project in year y.
Source of data to be used:	The value in the PDD is 1/3 of feed-in electricity in the FSR of the Guanting Phase II Project, the real value will be measured by the electricity meters M9/M9’
Value of data applied for the purpose of calculating expected emission reductions in section B.5	30,928 =(92,784/3)
Description of measurement methods and procedures to be applied:	Directly measured by electricity meters with precision no lower than 0.5s installed at the line 1. The recording frequency will be continuously measured and monthly recorded and aggregated. The proportion of data to be monitored is 100% and the data will be archived electronically and kept during the crediting period and 2 years after. The electricity meters are calibrated as stated in B.7.2.
QA/QC procedures to be applied:	Cross check by readings from the electricity meter M9 and the electricity meter M9’.
Any comment:	

Data / Parameter:	$EG_{Line2totrans,y}$
Data unit:	MWh
Description:	Electricity supplied by line 2 of the Project in year y.
Source of data to be used:	The value in the PDD is 1/3 of feed-in electricity in the FSR of the Guanting Phase II Project, the real value will be measured by the electricity meters M10/M10’
Value of data applied for the purpose of calculating expected emission reductions in section B.5	30,928 =(92,784/3)
Description of	Directly measured by electricity meters with precision no lower than 0.5s

measurement methods and procedures to be applied:	installed at the line 2. The recording frequency will be continuously measured and monthly recorded and aggregated. The proportion of data to be monitored is 100% and the data will be archived electronically and kept during the crediting period and 2 years after. The electricity meters are calibrated as stated in B.7.2.
QA/QC procedures to be applied:	Cross check by readings from the electricity meter M10 and the electricity meter M10'.
Any comment:	

Data / Parameter:	$EG_{Line3totrans,y}$
Data unit:	MWh
Description:	Electricity supplied by line 3 of the Project in year y.
Source of data to be used:	The value in the PDD is 1/3 of feed-in electricity in the FSR of the Guanting Phase II, the real value will be measured by the electricity meters M11/M11'
Value of data applied for the purpose of calculating expected emission reductions in section B.5	30,928 =(92,784/3)
Description of measurement methods and procedures to be applied:	Directly measured by electricity meters with precision no lower than 0.5s installed at the line 3. The recording frequency will be continuously measured and monthly recorded and aggregated. The proportion of data to be monitored is 100% and the data will be archived electronically and kept during the crediting period and 2 years after. The electricity meters are calibrated as stated in B.7.2.
QA/QC procedures to be applied:	Cross check by readings from the electricity meter M11 and the electricity meter M11'.
Any comment:	

Data / Parameter:	$EG_{Line4totrans,y}$
Data unit:	MWh
Description:	Electricity supplied by line 4 of the Project in year y.
Source of data to be used:	The value in the PDD is 1/2 of feed-in electricity in the FSR of the Phase II addition, the real value will be measured by the electricity meters M12/M12'
Value of data applied for the purpose of calculating expected emission reductions in section B.5	34,167.5 =(68,335/2)
Description of measurement methods and procedures to be applied:	Directly measured by electricity meters with precision no lower than 0.5s installed at the line 4. The recording frequency will be continuously measured and monthly recorded and aggregated. The proportion of data to be monitored is 100% and the data will be archived electronically and kept during the crediting period and 2 years after. The electricity meters are calibrated as stated in B.7.2.
QA/QC procedures to be applied:	Cross check by readings from the electricity meter M12 and the electricity meter M12'.
Any comment:	

Data / Parameter:	$EG_{Line5totrans,y}$
Data unit:	MWh
Description:	Electricity supplied by line 5 of the Project in year y.
Source of data to be used:	The value in the PDD is 1/2 of feed-in electricity in the FSR of the Phase II addition, the real value will be measured by the electricity meters M13/M13’
Value of data applied for the purpose of calculating expected emission reductions in section B.5	34,167.5 =(68,335/2)
Description of measurement methods and procedures to be applied:	Directly measured by electricity meters with precision no lower than 0.5s installed at the line 5. The recording frequency will be continuously measured and monthly recorded and aggregated. The proportion of data to be monitored is 100% and the data will be archived electronically and kept during the crediting period and 2 years after. The electricity meters are calibrated as stated in B.7.2.
QA/QC procedures to be applied:	Cross check by readings from the electricity meter M13 and the electricity meter M13’.
Any comment:	

Data / Parameter:	$EG_{Yanqingtotrans,y}$
Data unit:	MWh
Description:	Electricity supplied by Yanqing Project in year y.
Source of data to be used:	The value in the PDD is to be determined, the real value will be measured by the electricity meters M14/M14’
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Actual measurement records
Description of measurement methods and procedures to be applied:	Directly measured by electricity meters with precision no lower than 0.5s installed at the line 6. The recording frequency will be continuously measured and monthly recorded and aggregated. The proportion of data to be monitored is 100% and the data will be archived electronically and kept during the crediting period and 2 years after. The electricity meters are calibrated as stated in B.7.2.
QA/QC procedures to be applied:	Cross check by readings from the electricity meter M14 and the electricity meter M14’.
Any comment:	

Data / Parameter:	$EG_{Guanting totrans,y}$
Data unit:	MWh
Description:	Electricity supplied by Guanting Project in year y.
Source of data to be used:	The value in the PDD is to be determined, the real value will be measured by the electricity meters M5/M6
Value of data applied for the purpose of calculating expected emission reductions in section B.5	Actual measurement records

Description of measurement methods and procedures to be applied:	Directly measured by electricity meters with precision 0.2s installed at the outlet of No. 1 main transformer. The recording frequency will be continuously measured and monthly recorded and aggregated. The proportion of data to be monitored is 100% and the data will be archived electronically and kept during the crediting period and 2 years after. The electricity meters are calibrated as stated in B.7.2.
QA/QC procedures to be applied:	Cross check by readings from the electricity meter M5 and the electricity meter M6.
Any comment:	

Data / Parameter:	$EG_{PJ+Yqtotrans,y}$
Data unit:	MWh
Description:	Electricity supplied by the Project and the Yanqing Project in year y.
Source of data to be used:	The value of the Project in the PDD is from the FSR of Guanting Phase II and Phase II addition, the value of Yanqing Project is to be determined, the real value will be measured by the electricity meters M7/M8
Value of data applied for the purpose of calculating expected emission reductions in section B.5	161,119(the Project)+ Actual measurement records (Yanqing Project)
Description of measurement methods and procedures to be applied:	Directly measured by meters installed at the outlet of No.2 main transformer with 0.2s of precision. The recording frequency will be continuously measured and monthly recorded and aggregated. The proportion of data to be monitored is 100% and the data will be archived electronically and kept during the crediting period and 2 years after. Double check by receipt of sales. The meters are calibrated as stated in B.7.2.
QA/QC procedures to be applied:	Cross check by readings from the electricity meter M7 and the electricity meter M8.
Any comment:	

Data / Parameter:	$EG_{totaltoGrid,y}$
Data unit:	MWh
Description:	Electricity supplied to the grid by the Project and other projects in year y.
Source of data to be used:	The value of the Project in the PDD is from the FSR of Guanting Phase II and Phase II addition, the value of Yanqing Project and Guanting Project is to be determined, the real value will be measured by meter M1/M3
Value of data applied for the purpose of calculating expected emission reductions in section B.5	161,119(the Project)+ Actual measurement records (Yanqing Project)+ Actual measurement records(Guanting Project)
Description of measurement methods and procedures to be applied:	Directly measured by gateway meters with 0.2s of precision. The recording frequency will be continuously measured and monthly recorded and aggregated. The proportion of data to be monitored is 100% and the data will be archived electronically and kept during the crediting period and 2 years after. Double check by receipt of sales. The meters are calibrated as stated in B.7.2.
QA/QC procedures to be applied:	Double check by electricity transaction notes and the sum of $EG_{Guantingtotrans,y}$ and $EG_{PJ+Yqtotrans,y}$.

Any comment:	

Data / Parameter:	$EG_{Gridtototal,y}$
Data unit:	MWh
Description:	Electricity consumed by the Project and other projects from the grid in year y.
Source of data to be used:	The amount of electricity which the grid supply to the Project and other projects in the PDD was assumed as 0, the real value will be measured by gateway meter M2/M4
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:	Directly measured by gateway meters with 0.2s of precision. The recording frequency will be continuously measured and monthly recorded and aggregated. The proportion of data to be monitored is 100% and the data will be archived electronically and kept during the crediting period and 2 years after. Double check by receipt of sales. The meters are calibrated as stated in B.7.2.
QA/QC procedures to be applied:	Double check by electricity transaction notes.
Any comment:	

B.7.2 Description of the monitoring plan:

Since the baseline emission factor of the Project is determined ex-ante, the electricity delivered by the Project to the NCPG and the electricity bought from NCPG by the Project are defined as the key data to be monitored. The monitoring plan is drafted to focus on monitoring the electricity delivered to and bought from the NCPG by the Project. And Guanting Phase II and Phase II addition use the same set of monitoring equipments and plan.

Management Structure

For details regarding the management structure of the monitoring plan, please refer to Figure 4.

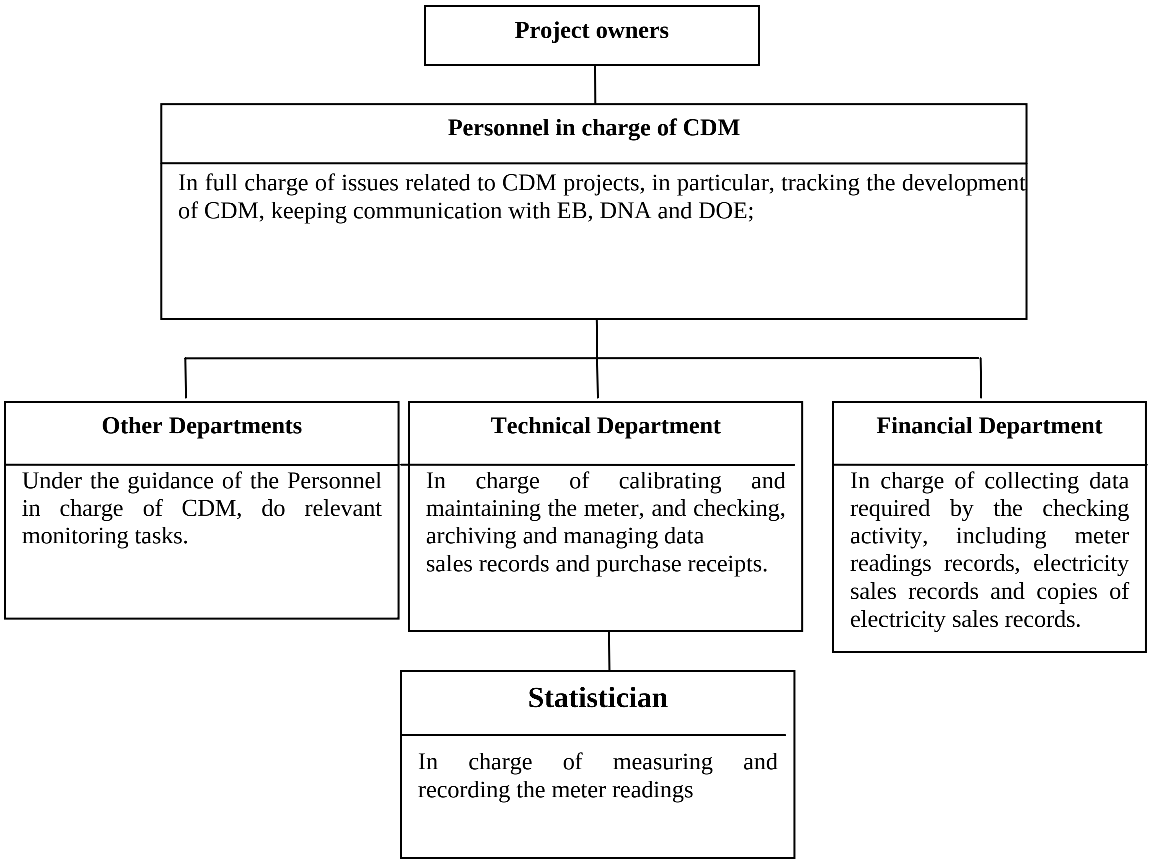


Figure 4. Management Structure of Monitoring Plan

Monitoring Measures

Because the Project shares gateway meters with Yanqing Project and Guanting Project, the total electricity supplied to the grid by the Project, Yanqing Project and Guanting Project ($EG_{totaltoGrid,y}$) and that bought from the grid by the Project, Yanqing Project and Guanting Project ($EG_{Gridtototal,y}$) will be measured by gateway meters M1/M3(for $EG_{totaltoGrid,y}$) and M2/M4(for $EG_{Gridtototal,y}$).

The electricity meters M5/M6 was installed at the outlet of No. 1 main transformer to measure the electricity supply of the Guanting Project. The electricity meters M7/M8 was installed at the outlet of No. 2 main transformer to measure the electricity supply of the Project and the Yanqing Project.

A pair of electricity meters will be installed at each line from line 1 to line 6 respectively to measure the electricity supplied by the Project and Yanqing Project.

The formula (16)-(21) was designed to calculating the electricity supplied to the grid by the Project($EG_{PJtoGrid,y}$).

Because it is impossible to separate the electricity bought from the grid ($EG_{GridtoPJ,y}$) by the Project from total electricity bought from the grid ($EG_{Gridtototal,y}$) by the Project,Yanqing Project and Guanting Project. So, total electricity bought from the grid ($EG_{Gridtototal,y}$) by the Project, Yanqing Project and Guanting Project will be adopted as the electricity bought from the grid ($EG_{GridtoPJ,y}$) by the Project, it is conservative.

If other project(s) share the same gateway electricity meters with the Project in the future, the appropriate meters will also be installed before gateway electricity meters to monitor the electricity delivered by each project(s).

The net feed-in electricity ($EG_{facility,y}$) will be calculated using formula $EG_{facility,y} = EG_{PJtoGrid,y} - EG_{GridtoPJ,y}$.

The gateway meters M1/M3, M2/M4 are owned by the grid company, the other meters are owned by the owner company.

Grid company reads the main meter M1 for total electricity exported by the Project and other project(s), M5 for electricity exported by the Guanting Project to No.1 main transformer, M7 for electricity exported by the Project and Yanqing Project to No.2 main transformer and M2 for total electricity imported by the Project and other project(s) on the appointed day of every month respectively. According to the reading of M1 and M2, grid company invoices respectively. The readings of electricity meters including M1, M2, M5, M7, M9-M14 and backup meters will be continuous measuring and monthly recorded by Project owner. Grid company supplies readings of M1, M5, M7 and M2 in the electricity transaction notes(ETN) to the project owner and provides invoice.

Project owner will provide the records and relevant ETN or invoices to DOE for verification.

Installation of monitoring devices

The electricity meters of the Project will be installed according to the Technical administrative code of electric energy metering (DL/T 448-2000). Before the operation of the Project, the project owner and the local grid company will check and accept those electricity meters as per the Technical Norm.

Calibration of Meters & Metering

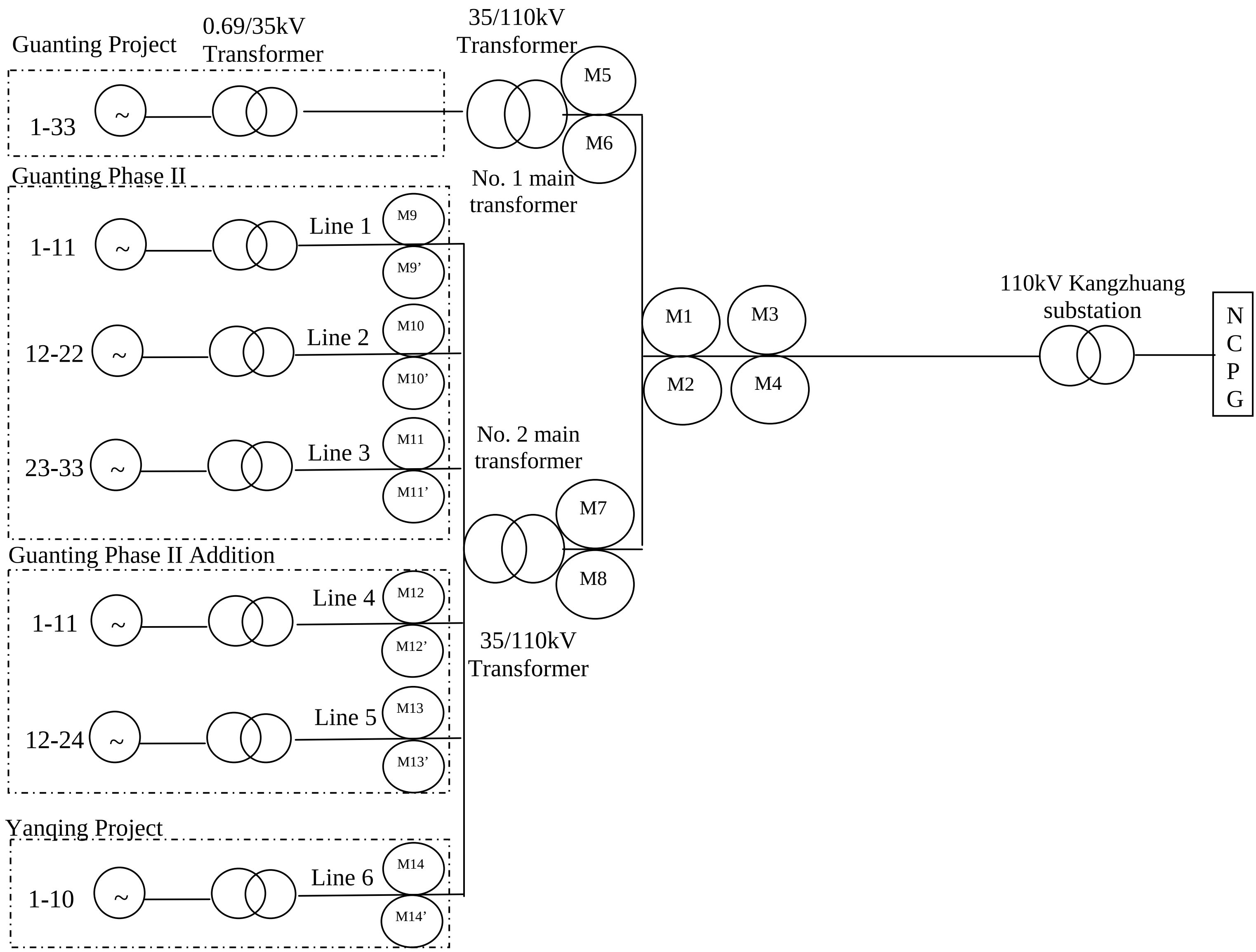
The regular calibration and on-site verification should be implemented as per the Technical administrative code of electric energy metering (DL/T 448-2000) to ensure the precision of electricity meters. Electricity meters should be calibrated every year. After calibration, the electricity meters must be sealed. The calibration and metering should be implemented jointly by the project owner and the local grid company, and any one party cannot unseal or change electricity meter in the absence of the other party. When the measurement error of electricity meter is larger than the permitted error or the electricity meter must be repaired because of its malfunction, the electricity will be determined as per the Power Purchase Agreement signed between the project owner and the local grid company.

Quality Assurance and Quality Control

The quality assurance and quality control procedures for recording, maintaining and archiving data shall be improved as part of this CDM project activity according to CDM EB rules and real practice in terms of the need for verification of the emission reductions on an annual basis according to this PDD. All calibration records and all metering records will be stored by the project owner for DOE verification.

Data Management System

Specific staff will be appointed by the project owner to take the overall responsibility for monitoring GHG emission reductions and keeping all the data collected as part of monitoring archived electronically and kept at least for two years after the end of the last crediting period.



Note: The No. 1 main transformer and the No. 2 main transformer are located at the 110kV substation of Beijing Guanting Wind Farm one by one, and all of meters are located at the Substation.

Meters M5/M6 are installed at the outlet of No. 1 main transformer, meters M7/M8 are installed at the outlet of No. 2 main transformer, meters M1-M4 are installed near to M5-M8. The meters M1-M8 are located at one cabinet(*110kV Line* cabinet). So, the line loss from M5/M6 and M7/M8 to M1-M4 is same and can be omitted.

Those meters M9/M9'-M14/M14' are installed the inlet of the No. 2 main transformer. Those meters M9/M9'-M14/M14' are located at one room. The distance between the room M1-M8 located and the room M9/M9'-M14/M14' located is no more than 30m.

Figure 5. The connection structure and the meter location

Meter No.	M1	M2	M3	M4	M5	M6
Function	Main gateway meter to record the total electricity supplied by the Project and other project(s)	Main gateway meter to record the total electricity bought by the Project and other project(s)	Back up meter of M1.	Back up meter of M2.	Main meter for the Guanting Project	Backup meter of M5
Precision	0.2S	0.2S	0.2S	0.2S	0.2S	0.2S
Monitored parameters	$EG_{totaltoGrid,y}$	$EG_{Gridtototal,y}$	$EG_{totaltoGrid,y}$	$EG_{Gridtototal,y}$	$EG_{Guanting\,totrans,y}$	$EG_{Guanting\,totrans,y}$
Location	The cabinet for gateway meters	The cabinet for gateway meters	The cabinet for gateway meters	The cabinet for gateway meters	Outlet of No. 1 main transformer	Outlet of No. 1 main transformer

Meter No.	M7	M8	M9-M13	M9’-M13’	M14	M14’
Function	Main meter for the Project and Yanqing Project	Backup meter of M7	Main meter of Line 1 to Line 5	Backup meter of M9-M13	Main meter for Yanqing Project	Backup meter of M14
Precision	0.2S	0.2S	no lower than 0.5s	no lower than 0.5s	no lower than 0.5s	no lower than 0.5s
Monitored parameters	$EG_{PJ+Yqtotrans,y}$	$EG_{PJ+Yqtotrans,y}$	$EG_{Line1totrans,y}$ to $EG_{Line5totrans,y}$	$EG_{Line1totrans,y}$ to $EG_{Line5totrans,y}$	$EG_{Yanqingtotrans,y}$	$EG_{Yanqingtotrans,y}$
Location	Outlet of No. 2 main transformer	Outlet of No. 2 main transformer	Line 1 to Line 5	Line 1 to Line 5	Line 6	Line 6

The electricity for the Project will be calculated as follow:

$$EG_{Phase\Pi totrans,y} = EG_{Line1totrans,y} + EG_{Line2totrans,y} + EG_{Line3totrans,y} \quad (16)$$

$$EG_{Phase\Pi adtotrans,y} = EG_{Line4totrans,y} + EG_{Line5totrans,y} \quad (17)$$

$$EG_{PJtotrans,y} = EG_{Phase\Pi totrans,y} + EG_{Phase\Pi adtotrans,y} \quad (18)$$

$$EG_{PJ+Yqtogrid,y} = \frac{EG_{PJ+Yqtotrans,y}}{EG_{PJ+Yqtotrans,y} + EG_{Guantingtotrans,y}} \times EG_{totaltoGrid,y} \quad (19)$$

$$EG_{PJtoGrid,y} = \frac{EG_{PJtotrans,y}}{EG_{PJtotrans,y} + EG_{Yanqingtotrans,y}} \times EG_{PJ+Yqtogrid,y} \quad (20)$$

$EG_{GridtoPJ,y} = EG_{Gridtototal,y}$, for conservativeness. (21)

Where

$EG_{Line1totrans,y}$ is the electricity supply by line 1 of the Guanting Phase II measured by M9/M9’;

$EG_{Line2totrans,y}$ is the electricity supply by line 2 of the Guanting Phase II measured by M10/M10’;

$EG_{Line3totrans,y}$ is the electricity supply by line 3 of the Guanting Phase II measured by M11/M11’;

$EG_{Line4totrans,y}$ is the electricity supply by line 4 of the Phase II addition measured by M12/M12’;

$EG_{Line5totrans,y}$ is the electricity supply by line 5 of the Phase II addition measured by M13/M13’;

$EG_{Yanqingtotrans,y}$ is the electricity supply by line 6 of the Yanqing Project to the No. 2 main transformer measured by M14/M14’;

$EG_{Phase\Pi totrans,y}$ is the electricity supply by the Guanting Phase II to the No. 2 main transformer;

$EG_{Phase\Pi adtotrans,y}$ is the electricity supply by the Phase II addition to the No. 2 main transformer;

$EG_{PJ+Yqtotrans,y}$ is the electricity supply by Guanting Phase II, Phase II addition and Yanqing Project to the No. 2 main transformer measured by M7/M8;

$EG_{Guantingtotrans,y}$ is the electricity supply by Guanting Project to the No. 1 main transformer measured by M5/M6;

$EG_{PJtotrans,y}$ is the electricity supply by the Project to the No. 2 main transformer;

$EG_{PJ+Yqtogrid,y}$ is the electricity supply of the Project and Yanqing Project to the grid;

$EG_{totaltoGrid,y}$ is the total electricity supply of the Project and other projects to the grid measured by M1/M3;

$EG_{Gridtototal,y}$ is total electricity bought by the Project and other projects from the grid measured by M2/M4;

$EG_{PJtoGrid,y}$ is the electricity supply by the Project to grid;

$EG_{GridtoPJ,y}$ is the electricity bought by the Project from grid.

Note: M1/M3 and M2/M4 record the feed-in electricity and the electricity bought from the grid of the Project, Guanting Project and Yanqing Project; M5/M6 record the feed-in electricity from Guanting

Project; M7/ M8 record the feed-in electricity of the Project and Yanqing Project. When main meters are under malfunction, the readings of backup meters will be used.

If other project(s) share the same gateway electricity meters with the Project in the future, the appropriate meters will also be installed before gateway electricity meters to monitoring the electricity delivered by each project(s).

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

>>

The application of the baseline study and monitoring methodology of the Project was completed on 13/01/2011 by Dr. Zheng Zhaoning of Goldchina Consultancy International Co., Ltd.

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The person/entity is not project participant listed in Annex 1.

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:

>>
20/06/2009

The date for signature of wind turbine-generators purchase contract of the Guanting Phase II is June 25, 2009, and the date for signature of basement construction contract is June 20, 2009.

The date for signature of wind turbine-generators purchase contract of the Phase II addition is June 25, 2009, and the date for signature of wind turbine foundation and temporary roads construction contract is Jul, 2009.

So, the starting date of the project activity is determined as June 20, 2009, which is the earliest date for signature of construction contract and equipment purchase contract of the Project.

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

20yrs

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:

>>
01/03/2011 or the date of registration, whichever is later.

C.2.1.2. Length of the first crediting period:

>>
7yrs

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:

>>

On October 17, 2008, the Environmental Protection Agency of Beijing approved the implementation of Guanting Phase II (Document No. JHS[2008]1081).

On May 25, 2009, the Environmental Protection Agency of Beijing approved the implementation of Phase II addition(Document No. JHS[2009]616).

According to the *EIA Report*, the environmental impacts, treatment and effect arising from the Project are analyzed separately for the construction phase and the operation phase. As the environmental impact of the two projects is basically the same, it is not separately described.

Land use

Land within the scope of the Project is the reservoir beach and wasteland land, the construction of the Project does not affect the amount of arable land.

Noise

Construction phase: The running noise of mechanical facilities and the traffic noise are the main sources of noise. As there are no settlements within the range of 500m outside the site，therefore, noises from construction of the Project will not impact the ordinary work and life of the surrounding residents. High-efficiency and low-noise equipments which meet the national standards will be employed by the Project, thus reducing the impact of noise on the construction workers. Noise generated in construction period satisfies the requirements of Noise limits for construction site (GB12523-90).

Operation phase: Noise of environmental background in the region of the Project is around 50dB. Noise value at 160m from the turbine is close to that of environmental background. And there are no environmental protection objectives within the range of 500m outside the site, so the impact from operation of the Project on the atmospheric environment is little.

Dust and exhaust gas

Construction phase: In addition to the small amount of exhaust gas generated by the transportation vehicles and mechanical facilities, impact on the atmospheric environment comes mainly from dust pollution. Construction period of the Project is comparatively short, and the project owner will take measures such as sprinkling and covering the place for piling up sand and stone and so on to control the sources of air pollution.

Operation phase: By means of driving turbines by wind to generate electricity, the Project itself will not generate dust and exhaust gas.

Waste water

Construction phase: During the construction phase, the Project will generated construction wastewater and sewage. The major pollutants in construction wastewater is suspended particulate matter which is harmless, construction wastewater will be recycled after the removal of suspended particulate matter by sedimentation tanks; oily wastewater will be recycled after the completion of separating waste oil, sewage will be discharged after being treated by sewage disposal system, the Project satisfied level I standard of the Integrated Wastewater Discharge Standard (GB8978-1996).

Operation phase: During the operation phase the wastewater mainly from sewage, it will be used for the greening work after being treated by sewage disposal system and Aerobic biological device. As a result of direct-drive turbine, during repair process little water of oil sales will be produced. The Project satisfied level I standard of the Integrated Wastewater Discharge Standard (GB8978-1996).

Solid waste
Construction Phase: For discarded residue resulting from the construction, the earth and stone excavated should be backfilled and reused in order to reduce the volume of discarded residue. Discarded residue must be piled up at designated sites. Engineering measures as well as biological measures will be taken to preserve the earth and bind the sand.

Operation Phase: After the Project is put into operation, electric boilers will be used for heating generation, thus no discarded residue will be generated. There remains only the household garbage which will be collectively disposed in order to eliminate the impact of household garbage on the environment.

Electromagnetic impact
The speed of the turbines of the Project is small and strength of electromagnetic induction is less than 4V/m, so there is no effect on nearby residents.

Ecological impact
The project site is not on the migration route of migratory bird, there is no wild birds given state-level priority protection nearby, and the height of fans installed is lower than that at which migratory birds fly, spatial area of the fans is relatively small, therefore migration or flight of birds will not be impacted.

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

>>
Impacts are not considered significant.

SECTION E. Stakeholders' comments

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

>>

According to the area impacted by the Project, local villagers are identified as the stakeholders of the Project. At the same time, local government is also identified as the stakeholder of the Project.

Given the approach of receiving information from the stakeholders of the Project, The project owner, by means of posting a public notice, invited local villagers interested in the Project to answer the questionnaires of the Project in Aug. of 2009. A total of 41 people received the questionnaires and return them with their responses. Related photographs and questionnaires are available for DOE checking.

The questionnaires mainly focus on the following issues:
·What's the attitude of the stakeholders on the construction and operation of the Project?
·What might be the positive impacts as a result of the implementation of the Project in the view of stakeholders?
·What might be the negative impacts as a result of the implementation of the Project in the view of stakeholders?
·The collection advises proposed by local residents on design, construction and operation of the project.

E.2. Summary of the comments received:

>>

Totally 41 questionnaires returned out of 41 with 100% response rate. The basic structure of the respondents is as follows:

·Among the respondents, 26 people are male, and 15 people are female.
·Among the respondents, 3 people are between 21 and 30, 13 people are between 31 and 40, 4 people are between 41 and 50, and 21 people are above the age of 50.
·Among the respondents, 6 people didn't mention the educational or didn't finish the education, 7 people finished the education of primary school, 17 people finished the education of junior high school, and 11 people finished the education of senior high school/technical secondary school.

It can be seen that respondents are representative of the public opinions in terms of their gender, age and educational levels. Therefore, it can be considered that responses to the survey have comprehensively reflected the attitudes towards the Project of the villagers possibly affected by the Project. A summary of the key findings based on 41 returned questionnaires is as follows:

·20 respondents (49%) have a very good understanding of the Project, the rest 21 respondents (51%) understand or know the Project.
·35 respondents (85%) support the construction of the Project, the rest 6 respondents (15%) didn't express their opinions on that.
·respondents consider that positive impacts of the construction of the Project include:
(1) 39 respondents consider reducing air pollution (95%), the rest 2 respondents didn't express their opinions (5%) on that.
(2) 6 respondents consider reducing electricity price (15%), the rest 35 respondents didn't express their opinions (85%) on that.
(3) 23 respondents consider increasing income (56%), the rest 18 respondents didn't express their opinions (44%) on that.

(4) 27 respondents consider increasing employment opportunities (66%), the rest 14 respondents didn't express their opinions (34%) on that.
(5) 15 respondents consider improving living standards (37%), the rest 26 respondents didn't express their opinions (63%) on that.

·respondents consider that negative impacts as a result of the Project construction include:
(1) 10 respondents consider land using during the construction and operation of the Project (24%), the rest 31 respondents didn't express their opinions (76%) on that.
(2) 5 respondents consider noises resulting from the construction and operation of the Project (12%), the rest 36 respondents didn't express their opinions (88%) on that.
(3) 1 respondent considers increased volume of garbage during construction of the Project (2%), the rest 40 respondents didn't express their opinions (98%) on that.

·In generally, 23 respondents consider that the Project has positive impacts, the rest 18 respondents didn't express their opinions on that.

The survey has not received any proposal on design, construction and operation of the Project

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

>>

The survey shows that most of the stakeholders at the project site consider the construction of the Project can have plenty of positive impacts. As to the possible negative impacts generated by the Project, the project owner explained to the respondents as follows:

(1) Land within the scope of the Project is the reservoir beach and wasteland land, the construction of this Project does not affect the amount of arable land.
(2) The project site is far away from the residential area and the noise control measures will be taken to reduce the noises from the wind turbine, thus the life of local villagers will not be impacted.
(3) The waste generated in the construction period will be strictly controlled and managed, therefore no waste will be discharged.

The project owner has given full consideration to the comments and suggestions from stakeholders in the process of project construction. Local residents and government are all very supportive to the implementation of the Project. According to the collected comments received from local stakeholders, it is not necessary to modify the Project.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

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

Annex 3

BASELINE INFORMATION

The following tables summarize the calculation result reasoning from the formula provided in "*Tool to calculate the emission factor for an electricity system*" version 02 The information provided in the table include data, sources of data and calculation process.

These tables source from "2009 Baseline Emission Factors for Regional Power Grids in China" issued by China DNA on July 2, 2009,

Table A1.Thermal Electricity generation of the NCPG

year	2005			2006			2007		
Province	**EG**	**AER**	**EDG**	**EG**	**AER**	**EDG**	**EG**	**AER**	**EDG**
	(MWh)	(%)	(MWh)	(MWh)	(%)	(MWh)	(MWh)	(%)	(MWh)
Beijing	20,880,000	7.73	19,265,976	2,070,500	7.51	19,150,055	22,300,000	7.51	20,625,270
Tianjin	36,993,000	6.63	34,540,364	35,924,000	6.86	33,459,614	39,900,000	6.53	37,294,530
Hebei	134,348,000	6.57	125,521,336	143,888,000	6.63	134,348,226	163,300,000	6.67	152,407,890
Shanxi	128,785,000	7.42	119,229,153	150,250,000	7.45	139,056,375	173,400,000	7.99	159,545,340
Inner Mongolia	92,345,000	7.01	85,871,616	139,593,000	7.58	129,011,851	180,100,000	7.77	166,106,230
Shandong	189,880,000	7.14	176,322,568	230,933,000	7.12	214,480,354	259,100,000	7.23	240,367,070
Total			560,751,013			669,506,473			776,346,330

Data source: China Electric Power Yearbook

EG- Electricity generation, AER- Auxiliary electricity consumption Rate, EDG-Electricity delivered to the grid.

Table A2. Calculation of simple OM emission factor of the NCPG in 2005

Energy	Unit	Beijing	Tianjin	Hebei	Shanxi	Inner Mongolia	Shandong	Total fuel	Emission factor	Oxidation rate	NCV	Emission
									$kgCO_2/TJ$	(%)	$MJ/t,km^3$	tCO_2e
		A	B	C	D	E	F	G=Sum(A:F)	H	I	J	K*
Coal	10^4t	897.75	1,675.2	6,726.5	6,176.45	6,277.23	10,405.4	**32,158.53**	87,300	100	20,908	586,979,486
Cleaned coal	10^4t						42.18	**42.18**	87,300	100	26,344	970,069
Other washed coal	10^4t	6.57		167.45	373.65		108.69	**656.36**	87,300	100	8,363	4,792,018
Coke	10^4t					0.21	0.11	**0.32**	95,700	100	28,435	8,708
Coke oven gas	10^8m^3	0.64	0.75	0.62	21.08	0.39		**23.48**	37,300	100	16,726	1,464,870
Other gas	10^8m^3	16.09	7.86	38.83	9.88	18.37		**91.03**	37,300	100	5,227	1,774,786
oil	10^4t					0.73		**0.73**	71,100	100	41,816	21,704
gasoline	10^4t			0.01				**0.01**	67,500	100	43,070	291
Diesel	10^4t	0.48		3.54		0.12		**4.14**	72,600	100	42,652	128,197
Fuel oil	10^4t	12.25		0.23		0.06		**12.54**	75,500	100	41,816	395,901
LPG	10^4t							**0**	61,600	100	50,179	0
Refinery gas	10^4t			9.02				**9.02**	48,200	100	46,055	200,231
Natural gas	10^8m^3	0.28	0.08		2.76			**3.12**	54,300	100	38,931	659,553
Other oil products	10^4t							**0**	75,500	100	41,816	0
Other coke products	10^4t							**0**	95,700	100	28,435	0
Other energy	10^4t Ce	8.58		32.35	69.31	7.27	118.9	**236.41**	0	0	0	0
											subtotal	597,395,812

Thermal electricity delivered to the NCPG (MWh)	**560,751,013**
Net electricity import from the Northeast China Power Grid to the NCPG (MWh)	**3,929,000**
The simple OM emission factor of the Northeast China Power Grid (tCO_2e/MWh)	**1.16489**
Total emission of the NCPG (tCO_2e)	**601,972,665**
Total electricity delivered to the NCPG (MWh)	**564,680,013**
Simple OM emission factor of the NCPG in 2005 (tCO_2e/MWh)	**1.06604**

* K=G×H×J/100000(mass unit) or K=G×H×J/10000 (volume unit)

Data sources: *China Energy Statistical Yearbook 2006.*
China Energy Statistical Yearbook 2008
2006 IPCC Guideline for National Greenhouse Gas Inventories, Volume 2 Energy

Table A3. Calculation of simple OM emission factor of the NCPG in 2006

Energy	**Unit**	**Beijing**	**Tianjin**	**Hebei**	**Shanxi**	**Inner Mongolia**	**Shandong**	**Total fuel**	**Emission factor**	**Oxidation rate**	**NCV**	**Emission**
									$kgCO_2/TJ$	**(%)**	**$MJ/t,km^3$**	**tCO_2e**
		A	**B**	**C**	**D**	**E**	**F**	**G= sum(A:F)**	**H**	**I**	**J**	**K***
Coal	10^4t	796.63	1,639.2	6,867.99	6,968.9	8,404.1	10,930.7	**35,607.41**	87,300	100	20,908	649,930,803
Cleaned coal	10^4t						39.77	**39.77**	87,300	100	26,344	914,643
Other washed coal	10^4t	6.36		214.13	371.14	61.77	544.6	**1198**	87,300	100	8,363	8,746,477
Moulding coal	10^4t	7.97					27.77	**35.74**	87,300	100	20,908	652,351
Coke	10^4t						3.23	**3.23**	95,700	100	28,435	87,896
Coke oven gas	10^8m^3	0.38	0.63	5.8	22.32	0.64	5.79	**35.56**	37,300	100	16,726	2,218,517
Other gas	10^8m^3	20.66	6.58	69.72	13.79	22.76	7.22	**140.73**	37,300	100	5,227	2,743,772
oil	10^4t					0.74		**0.74**	71,100	100	41,816	22,001
gasoline	10^4t			0.01				**0.01**	67,500	100	43,070	291
Diesel	10^4t	0.21		3.01		0.07	6.32	**9.61**	72,600	100	42,652	297,577
Fuel oil	10^4t	6.38		0.08			4.1	**10.56**	75,500	100	41,816	333,391
LPG	10^4t						0.01	**0.01**	61,600	100	50,179	309
Refinery gas	10^4t			2.43			2.32	**4.75**	48,200	100	46,055	105,443
Natural gas	10^8m^3	3.41	0.73		0.53			**4.67**	54,300	100	38,931	987,216
Other oil products	10^4t						0.28	**0.28**	75,500	100	41,816	8,840
Other coke products	10^4t							**0**	95,700	100	28,435	0

Other energy	10^4t Ce	6.83		47.11	230.76	12.51	132.29	**429.5**	0	0	0	0
											subtotal	667,049,525

Thermal electricity delivered to the NCPG (MWh)	**669,506,473**
Net electricity import from the Northeast China Power Grid to the NCPG (MWh)	**2,618,060**
The simple OM emission factor of the Northeast China Power Grid (tCO_2e/MWh)	**1.14972**
Net electricity import from the Central China Power Grid to the NCPG (MWh)	**497,060**
The simple OM emission factor of the Central China Power Grid (tCO_2e/MWh)	**1.12157**
Total emission of the NCPG (tCO_2e)	**670,617,049**
Total electricity delivered to the NCPG (MWh)	**672,621,593**
Simple OM emission factor of the NCPG in 2006 (tCO_2e/MWh)	**0.99702**

* K=G×H×J/100000(mass unit) or K=G×H×J/10000 (volume unit)

Data sources: China Energy Statistical Yearbook 2007.
China Energy Statistical Yearbook 2008
2006 IPCC Guideline for National Greenhouse Gas Inventories, Volume 2 Energy

Table A4. Calculation of simple OM emission factor of the NCPG in 2007

Energy	Unit	Beijing	Tianjin	Hebei	Shanxi	Inner Mongolia	Shandong	Total fuel	Emission factor	Oxidation rate	NCV	Emission
									$kgCO_2/TJ$	**(%)**	**$MJ/t,km^3$**	**tCO_2e**
		A	**B**	**C**	**D**	**E**	**F**	**G= sum(A:F)**	**H**	**I**	**J**	**K***
Coal	10^4t	816.17	1,753.99	7,716.13	7,510.06	10,434.25	11,884.83	**40,115.43**	87,300	100	20,908	732,214,267
Cleaned coal	10^4t						18.43	**18.43**	87,300	100	26,344	423,859
Other washed coal	10^4t	5.76		156.89	478.81	48.57	756.84	**1,446.87**	87,300	100	8,363	10,563,452
Moulding coal	10^4t	7.93					42.86	**50.79**	87,300	100	20,908	927,054
Coke	10^4t			0.02			4.09	**4.11**	95,700	100	28,435	111,843
Coke oven gas	10^8m^3	0.07	0.72	3.13	25.46	2.58	13.61	**45.57**	37,300	100	16,726	2,843,020
Other gas	10^8m^3	11.8	7.6	88.38	72.8	28.17	29.64	**238.39**	37,300	100	5,227	4,647,821
oil	10^4t							**0**	71,100	100	41,816	0
gasoline	10^4t			0.01				**0.01**	67,500	100	43,070	291
Diesel	10^4t	0.33		2.35		0.62	5.08	**8.38**	72,600	100	42,652	259,490
Fuel oil	10^4t	4.74		0.18			2.35	**7.27**	75,500	100	41,816	229,522
LPG	10^4t							**0**	61,600	100	50,179	0
Refinery gas	10^4t	0.06		2.85			1.65	**4.56**	48,200	100	46,055	101,225
Natural gas	10^8m^3	5.03	0.73		0.54	4.22	0.01	**10.53**	54,300	100	38,931	2,225,993
Other oil products	10^4t	1.72						**1.72**	75,500	100	41,816	54,302
Other coke products	10^4t	4.74						**4.74**	95,700	100	28,435	128,986
Other energy	10^4t Ce	11.94		77.25	360.26	30.75	163.48	**643.68**	0	0	0	0
											subtotal	754,731,124

Thermal electricity delivered to the NCPG (MWh)	**776,346,330**
Net electricity import from the Northeast China Power Grid to the NCPG (MWh)	**1,789,750**
The simple OM emission factor of the Northeast China Power Grid (tCO_2e/MWh)	**1.08186**

Net electricity import from the Central China Power Grid to the NCPG (MWh)	**803,000**
The simple OM emission factor of the Central China Power Grid (tCO_2e/MWh)	**1.10197**
Total emission of the NCPG (tCO_2e)	**757,552,265**
Total electricity delivered to the NCPG (MWh)	**778,939,080**
Simple OM emission factor of the NCPG in 2007 (tCO_2e/MWh)	**0.97254**

* K=G×H×J/100000(mass unit) or K=G×H×J/10000 (volume unit)

Data sources: China Energy Statistical Yearbook 2008
2006 IPCC Guideline for National Greenhouse Gas Inventories, Volume 2 Energy

Calculated with the data provided in Table A1~Table A4, the OM emission factor of the NCPG is calculated as 1.0069 tCO_2e/MWh.
The calculation of average OM emission factor of the Northeast China Power Grid is as follow:

<u>The calculation of simple OM emission factor of the Northeast China Power Grid is as follow:</u>

Table A5. Total electricity generation and total electricity delivered to the Northeast China Power Grid

year	**2005**			**2006**			**2007**		
Province	**EG**	**AER**	**EDG**	**EG**	**AER**	**EDG**	**EG**	**AER**	**EDG**
	(MWh)	(%)	(MWh)	(MWh)	(%)	(MWh)	(MWh)	(%)	(MWh)
Liaoning	83,697,000	7.03	77,813,101	96,282,000	6.62	89,908,132	106,500,000	7	99,045,000
Jilin	35,294,000	6.59	32,968,125	38,576,000	6.78	35,960,547	43,700,000	7.68	40,343,840
Heilongjiang	58,000,000	7.96	53,383,200	62,964,000	7.85	58,021,326	68,400,000	7.67	63,153,720
Total			164,164,426			183,890,005			202,542,560

Data sources: China Electric Power Yearbook 2006-2008

Table A6. Calculation of simple OM emission factor of the Northeast China Power Grid in 2005

Energy	Unit	Liaoning	Jilin	Heilongjiang	Total fuel	Emission factor	Oxidation rate	NCV	Emission
						$kgCO_2/TJ$	(%)	$MJ/t,km^3$	tCO_2e
		A	B	C	D= sum(A:C)	E	F	G	H*
Coal	10^4t	4,305.41	2,446.13	3,383.21	**10,134.75**	87,300	100	20,908	184,986,389
Cleaned coal	10^4t				**0**	87,300	100	26,344	0
Other washed coal	10^4t	524.74	19.26	24.16	**568.16**	87,300	100	8,363	4,148,079
Coke	10^4t				**0**	95,700	100	28,435	0
Coke oven gas	10^8m^3	1.03	3.57	0.68	**5.28**	37,300	100	16,726	329,409
Other gas	10^8m^3	12.62	8.37		**20.99**	37,300	100	5,227	409,236
oil	10^4t	1.16			**1.16**	71,100	100	41,816	34,488
gasoline	10^4t				**0**	67,500	100	43,070	0
Diesel	10^4t	1.18	1.48	0.57	**3.23**	72,600	100	42,652	100,018
Fuel oil	10^4t	9.32	2.46	1.55	**13.33**	75,500	100	41,816	420,842
LPG	10^4t	0.12			**0.12**	61,600	100	50,179	3,709
Refinery gas	10^4t	5.48		1.32	**6.8**	48,200	100	46,055	150,950
Natural gas	10^8m^3		0.84	2.24	**3.08**	54,300	100	38,931	651,098
Other oil Products	10^4t				**0**	75,500	100	41,816	0
Other coke products	10^4t				**0**	95,700	100	28,435	0
Other energy	10^4t Ce	16.18			**16.18**	0	0	0	0
								subtotal	191,234,218
Total electricity delivered to the Northeast China Power Grid (MWh)									164,164,426
average OM emission factor(tCO_2/MWh)									1.16489

*H=D×E×G/100000(Mass Unit) or H=D×E×G/10000 (Volume Unit)

Data sources: China Energy Statistical Yearbook 2006
China Energy Statistical Yearbook 2008

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Table A7. Calculation of simple OM emission factor of the Northeast China Power Grid in 2006

Energy	Unit	Liaoning	Jilin	Heilongjiang	Total fuel	Emission factor	Oxidation rate	NCV	Emission
						$kgCO_2/TJ$	(%)	$MJ/t,km^3$	tCO_2e
		A	B	C	D= sum(A:C)	E	F	G	H*
Coal	10^4t	4,681.99	2,738.24	3,698.29	**11,118.52**	87,300	100	20,908	202,942,832
Cleaned coal	10^4t	0.03			**0.03**	87,300	100	26,344	690
Other washed coal	10^4t	674.74	17.83	96	**788.57**	87,300	100	8,363	5,757,270
Coke	10^4t	3.32			**3.32**	95,700	100	28,435	90,345
Coke oven gas	10^8m^3	2.68	0.16	1.44	**4.28**	37,300	100	16,726	267,021
Other gas	10^8m^3	55.26	1.43		**56.69**	37,300	100	5,227	1,105,268
oil	10^4t	0.49			**0.49**	71,100	100	41,816	14,568
gasoline	10^4t				**0**	67,500	100	43,070	0
Diesel	10^4t	0.75	0.39	0.3	**1.44**	72,600	100	42,652	44,590
Fuel oil	10^4t	11.73	0.45	1.44	**13.62**	75,500	100	41,816	429,998
LPG	10^4t				**0**	61,600	100	50,179	0
Refinery gas	10^4t	8.55		4.27	**12.82**	48,200	100	46,055	284,585
Natural gas	10^8m^3		0.19	2.1	**2.29**	54,300	100	38,931	484,095
Other oil products	10^4t				**0**	75,500	100	41,816	0
Other coke products	10^4t				**0**	95,700	100	28,435	0
Other energy	10^4t Ce	12.16	17.6	82.77	**112.53**	0	0	0	0
								subtotal	211,421,263
Total electricity delivered to the Northeast China Power Grid(MWh)									183,890,005
average OM emission factor(tCO_2/MWh)									1.14972

*H=D×E×G/100000(Mass Unit) or H=D×E×G/10000 (Volume Unit)

Data sources: China Energy Statistical Yearbook 2007
China Energy Statistical Yearbook 2008
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Table A8. Calculation of simple OM emission factor of the Northeast China Power Grid in 2007

Energy	Unit	Liaoning	Jilin	Heilongjiang	Total fuel	Emission factor	Oxidation rate	NCV	Emission
						$kgCO_2/TJ$	(%)	$MJ/t,km^3$	tCO_2e
		A	B	C	D= sum(A:C)	E	F	G	H*
Coal	10^4t	4,869.32	2,873.45	3,736.11	**11478.88**	87,300	100	20,908	209,520,369
Cleaned coal	10^4t				**0**	87,300	100	26,344	0
Other washed coal	10^4t	747.85	16.52	106.81	**871.18**	87,300	100	8,363	6,360,397
Coke	10^4t				**0**	87,300	100	20,908	0
Coke oven gas	10^8m^3	4.99			**4.99**	95,700	100	28,435	135,789
Other gas	10^8m^3	5.53	1.44	1.89	**8.86**	37,300	100	16,726	552,758
Crude oil	10^4t	68.38	9.06		**77.44**	37,300	100	5,227	1,509,825
gasoline	10^4t	0.24			**0.24**	71,100	100	41,816	7,135
Diesel	10^4t				**0**	67,500	100	43,070	0
Fuel oil	10^4t	0.96	0.39	0.47	**1.82**	72,600	100	42,652	56,357
LPG	10^4t	8.43	0.45	1.48	**10.36**	75,500	100	41,816	327,076
Refinery gas	10^4t				**0**	61,600	100	50,179	0
Natural gas	10^8m^3	7.33		1.99	**9.32**	48,200	100	46,055	206,890
Other oil products	10^4t		0.02	2.03	**2.05**	54,300	100	38,931	433,360
Other coke products	10^4t	0.01			**0.01**	75,500	100	41,816	316

Other energy	10^4t Ce	0.46			**0.46**	95,700	100	28,435	12,518
								subtotal	219,122,791
Total electricity delivered to the Northeast China Power Grid(MWh)									202,542,560
Simple OM emission factor(tCO_2/MWh)									1.08186

*H=D×E×G/100000(Mass Unit) or H=D×E×G/10000 (Volume Unit)

Data sources: China Energy Statistical Yearbook 2008
2006 IPCC Guidelines for National Greenhouse Gas Inventories" Volume 2 Energy

The calculation of simple OM emission factor of the Central China Power Grid is as follow:

Table A9. Total electricity generation and total electricity delivered to the Central China Power Grid

year	**2006**			**2007**		
Province	**EG**	**AER**	**EDG**	**EG**	**AER**	**EDG**
	(MWh)	(%)	(MWh)	(MWh)	(%)	(MWh)
Jiangxi	34,449,000	6.17	32,323,497	42,100,000	7.72	38,849,880
Henan	151,235,000	7.06	140,557,809	177,300,000	7.55	163,913,850
Hubei	54,841,000	2.75	53,332,873	60,900,000	6.69	56,825,790
Hunan	46,408,000	4.95	44,110,804	54,200,000	7.18	50,308,440
Chongqing	23,487,000	8.45	21,502,349	28,800,000	9.2	26,150,400
Sichuan	44,193,000	4.51	42,199,896	45,100,000	8.68	41,185,320
Total			334,027,226			377,233,680

Data sources: China Electric Power Yearbook 2007-2008

Table A10. Calculation of simple OM emission factor of the Central China Power Grid in 2006

Energy	**Unit**	**Jiangxi**	**Henan**	**Hubei**	**Hunan**	**Chongqing**	**Sichuan**	**Total fuel**	**Emission factor**	**Oxidation rate**	**NCV**	**Emission**
									$kgCO_2/TJ$	**(%)**	**$MJ/t,km^3$**	**tCO_2e**
		A	**B**	**C**	**D**	**E**	**F**	**G= sum(A:F)**	**H**	**I**	**J**	**K***
Coal	10^4t	1,926.02	8,098.01	3,179.79	2,454.48	1,184.3	3,285.22	**20,127.82**	87,300	100	20,908	367,386,738
Cleaned coal	10^4t					5.79		**5.79**	87,300	100	26,344	133,160
Other washed coal	10^4t	4.51	104.12		8.59	79.21		**196.43**	87,300	100	8,363	1,434,116
Moulding coal	10^4t						0.01	**0.01**	87,300	100	20,908	183
Coke	10^4t		17.23		0.32			**17.55**	95,700	100	28,435	477,576
Coke oven gas	10^8m^3		0.52	1.07	4.24	0.38	0.01	**6.22**	37,300	100	16,726	388,053
Other gas	10^8m^3	12.69	3.95		1.7	4.36	0.01	**22.71**	37,300	100	5,227	442,770
oil	10^4t		0.49					**0.49**	71,100	100	41,816	14,568
gasoline	10^4t		0.01					**0.01**	67,500	100	43,070	291
Diesel	10^4t	0.91	2.23	1.41	1.78	0.96		**7.29**	72,600	100	42,652	225,737
Fuel oil	10^4t	0.51	1.26	1.31	0.8	0.57	3.49	**7.94**	75,500	100	41,816	250,674
LPG	10^4t							**0**	61,600	100	50,179	0
Refinery gas	10^4t	0.86	8.1	1	0.97			**10.93**	48,200	100	46,055	242,630
Natural gas	10^8m^3			0.28		0.16	18.63	**19.07**	54,300	100	38,931	4,031,309
Other oil products	10^4t							**0**	75,500	100	41,816	0
Other coke products	10^4t						0.01	**0.01**	95,700	100	28,435	272
Other energy	10^4t Ce	17.45	37.36	31.55	18.29	29.35		**134**	0	0	0	0
											subtotal	375,028,077
Net electricity import from the Northwest China Power Grid to the Central China Power Grid(MWh)												3,028,950
The Simple OM emission factor of the Northwest China Power Grid(tCO_2e/MWh)												0.99148
Total emission of the Central China Power Grid(tCO_2e)												378,031,221
Total electricity delivered to the NCPG(MWh)												337,056,176

Simple OM emission factor of the Central China Power Grid(tCO_2/MWh)		1.12157

** K=G×H×J/100000 (Mass Unit) or K=G×H×J/10000 (Volume Unit)

Data sources: China Energy Statistical Yearbook 2007
China Energy Statistical Yearbook 2008
2006 IPCC Guidelines for National Greenhouse Gas Inventories" Volume 2 Energy

Table A11. Calculation of simple OM emission factor of the Central China Power Grid in 2007

Energy	**Unit**	**Jiangxi**	**Henan**	**Hubei**	**Hunan**	**Chongqing**	**Sichuan**	**Total fuel**	**Emission factor**	**Oxidation rate**	**NCV**	**Emission**
									$kgCO_2$/TJ	**(%)**	**MJ/t,km^3**	**tCO_2e**
		A	**B**	**C**	**D**	**E**	**F**	**G= sum(A:F)**	**H**	**I**	**J**	**K***
Coal	10^4t	2,200.57	9,357	3,479.81	2,683.81	1,547.7	3,239	**22,507.89**	87,300	100	20,908	410,829,404
Cleaned coal	10^4t		3.07			3.8		**6.87**	87,300	100	26,344	157,998
Other washed coal	10^4t	0.04	87.16		2.06	96.42		**185.68**	87,300	100	8,363	1,355,631
Moulding coal	10^4t						0.01	**0.01**	87,300	100	20,908	183
Coke	10^4t							**0**	95,700	100	28,435	0
Coke oven gas	10^8m^3	0.08	2.61	0.25	0.31	0.91		**4.16**	37,300	100	16,726	259,534
Other gas	10^8m^3	29.17	25.79		24.69		23.98	**103.63**	37,300	100	5,227	2,020,444
oil	10^4t		0.43					**0.43**	71,100	100	41,816	12,784
gasoline	10^4t				0.04	0.01		**0.05**	67,500	100	43,070	1,454
Diesel	10^4t	0.98	3.21	2.51	2.83	1.93		**11.46**	72,600	100	42,652	354,863
Fuel oil	10^4t	0.42	1.25	1.33	0.63	0.64	1.74	**6.01**	75,500	100	41,816	189,742
LPG	10^4t							**0**	61,600	100	50,179	0
Refinery gas	10^4t	1.43	10.01	0.97	0.7			**13.11**	48,200	100	46,055	291,022
Natural gas	10^8m^3		0.12	0.18		0.2	1.87	**2.37**	54,300	100	38,931	501,007
Other oil products	10^4t							**0**	75,500	100	41,816	0

Other coke products	10^4t							**0**	95,700	100	28,435	0
Other energy	10^4t Ce	23.43	63.65	35.95	29.46	23.21		**175.7**	0	0	0	0
											subtotal	415,974,066
Net electricity import from the Northwest China Power Grid to the Central China Power Grid(MWh)												3,005,400
The Simple OM emission factor of the Northwest China Power Grid(tCO_2e/MWh)												1.01129
Total emission of the Central China Power Grid(tCO_2e)												419,013,397
Total electricity delivered to the NCPG(MWh)												380,239,080
Simple OM emission factor of the Central China Power Grid(tCO_2/MWh)												1.10197

* K=G×H×J/100000 (Mass Unit) or K=G×H×J/10000 (Volume Unit)

Data sources: China Energy Statistical Yearbook 2008
2006 IPCC Guidelines for National Greenhouse Gas Inventories" Volume 2 Energy

The section Baseline emissions factor detailed the calculation of BM emission factor of NCPG, as per *2009 Baseline Emission Factors for Regional Power Grids in China* published by China DNA on July 2, 2009 details as follows:

Sub-step 1: Calculation of the share of CO_2 emissions from solid, liquid and gaseous fuels.
Calculated with the data provided in Table A4 and equations (4), (5) and (6), $\lambda_{Coal,y}$ =98.63%， $\lambda_{Oil,y}$ =0.07%， $\lambda_{Gas,y}$ =1.30%

Sub-step 2: with weight of the proportion calculated in Step1, Calculated the emission factor of thermal power based on the emission factors of the best efficient and commercial generation technologies as follow:

Table A12. CO_2 emission factor for best efficient and commercially available thermal power technologies in China

Thermal Power Technologies	Variable	Electricity supply efficiency(%)	Emission factor of fuel($kgCO_2$)	Oxidation	Emission factor(tCO_2e/MWh)
		A	B	C	D=3.6/A/1,000,000×B×C
Coal fired power plants	$EF_{Coal,Adv,y}$	38.1	87,300	1	0.8249
Oil fired power plants	$EF_{Oil,Adv,y}$	49.99	75,500	1	0.5437

Gas fired power plants	$EF_{Gas,Adv,y}$	49.99	54,300	1	0.391

As per equation (7)

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

=98.63%×0.8249+0.07 %×0.5437+1.30%×0.391

=0.8191 tCO_2e/MWh

Sub-step 3: take the thermal power emission factor calculated in the Step 2 multiplied by the proportion count for 20% of capacity addition of the grid as the build Margin emission factor ($EF_{grid,BM,y}$)

Table A13. Installed capacity of the NCPG in 2007

Installed capacity	**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	1,096.50	210	1,719.20
Total (MW)	4,952.70	6,930	30,210	31,740	41,796.50	55,400	171,029.20

Data source: China Electric Power Yearbook 2008.

Table A14. Installed capacity of the NCPG in 2006

Installed capacity	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

Data source: China Electric Power Yearbook 2007.

Table A15. Installed capacity of the NCPG in 2005

Installed capacity	Beijing	Tianjin	Hebei	Shanxi	Inner Mongolia	Shandong	Total
Thermal power (MW)	3,833.50	6,149.90	22,333.20	22,246.80	19,173.30	37,332	111,068.70
Hydro power (MW)	1,025	5	784.5	783	567.9	50.8	3,216.20
Nuclear power (MW)	0	0	0	0	0	0	0
Wind power and Other (MW)	24	24	48	0	208.9	30.6	335.5
Total (MW)	4,882.50	6,178.90	23,165.70	23,029.80	19,950.20	37,413.40	114,620.40

Data source: China Electric Power Yearbook 2006.

Table A16. Calculation of BM emission factor of the NCPG

	Installed capacity in 2005	**Installed capacity in 2006**	**Installed capacity in 2007**	**Capacity additions from 2005 to 2007**	**Share in total capacity additions**
Unit	MW	MW	MW	MW	
	A	**B**	**C**	**D=C-A**	
Thermal power	111,068.70	141,538	164,800	53,731.30	95.25%
Hydro power	3,216.20	4,004	4,510	1,293.80	2.29%
Nuclear power	0	0	0	0	0.00%
Wind power and Other	335.5	937	1,719.20	1,383.70	2.45%
Total	114,620.40	146,479	171,029.20	56,408.80	100.00%
Share in total installed capacity of 2007	67.02%	85.65%	100%		

$$EF_{\mathrm{grid},BM,\mathrm{y}} = 0.8191 \times 95.25\% = 0.7802\ \mathrm{tCO_2/MWh}$$

Annex 4

MONITORING INFORMATION

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