

INNER MONGOLIA WUJIER PHASE I WIND POWER PROJECT

Document Prepared By Beijing Ruifang Technology Co., Ltd

Project Title	Inner Mongolia Wujier Phase I Wind Power Project
Version	2.0
Date of Issue	26/07/2019
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1 PROJECT DETAILS

1.1 Summary Description of the Project

The Inner Mongolia Wujier Phase I Wind Power Project developed by Inner Mongolia Xinjin Wind Power Co., Ltd. is a grid-connected renewable energy project in Ordos city, Inner Mongolia, in the People's Republic of China. It involves the installation of 33 wind turbines, each of which has a rated output of 1500 kW, providing a total installed capacity of 49.5 MW, with a predicted power supplied to the grid of 126,821MWh per annum.

The purpose of the Project is to utilise a wind power facility to generate zero greenhouse gas (GHG) emissions electricity for the North China Power Grid (hereafter referred to as the "Grid"), thereby displacing electricity that is relatively carbon intensive, with a Combined Margin Emission Factor of 0.9502 tCO₂/MWh. The project is therefore expected to reduce emissions of GHG by an estimated 120,508 tCO₂e per year during the first crediting period by displacing electricity from the Grid. The baseline scenario is the same as the scenario existing prior to the start of the implementation of the project activity: electricity delivered to the Grid by the project would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources.

The Project will contribute to sustainable development of the Host Country. Specifically, the Project:

- Increases employment opportunities in the area where it is located - approximately 15 people¹ will be permanently employed for Project operation, and Project construction secures jobs in the construction sector. The Project therefore contributes to developing local infrastructure and increasing the life level of local resident.
- Enhances the local investment environment, and therefore improves the local economy
- Diversifies the sources of electricity generation. This is important for meeting growing energy demands, and transitioning away from coal-supplied electricity generation
- Makes use of renewable wind power resources

The Project started construction on 29/05/2009. The continued operation period started on 16/09/2010.

1.2 Sectoral Scope and Project Type

The Project falls in the sectoral scope 1: energy industries (renewable-/non-renewable sources).

The Project is not a grouped project.

1.3 Project Proponent

Organization name	Inner Mongolia Xinjin Wind Power Co.,Ltd.
Contact person	Li Qiang
Title	Director
Address	Shengli South Street, Xini Town, Hangjin County, Ordos City, Inner Mongolia, China.
Telephone	+86 134 8882 3841
Email	99824178@qq.com

1.4 Other Entities Involved in the Project

Organization name	Beijing Ruifang Technology Co., Ltd
Contact person	Teng Haipeng
Title	-
Address	Haidian District, Beijing, PRC China
Telephone	+86-10-86291231
Email	Teng_hp@126.com

1.5 Project Start Date

16/09/2010 (continuous operation starts date)

1.6 Project Crediting Period

The first 7-year renewable crediting period under CDM started on 04/07/2010 and expired on 03/07/2017.

The VCS crediting period of the Project is from 04/07/2010 to 03/07/2020 totally 10 years.

1.7 Project Scale and Estimated GHG Emission Reductions or Removals

Project Scale	
Project	✓
Large project	

Year	Estimated GHG emission reductions or removals (tCO ₂ e)
Year 1	120,508
Year 2	120,508
Year 3	120,508
Year 4	120,508
Year 5	120,508
Year 6	120,508
Year 7	120,508
Year 8	120,508
Year 9	120,508
Year 10	120,508
Total estimated ERs	1,205,080
Total number of crediting years	10
Average annual ERs	120,508

1.8 Description of the Project Activity

NA

1.9 Project Location

The project is located in the Hangjin County, Ordos City, Inner Mongolia, People's Republic of China (P.R. China). The exact location of the Project centre is defined using geographic coordinates obtained with a Global Positioning System (GPS) receiver: E 107°21'39" Longitude, N 40°11'40" Latitude. These geographic coordinates are for the centre of the wind farm.

1.10 Conditions Prior to Project Initiation

The scenario existing prior to the start of the implementation of the project activity is:

Electricity delivered to the NCPG by the project would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources

This is also the same as the baseline scenario.

1.11 Compliance with Laws, Statutes and Other Regulatory Frameworks

The project is in the field of renewable energy and meets the relevant provisions of the Renewable Energy Law of the People's Republic of China. The generation of power from NCPG

will meet the requirement of national laws and regulations, also financially viable.

1.12 Ownership and Other Programs

1.12.1 Project Ownership

The approval of Environmental Impact Assessment (EIA), Feasibility Study Report (FSR), and Letter of Approval for the Project as a CDM Project issued by China National Development and Reform Commission, and the business license of the project owner are evidences for legislative right. Besides, the purchasing contract of turbines, and the purchasing power agreement are the evidences for the ownership of the plant, equipment and power generating.

1.12.2 Emissions Trading Programs and Other Binding Limits

The Project has been registered as a CDM project in UNFCCC on 04/07/2010 (UNFCCC Ref. 3387). The first 7-year renewable crediting period started on 04/07/2010 and expired on 03/07/2017. So, the Credit which could be issued after 04/07/2010 could be used as a CDM or VCS credit. But the project proponent chose a clear VCS crediting period from 04/07/2010 to 03/07/2020 which has not created another form of environmental credit other than CERs.

1.12.3 Other Forms of Environmental Credit

The Project has been registered as a CDM project in UNFCCC on 04/07/2010 (UNFCCC Ref. 3387). So, the Credit which be issued after 04/07/2010 would be used as a VCS or CDM credit.

1.12.4 Participation under Other GHG Programs

The Project has been registered as a CDM project in UNFCCC on 04/07/2010 (UNFCCC Ref. 3387). The first 7-year renewable crediting period started on 04/07/2010. So, the Credit which be issued after 04/07/2010 could be used as a CDM or VCS credit. But the project proponent chose a clear VCS crediting period from 04/07/2010 to 03/07/2020 which has not created another form of environmental credit.

1.12.5 Projects Rejected by Other GHG Programs

The project was not rejected by other GHG programs.

1.13 Additional Information Relevant to the Project

Eligibility Criteria

The project is not a grouped project.

Leakage Management

NA

Commercially Sensitive Information

No commercially sensitive information has been excluded from the public version of the project description.

Sustainable Development

The proposed project promotes local sustainable development through the following aspects:

- Increases employment opportunities in the area where it is located - approximately 15 people will be permanently employed for Project operation, and Project construction secures jobs in the construction sector. The Project therefore contributes to developing local infrastructure and increasing the life level of local resident.
- Enhances the local investment environment, and therefore improves the local economy.
- Diversifies the sources of electricity generation. Makes use of renewable wind power resources.
- Reducing GHG emissions resulting from the fossil fuel fired power plants compared with a business-as-usual scenario.

Further Information

NA

2 APPLICATION OF METHODOLOGY**2.1 Title and Reference of Methodology**

NA

2.2 Applicability of Methodology

NA

2.3 Project Boundary

NA

2.4 Baseline Scenario

NA

2.5 Additionality

NA

2.6 Methodology Deviations

There is no methodology deviation.

3 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

3.1 Baseline Emissions

NA

3.2 Project Emissions

NA

3.3 Leakage

NA

3.4 Net GHG Emission Reductions and Removals

NA

4 MONITORING

4.1 Data and Parameters Available at Validation

NA

4.2 Data and Parameters Monitored

NA

4.3 Monitoring Plan

NA

5 SAFEGUARDS

5.1 No Net Harm

This project will do no harm to the environment.

5.2 Environmental Impact

This project has no negative effects on environment. the EIA (environment influence assessment) of this project has been conducted by a qualified third party (Inner Mongolia Institute of Electricity Power Survey and Design) and was approved by the Inner Mongolia Environmental Protection

Bureau on May 7th of 2008. The impacts on environment and mitigation measures could be seen in section D.1 of the registered CDM PDD.

5.3 Local Stakeholder Consultation

The stakeholder consultation for the Project activity took place during May 2009. The consultation invited local stakeholders to submit comments on the Project activity by filling in a questionnaire sent out by the Project Developer. The Project Developer put the notice at the gate of the Hangjin County government office which made the local stakeholders aware that the project developer would undertake a consultation on the Proposed Project. The notice included a technical description of the Project as well as a brief explanation of how the project activity mitigates climate change through the Clean Development Mechanism of the Kyoto Protocol, and brings other sustainable development benefits.

The questionnaires were sent out around the project site. The questions asked were as follows:

- What impacts do you think the CDM Project activity will have on the local environment?
- What impacts do you think the CDM Project activity will have on employment in the local area?
- What impacts do you think the CDM Project activity will have on your livelihood?
- What impacts do you think the CDM Project activity will have on social welfare in the local area?
- What would be the overall effects of the construction and operation of the CDM Project?
- What is your attitude towards the construction of the CDM Project?

34 questionnaires were sent to the stakeholders by the Project Developer. The stakeholders are all local residents including governmental officials (4 people), local residents (27 people) and related employees (3 people).

The survey received 100% participation (34 questionnaires returned out of 34). The survey shows the stakeholders believe that the proposed CDM project activity will have positive impacts on the local ecological, environmental, employment and social life. All stakeholders expressed their support for the proposed project.

5.4 Public Comments

No negative comments were received on the project.

ANNEX CDM PDD



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

CONTENTS

- A. General description of project activity
- B. Application of a baseline and monitoring methodology.
- C. Duration of the project activity / crediting period
- D. Environmental impacts
- E. Stakeholders' comments

Annexes

- Annex 1: Contact information on participants in the project activity
- Annex 2: Information regarding public funding
- Annex 3: Baseline information
- Annex 4: Monitoring plan

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

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Inner Mongolia Wujier Phase I Wind Power Project
Version 4.0
19/03/2013

Version history:

Version Number	Date	Description and reason of revision
1.0	13/07/2009	Original PDD
2.0	30/11/2009	PDD updated according to validator's comments
2.1	10/12/2009	PDD updated according to validator's further comments
3.0	08/01/2010	Registered PDD

A.2. Description of the project activity:

>>

The Inner Mongolia Wujier Phase I Wind Power Project (hereafter referred to as the “Project”) developed by Inner Mongolia Xinjin Wind Power Co., Ltd. (hereafter referred to as the “Project Developer”), is a grid-connected renewable energy project in Ordos city, Inner Mongolia, in the People's Republic of China (hereafter referred to as the “Host Country”). It involves the installation of 33 wind turbines, each of which has a rated output of 1500 kW, providing a total installed capacity of 49.5 MW, with a predicted power supplied to the grid of 126,821MWh per annum. The provider of the wind turbines is Xinjiang Goldwind Science & Technology Co., Ltd.

The purpose of the Project is to utilise a wind power facility to generate zero greenhouse gas (GHG) emissions electricity for the North China Power Grid (hereafter referred to as the “Grid”), thereby displacing electricity that is relatively carbon intensive, with a Combined Margin Emission Factor of 0.9502 tCO₂/MWh. The project is therefore expected to reduce emissions of GHG by an estimated 120,508 tCO₂e per year during the first crediting period by displacing electricity from the Grid. The baseline scenario is the same as the scenario existing prior to the start of the implementation of the project activity: electricity delivered to the Grid by the project would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources.

The Project will contribute to sustainable development of the Host Country. Specifically, the Project:

- Increases employment opportunities in the area where it is located - approximately 15 people¹ will be permanently employed for Project operation, and Project construction secures jobs in the construction sector. The Project therefore contributes to developing local infrastructure and increasing the life level of local resident.
- Enhances the local investment environment, and therefore improves the local economy

¹ See the Feasibility Study Report of the Project



CDM – Executive Board

page 3

- Diversifies the sources of electricity generation. This is important for meeting growing energy demands, and transitioning away from coal-supplied electricity generation
- Makes use of renewable wind power resources

A.3. Project participants:

>>

Name of Party involved (*) (host) indicates a host Party)	Private and/or public entity(ies) project participants (*) (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
People's Republic of China (host)	Inner Mongolia Xinjin Wind Power Co., Ltd.	No
United Kingdom of Great Britain and Northern Ireland	EcoSecurities International Limited	No

(*) In accordance with the CDM modalities and procedures, at the time of making the CDM-PDD public at the stage of validation, a Party involved may or may not have provided its approval. At the time of requesting registration, the approval by the Party(ies) involved is required.

Further contact information of project participants is provided in Annex 1.

A.4. Technical description of the project activity:**A.4.1. Location of the project activity:**

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The project is located in the Hangjin County, Ordos City, Inner Mongolia, People's Republic of China (P. R. China)

A.4.1.1. Host Party(ies):

>>

People's Republic of China (P. R. China)

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

>>

Inner Mongolia

A.4.1.3. City/Town/Community etc:

>>

Hangjin County , Ordos City

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

>>



The exact location of the Project centre is defined using geographic coordinates obtained with a Global Positioning System (GPS) receiver: E 107°21'39" Longitude, N 40°11'40" Latitude². These geographic coordinates are for the centre of the wind farm.



Figure A.4.1 The location of Inner Mongolia in China

² See the page 1-1of the Feasibility Study Report of the Project.



Figure A.4.2 The location of the Project in Inner Mongolia

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

>>

According to Annex A of the Kyoto Protocol, this project fits in Sectoral Category 1, Energy Industries (renewable/non-renewable).

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

>>

The purpose of the Project is to use well established wind power generation technology for electricity generation and transmission to generate low emissions electricity for the Grid thereby displacing CO₂ emissions from electricity generation from the Grid. The baseline scenario is the same as the scenario existing prior to the start of the implementation of the project activity: electricity delivered to the Grid by the project would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources.

The proposed project involves the installation of 33 wind turbines each of which with a rated capacity of 1500 kW, providing a total capacity of 49.5MW. The expected annual electricity supply to the grid is 126,821 MWh.

According to the turbine layout, each turbine will be equipped with one transformer. The wind power to be generated will be delivered to the Wujier step-up substation by 35kV transmission lines. The power in the 220kV Wujier step-up substation will be transmitted to the Kubuqi 220kV substation. Then the electricity generated will first be transmitted to the Inner Mongolia Power Grid and then to the North China Power Grid.

The main technical parameters of the proposed project are shown in Table A.4.3.1

Table A.4.3.2 Main technical parameters of the proposed project



	Value	Source
Forecast installed capacity (MW)	49.5	Feasibility Study 14-1
Forecast annual operating time (hour)	2562	Feasibility Study 14-1
Forecast annual electricity supplied to the grid (MWh)	126,821	Feasibility Study 14-2
Forecast load factor (%)	29	Feasibility Study 5-19

*The Feasibility Study was performed by the Inner Mongolia Institute of Electricity Power Survey and Design that did the FS in June 2008, and approved by the Development & Reform Committee of Inner Mongolia Autonomous Region on 23rd July 2008

Table A.4.3.3 Main Technical Parameters of the wind turbines³

Wind Turbines	
Parameter	Value
Type	Jinfeng82/1500
No. of vane	3
Rated Power (kW)	1500
Rotor diameter (m)	82
Cut-in speed(m/s)	3
Cut-out speed(m/s)	22
Rated speed(m/s)	10.3
Hub height (m)	70
Manufacturer	Xinjiang Goldwind Science & Technology Co., Ltd.

The Project will use recognised state-of-the-art technology in electricity generation and transmission. Essential equipment used in the Project is domestically produced, and the Project Developer is experienced in handling and operating this kind of equipment.

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

>>

Years	Estimation of annual emission reductions in tonnes of CO ₂ e
2010*	120,508
2011	120,508
2012	120,508
2013	120,508
2014	120,508

³ These technical specifications may be subject to change since the PDD is written at an early stage of project development



2015	120,508
2016	120,508
Total estimated reductions (tonnes of CO₂e)	842,556
Total number of crediting years	7
Annual average of the estimated reductions over the crediting period (tCO₂e)	120,508

*From May 2010 to April 2011.

Refer to Section B.6.3 for further details on the quantification of GHG emission reductions associated with the Project.

A.4.5. Public funding of the <u>project activity</u>:
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The Project will not receive any public funding from Parties included in Annex I of the UNFCCC.

**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:**

>>

1. The approved consolidated baseline and monitoring methodology ACM0002: “Consolidated methodology for grid-connected electricity generation from renewable sources”, Version 10, in effect as of EB47;
 2. The approved “Tool for demonstration and assessment of additionality”, Version 5.2, in effect as of EB 39 and
 3. The approved “Tool to calculate the emission factor for an electricity system”, Version 2, in effect as of EB 50
- are applied to the Project activity⁴.

Further information pertaining to the methodology can be obtained at:

<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:

>>

ACM0002 (Version 10) is chosen and applicable to the proposed project for the following reasons:

- The project activity is a grid-connected renewable power generation project activity that involves the installation of a new wind power plant at a site where no renewable power plant was operated prior to the implementation of the project activity (greenfield plant).
- The project activity is connected to the North China Power Grid (NCPG). The geographic and system boundaries for this grid can be clearly identified, and information on the characteristics of this grid is available.
- The project activity does not involve switching from fossil fuels to renewable energy at the site of the project activity.
- The project activity is not a biomass fired plant.
- The project activity meets the applicability conditions of the ‘Tool to calculate the emission factor for an electricity system’, and the ‘Tool for the demonstration and assessment of additionality’.

The applicability criteria stated in methodology ACM0002 (Version 10) are met on the basis of the reasons above.

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

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The spatial extent of the project boundary includes the Project power plant and all power plants physically connected to the NCPG to which the Project is connected.

⁴ The approved “Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion” is not applicable to the Project since there is no backup power project generation for the proposed Project.



The GHG and emission sources included in, or excluded from the project boundary are listed in Table B.3. below.

Table B.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 to the NCPC	CO ₂	Yes	The project is a wind power project. Project emissions should not be considered according to ACM0002.
		CH ₄	No	
		N ₂ O	No	
Project Activity	Emissions of CH ₄ from the reservoir	CO ₂	No	Minor emission source
		CH ₄	No	Since the power density of the project is greater than 10 W/m ² , no GHG emissions from the project have to be considered according to ACM0002.
		N ₂ O	No	Minor emission source.

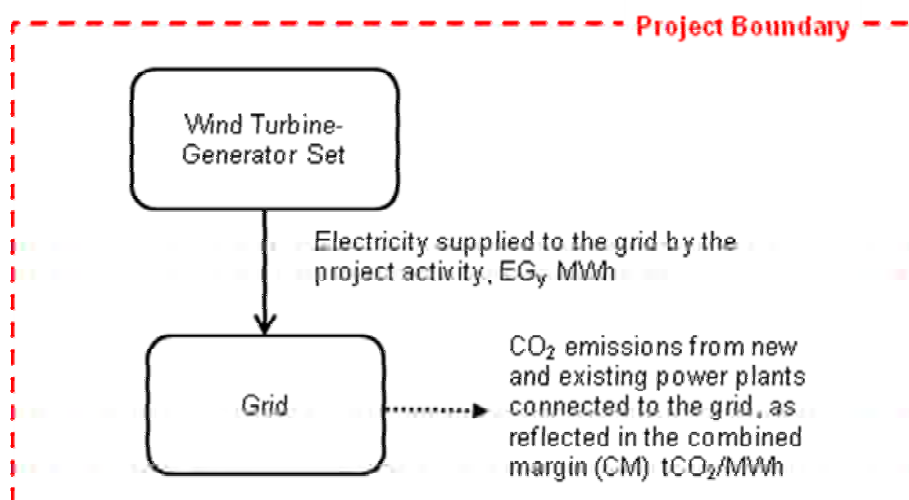


Figure B.1 Flow diagram of the project boundary

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

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As the project activity is the installation of a new grid-connected renewable power plant, the baseline scenario is the following:

Electricity delivered to the grid by the Project activity would have otherwise been generated by the operation of grid-connected power plants, and by the addition of new generation sources, as reflected in the Combined Margin (CM) calculations described in the “Tool to calculate the emission factor for an electricity system”, and applied in Section B.6.1.

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):

>>

The following steps are used to demonstrate the additionality of the Project according to the latest version of the “Tool for the demonstration and assessment of additionality” approved by the Executive Board.

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

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

Project activities that apply the 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. The following two alternatives to the Project activity are considered here in detail:

Alternative 1: The proposed Project activity undertaken without being registered as a CDM project activity, i.e. the construction of a new wind generation plant with an installed capacity of 49.5 MW, connected to the local grid, and implemented without considering CDM revenues.

Alternative 2: Continuation of the current situation, i.e. electricity will continue to be generated by the existing generation mix operating in the grid.

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

The Chinese power sector has undergone a transformation to a market-oriented system, Therefore investment in a power generation project is an individual power project developer’s decision, based on the project return and risk profile⁵. There are no laws compelling the project developer to develop wind power plants, thus *Alternatives 1* and *2* identified are in line with all applicable laws and regulations.

The main sectoral policy relevant to this Project Activity is the ‘Renewable Energy Law of the People’s Republic of China’, which came into effect on 01/01/2006, and which aims to promote renewable energy in the Host Country. This Law demonstrates the Chinese Government’s commitment to the development of renewable energy as part of the overall energy development strategy, and encourages grid-connected power generation from renewable sources. Nevertheless, there are no direct incentives, such as financial grants, higher tariffs, or subsidised loans available for these types of project.

⁵ Source: State Council’s Decision on Reforming Investment Approval Process, 16/07/2004.



In addition, although energy efficiency and renewable energy were included in the agenda for the Host Country's 11th Five-Year Plan (2006-2010), there is no legislative requirement to meet the projections under this Plan⁶.

Step 2. Investment Analysis

Sub-step 2a. Determine appropriate analysis method

According to the latest version of the "Tool for the demonstration and assessment of additionality", three options can be applied to conduct the investment analysis. These are Simple Cost Analysis (Option I), Investment Comparison Analysis (Option II), and Benchmark Analysis (Option III).

Since this Project and the alternatives will generate financial/economic benefits (other than CDM related income) via the sale of generated electricity, Option I (Simple Cost Analysis) is not applicable.

According to the Additionality Tool, if the alternative to the CDM project activity does not include investments of comparable scale to the Project, then Option III must be used.

Given that the project developer does not have alternative and comparable investment choices, Benchmark Analysis (Option III) is more appropriate than Investment Comparison Analysis (Option II) for assessing the financial attractiveness of the project activity.

Sub-step 2b. Option III – Application of benchmark analysis

The likelihood of development of the Project, as opposed to the continuation of the generation of grid electricity from the existing generation mix (i.e. *Alternative 2* - the baseline), will be determined by comparing the Project IRR without CDM financing (*Alternative 1*) with benchmark rates applicable to a local investor, i.e. those provided by national authorities, local banks, or investment bonds in the Host Country.

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

With reference to *Interim Rules on Economic Assessment of Electrical Engineering Retrofit Projects*⁷, the financial benchmark rate of return (Project IRR after tax) of the Chinese power industry is 8%, which is therefore the benchmark applicable for the IRR of this Project. It was used to assess the Project in the Feasibility Study of the Project. This benchmark is widely applied for power project investments in P. R. China and serves as the sectoral benchmark rate on total investment for wind projects.

Table B.5.1 below shows the financial analysis for the Project activity with and without CDM financing. As shown, the Project IRR without CDM (6.00%), was lower than the benchmark rate applicable to the

⁶ See: Point Carbon's CDM & JI Monitor: *Chinese official defends additionality of renewables in CDM*, 21/03/2007

⁷ *Interim Rules on Economic Assessment of Electrical Engineering Retrofit Projects* ([2002] No.623), published by the Operations Department of Power Generation and Power Transmission of the State Power Corporation of China, specifies in Section 1.11 that the benchmark (Project IRR) for the power industry (not only for retrofit projects) is 8%.



Project. This therefore indicates that in comparison to alternative investments, the Project was not financially attractive in the absence of CDM financing.

Table B.5.1. Summary of project investment analysis without and with CDM financing

IRR without CDM	6.00%
IRR with CDM	8.90%

Sub-step 2d: Sensitivity analysis

A sensitivity analysis was conducted using assumptions that are conservative from the point of view of analysing additionality, i.e. the ‘best-case’ conditions for the Project IRR were assumed by altering the following parameters:

- Operating costs
- Investment costs
- Electricity tariff
- Annual operating hours

Table B.5.2 summarizes the results of the sensitivity analysis, showing the variation of each parameter required to reach the 8% benchmark.

Table B.5.2. Results of the sensitivity analysis

	% Variation of the parameter required to reach the 8% benchmark
Operating costs	-99.5
Investment costs	-14.45
Electricity tariff	+16.2
Annual operating hours	+16.65

These variations do not reflect a realistic range of assumptions for the input parameters of the financial analysis.

- **Operating costs:** The results of the sensitivity analysis mean that even if the Project incurred almost zero operating costs, which is not feasible, the IRR of the Project would not reach the 8% benchmark.
- **Investment costs:** 14.45% of decrease in investment costs is very unlikely to happen, as it is much more likely that wind power projects will experience cost *increases* rather than cost decreases during construction. This can be explained by the increase in the price of construction materials and in the staff salaries⁸. This increase demonstrates that a decrease in investment costs is extremely unrealistic, and that the IRR is not likely to reach the 8% benchmark.

⁸ See National Bureau of Statistics of China: <http://www.stats.gov.cn/english/StatisticalCommunique/>



- **Electricity tariff:** Only if the proposed project received a tariff of 0.5926RMB/kWh throughout its lifetime, would the IRR reach the benchmark. However, this is highly unlikely since, the government tariff approval applicable at the time of the investment decision was the notification dated 03/12/2007⁹ and 23/07/2008¹⁰; this regulated the tariff of wind power projects in West Inner Mongolia at 0.51 RMB/kWh including VAT. This notification was the latest government tariff approval information available to the project developer at the time of making the investment decision. Then, the bus-bar tariff 510RMB/MWh (incl VAT) has been indicating in the approval document of the project released by the NDRC on 20/07/2009¹¹. According to the document, the tariff of the proposed project is 0.51 RMB/kWh including VAT, which is fully consistent with the value used in the investment analysis.

In addition, as stated in all the electricity tariff approval documents issued by NDRC, the approved tariff applies for the first 30,000 operating hours. Afterward a lower tariff closer to the average grid tariff which is dominated by thermal power plants will be granted to the project.

The tariff for the proposed project activity is a government approved tariff. It will be strictly regulated by the government; neither the project owner nor the grid company can change it. Hence, it is unlikely that the tariff of the Project increases over 16.2%. So the IRR is not likely to reach the benchmark due to an increase in electricity tariff.

When using the highest tariff granted to a wind power project connected to the West Inner Mongolia Power Grid (0.579RMB/kWh¹² including VAT) in the financial analysis of the proposed project, the Project IRR of the proposed project would be 7.69%, which is below the benchmark. Only if the proposed project received a tariff of 0.5926RMB/kWh, would the IRR reach the benchmark. This scenario is deemed extremely unlikely since the project will receive the government approved tariff, which has been fixed to 0.51 RMB/kWh with VAT in line with the latest tariff policy.

- **Annual operating hours:** The expected operating hours of the proposed Project indicated in the Feasibility Study were calculated based on 46 years' worth of historical wind data¹³. As the operating hours were calculated based on historical data, although annual fluctuations are possible, it is very unlikely that the long term average annual operating hours will be much higher than stated in the Feasibility Study. Thus a 16.65% of increase in annual operating hours is not reasonable, and the IRR is therefore not likely to reach the 8% benchmark.

These results show that only under very unrealistic and highly favourable circumstances would it be possible to reach the Project IRR benchmark. We can conclude that the IRR is lower than the benchmark for a realistic range of assumptions for the input parameters of the sensitivity analysis, and therefore, that

⁹ Notice on Feed in Tariff of Renewable Energy Project– issued by NDRC on 3 December 2007
http://www.ndrc.gov.cn/jggl/zcfg/t20080218_193008.htm (Fa Gai Jia Ge[2007]3303)

¹⁰ Fa Gai Jia Ge [2007] 1260 - “Approval of the Electricity Price of Renewable Energy Power Generation Projects in Some Provinces”– issued by NDRC on 9 June 2007

¹¹ NDRC Notice on Perfection the Feed-in-tariff of Wind Farms Policy issued on July 20, 2009
http://www.sdpc.gov.cn/zfdj/jggg/dian/t20090727_292837.htm (Fa Gai Jia Ge[2009]1906)

¹² Inner-Mongolia Ximeng Abag 49.5MW Wind Power Project, tariff was approved in December 2006

¹³ See the page 2-2 of FSR.



the Project is not financially attractive. This demonstrates that the project activity would not be implemented without the CDM.

Table B.5.3. Main parameters used in the investment analysis

Name	Value	Source
Installed capacity (MW)	49.5	Feasibility Study* 14-1
Expected power supplied to the grid (MWh)	126,821	Feasibility Study 14-2
Total static investment (RMB)	558,980,000	Feasibility Study 13-3 and the Approval of FSR
Operating costs (RMB/MWh)	80.4	Feasibility Study 14-10&14-11
Income tax (%)	25	Feasibility Study 14-2
City Maintenance and Construction Tax (%)	5	Feasibility Study 14-2
Educational Surcharge Tax (%)	3	Feasibility Study 14-2
Electricity tariff, including VAT (RMB/MWh)	510	Feasibility Study 14-2
VAT (%)	8.5	Feasibility Study 14-2
Lifetime of Project (y)	20	Feasibility Study 14-1

* The Feasibility Study was performed by the Inner Mongolia Institute of Electricity Power Survey and Design that did the FS in June 2008, and approved by the Development & Reform Committee of Inner Mongolia Autonomous Region on 23rd July 2008

Step 3. Barrier Analysis

The latest version of the “Tool for the demonstration and assessment of additionality” states that project participants may choose to apply Step 2 (Investment Analysis), OR Step 3 (Barrier Analysis) to demonstrate Project additionality.

Given the low IRR of the Project, Step 3 is not used to demonstrate additionality of the proposed Project.

Step 4. Common Practice Analysis

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

In line with the EB guidance on the additionality tool, other wind power projects that are currently operational in Inner Mongolia that are similar to the proposed Project activity are listed in Table B.5.4 below.

Firstly, the common practice analysis is limited to the provincial level, as the investment environment for each province differs (e.g. with regards to taxes, loan policy, and electricity tariffs). In Inner Mongolia, the Provincial Government is responsible for taxes, loan policies etc., which are specifically applicable to the Province.

Furthermore, only the projects which were developed after 2003 are considered in the common practice analysis below. Before 2003¹⁴, wind power projects in China were undertaken under non-commercial

¹⁴ <http://www.ndrc.gov.cn/zjgx/P020091126386872388651.pdf>



conditions with supporting policies, such as favorable higher tariffs¹⁵ for wind projects, known as ‘cost-plus power pricing’, domestic loan subsidies, bilateral soft loan financing and multilateral finance, so that most wind projects were built as monopolistic power company “pilot-projects”. This resulted in a series of wind farms each with capacity less than 30MW, and a sector that was still not fully commercialized. After 2003, only limited wind farm development occurred (except under CDM) due to a change in regulations issued by NDRC, which required the wind projects to be developed on a commercial basis, through a bidding process. Recent wind farm development has increased, due to the availability of CDM financing. Several similar projects have been or are being developed, and these have all had recourse to CDM incentives.

So other wind farms in Inner Mongolia Autonomous Region with an installed capacity between 25MW and 75MW that have been operational since 2003 are listed in Table B.5.4.

Table B.5.4. Wind power projects in Inner Mongolia

Project name	Total capacity	CDM activities	Reg. No.
Dali phaseIII	30MW	Demonstration Project Supported by national debt fund	N/A
Huitengxile 2	25.8MW	Registered CDM project	0064
Saihanba west	30.6MW	Registered CDM project	0994
Saihanba East	45.05	Registered CDM project	0561
Saihanba North	45.05	Registered CDM project	0576
Inner Mongolia Datang Chifeng Dongshan	49.3	Registered CDM project	0689
Inner Mongolia Chifeng Xinsheng Wudaogou Wind Power Project	50.25	Registered CDM project	1487
Fuhui Inner Mongolia Tugurige Wind Project	49.5	Registered CDM project	2038
Guohua Inner Mongolia Huitengliang Wind Project	48.75	Registered CDM project	1261
Inner Mongolia Chifeng Dongshan Phase II Wind Project	50	Registered CDM project	1869
Datang Huitengliang Wind Farm	49.5	Registered CDM project	0589
Hulunbeier Xinbaerhu Youqi	49.5	Registered CDM project	0981

¹⁵ <http://www.newenergy.org.cn/html/00412/20041605.html>



Datang Inner Mongolia Chifeng Bolike Wind Power Project	50	Registered CDM project	1830
Inner Mongolia Duolun Daxishan Wind Project	30.6	Registered CDM project	1833
Inner Mongolia Bayin'aobao 49.5MW Wind Project	49.5	Registered CDM project	1823
Inner Mongolia Bayannaoer Chuanjinsumu	49.3	Request for Registration	1621

Sources:

<http://www.cwea.org.cn/upload/20080324.pdf> (Wind Farms in China 2007 written by Shi Pengfei)

<http://www.kskt.gov.cn:8080/old/news/2002-11-25-01.htm> (Dali Phase III project)

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

From the table above it can be seen that there is only Dali phase III wind project which started operating after 2003 without CDM support. Dali phase III wind project was a Demonstration Project supported by national debt fund¹⁶. In the absence of the Government aided fund, the investment in this Project has become more riskier. However, such kinds of support are no longer given in Inner Mongolia and the proposed Project does not benefit from such support.

To summarize, it can be demonstrated that the proposed project activity is additional and not the baseline scenario. Without the CDM revenues, the equivalent electricity service will be provided by the North China Power Grid. As a result, the reduction of GHG emissions would not be realized. The above additionality analysis provides sufficient evidence that the registration of the CDM revenues can enable the project to overcome the barriers it faces.

In conclusion, the proposed Project is deemed to be additional according to ACM0002 and the 'Tool for the demonstration and assessment of additionality'.

CDM consideration and CDM timeline

During the process of carrying out the Feasibility Study Research by the Inner Mongolia Institute of Electricity Power Survey and Design in 2008, it is demonstrated that the project face unattractive financial index; however, when the revenue from CDM is considered, the project IRR could be improved and exceeded the benchmark. So in order to make the project financially feasible, the CDM was seriously considered and recommended in the Feasibility Study Research finished in June 2008, which was used for the project owner's investment decision. After considering the Feasibility Study Report carefully, the project developer decided to undertake the project as a CDM project in September 2008, as shown in the board meeting resolution, and then the project developer started to construction on 10th September 2008. and then the Purchase Agreement of Wind Turbine could finally be signed in November 2008. Meantime, the project developer started to take actions to secure CDM status for the project: they got in touch with EcoSecurities to negotiate an Emission Reduction Purchase Agreement (ERPA), which was signed on the 21st January, 2009. On 3rd March, 2009, the project participants informed the UNFCCC secretariat in

¹⁶ <http://www.kskt.gov.cn:8080/old/news/2002-11-25-01.htm>



writing of the commencement of the project activity and of their intention to seek CDM status.

The timeline for the development of the project and CDM progress are shown as below

Table B.5.5. Timeline for the development of the project and CDM progress

Stage	Date	Source
EIA approval	07/05/2008	Inner Mongolia Environmental Protection Bureau
Feasibility Study Report	06/2008	the Inner Mongolia Institute of Electricity Power Survey and Design
CDM consideration in FSR	06/2008	the Inner Mongolia Institute of Electricity Power Survey and Design
Approval of Feasibility Study Report	23/07/2008	Development & Reform Commission of Inner Mongolia Autonomous Region
Consideration of CDM	02/09/2008	Board Resolution of the Project Developer
Construction approval	20/10/2008	the State Grid Xinyuan Construction Co., Ltd.
Purchase Agreement of Equipment (start of the project activity)	18/11/2008	investment decision
ERPA signature	21/01/2009	ERPA with EcoSecurities
Notification of intention to seek CDM status sent to UNFCCC secretariat	03/03/2009	Email sent to UNFCCC secretariat
Civil work construction contract	31/03/2009	the State Grid Xinyuan Construction Co.,Ltd.
Construction start date	29/05/2009	Construction company: State Grid Xinyuan Construction Co.,Ltd
China's LoA approval	16/06/2009	NDRC
PDD uploaded for GSP	12/08/2009	http://cdm.unfccc.int/Projects/Validation/index.html
Estimated Commercial operation Start	01/01/2010	

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

According to the latest version of ACM0002 (version 10) and the tool to calculate the emission factor for electricity system, since the project activity is the installation of a new grid-connected renewable power plant/unit, the baseline scenario is the following:

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



The Project therefore applies the combined margin (CM) calculations described in the “Tool to calculate the emission factor for an electricity system”.

This PDD uses the calculations published by the DNA of P. R. China¹⁷ to determine the Operating Margin (OM) emission factor¹⁸ and the Build Margin (BM) emission factor¹⁹ using the most recent data available.

The description below follows the steps of the latest version of the “Tool to calculate the emission factor for an electricity system” and focuses on the key process of the calculation of the emission factors. Please see Annex 3 for the baseline data underlying the calculations.

The “Tool to calculate the emission factor for an electricity system (Version 01.1)” is applied in the context of the Project in the following seven steps:

- Step 1. Identify the relevant electricity systems
- Step 2. Choose whether to include off-grid power plants in the project electricity system
- Step 3. Select a method to determine the operating margin (OM)
- Step 4. Calculate OM emission factor according to the selected method
- Step 5. Identify the group of power plants to be included in the build margin
- Step 6. Calculate the build margin emission factor
- Step 7. Calculate the combined margin emission factor

Step 1. Identify the relevant electric power system

P. R. China is divided into regional electricity systems which are defined by the DNA of P. R. China²⁰. The Project is located in Inner Mongolia which belongs to the NCPG. Therefore, the relevant electric power system is identified as the NCPG.

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

The “Tool to calculate the emission factor for an electricity system” offers 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.

Option I is applied and only grid power plants are included in the calculation.

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

¹⁷ National Coordination Committee on Climate Change – National Development and Reform Commission (NDRC)

¹⁸ See <http://qhs.ndrc.gov.cn/qjfzjz/W020090703644238739485.xls> for the EF_{OM}

¹⁹ See <http://qhs.ndrc.gov.cn/qjfzjz/W020090703644239079814.doc> for the EF_{BM}

²⁰ See http://qhs.ndrc.gov.cn/qjfzjz/t20090703_289357.htm



The “Tool to calculate the emission factor for an electricity system” offers four methods to calculate the OM emission factor ($EF_{grid,OM,y}$):

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

Of these procedures, Option (a) (Simple OM) is applied. This is because low-cost / must run resources constitute less than 50% of total grid generation in average of the five most recent years. From 2003 to 2007 respectively, 0.70%, 0.75%, 0.79%, 0.15% and 0.29%, of the electricity generated in the NCPG came from low-cost / must run resources²¹.

Power plants registered as CDM project activities are included in the sample group that is used to calculate the OM as long as the criteria for including the power sources in the sample group apply.

The “Tool to calculate the emission factor for an electricity system” offers the choice between two data vintages calculate the Simple OM emission factor ($EF_{grid,OMsimple,y}$):

- *Ex-ante* option: A 3-year generation-weighted average, based on the most recent data available at the time of submission of the CDM-PDD to the DOE for validation, without requirement to monitor and recalculate the emissions factor during the crediting period.
- *Ex-post* option: The year in which the project activity displaces grid electricity, requiring the emissions factor to be updated annually during monitoring.

$EF_{grid,OMsimple,y}$ is calculated *ex-ante* using the data from 2005 to 2007, available in the China Energy Statistics Yearbooks 2006-2008 and the China Electric Power Yearbooks 2006-2008. This data vintage remains fixed during the crediting period.

Step 4. Calculate OM emission factor according to the selected method

The “Tool to calculate the emission factor for an electricity system” offers three options to calculate $EF_{grid,OMsimple,y}$:

- *Option A*: Based on data on fuel consumption and net electricity generation of each power plant / unit
- *Option B*: Based on data on net electricity generation, the average efficiency of each power unit and the fuel type(s) used in each power unit
- *Option C*: Based on data on the total net electricity generation of all power plants serving the system and the fuel types and total fuel consumption of the project electricity system.

Detailed data on the individual power plants connected to the NCPG necessary for applying option A and option B is not available; therefore, options A and B cannot be used. Since only nuclear and renewable power generation are considered as low-cost / must-run power sources and since the quantity of electricity supplied to the grid by these sources is known, option C is applicable and used to calculate the Simple OM emission factor.

²¹ China Electric Power Yearbooks 2004-2008



$EF_{grid,OMsimple,y}$, using option C is calculated based on the net electricity supplied to the grid by all power plants serving the system, not including low-cost / must-run power plants / units, and based on the fuel type(s) and total fuel consumption of the project electricity system, as follows:

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

Where:

- $EF_{grid,OMsimple,y}$ = Simple operating margin CO₂ emission factor in year y (tCO₂/MWh)
- $FC_{i,y}$ = Amount of fossil fuel type i consumed in the project electricity system in year y (mass or volume unit)
- $NCV_{i,y}$ = Net calorific value (energy content) of fossil fuel type i in year y (GJ / mass or volume unit) (country-specific values are used)
- $EF_{CO2,i,y}$ = CO₂ emission factor of fossil fuel type i in year y (tCO₂/GJ)
- $EG_{y,grid}$ ²² = Net electricity generated and delivered to the grid by all power sources serving the system, not including low-cost / must-run power plants / units, in year y (MWh)
- i = All fossil fuel types combusted in power sources in the project electricity system in year y
- y = The three most recent years for which data is available at the time of submission of the CDM-PDD to the DOE for validation

$$EF_{grid,OMsimple,y} = 1.0069 \text{ tCO}_2/\text{MWh}$$

For detailed information, please see Annex 3.

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

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

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

However, due to the fact that data on electricity generation of each power plant / unit in the grid is currently not available in P. R. China (see Step 3), EB guidance on the estimation of the build margin in P.R. China can be applied for the purpose of defining the sample group²³. In accordance with the guidance, the build margin consists of the set of power capacity additions in the electricity system that comprises 20% of the system generation capacity (in MW) and that have been built most recently. The set of power capacity additions included in the build margin is determined as follows:

²² $EG_{y,grid}$ = GEN x (1-rate of internal use by the power station). See Annex 3 and section B.6.2. for details.

²³ See: EB guidance on estimating the build margin for AM0005, consolidated in ACM0002 which refers to the Tool to calculate the emission factor for an electricity system

<http://cdm.unfccc.int/UserManagement/FileStorage/6POIAMGYOEDOTKW25TA20EHEKPR4DM> and http://cdm.unfccc.int/UserManagement/FileStorage/AM_CLAR_QEJWJEF3CFBP1OZAK6V5YXPQKK7WYJ



$$\frac{\sum_j CAP_{j,y-n}}{\sum_j CAP_{j,y}} > 20\% \quad (2)$$

- $\sum_j CAP_{j,y-n}$ = The aggregate incrementally installed power capacity of all kinds of power generation sources j (MW) in year $y-n$
 $\sum_j CAP_{j,y}$ = The aggregate incrementally installed power capacity of all kinds of power generation sources j (MW) in year y
 n = The number of years ($y-1, y-2, \dots, y-n$) which have to be considered to comprise 20% of the system generation capacity (in MW) and that have been built most recently

In the period from 2005 to 2007 (2007 being the most recent year for which data is available), the amount of power capacity additions made up 20% of the total NCPG generation capacity in 2007. Therefore $n = 2$.

Since data on the electricity generation of each individual power plant / unit in the grid is not available in P. R. China, power plants registered as CDM project activities cannot be isolated and are taken into account in the build margin.

The “Tool to calculate the emission factor for an electricity system” offers the choice between two data vintages to calculate the BM:

- *Option 1.* For the first crediting period, the build margin emission factor is calculated *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.
- *Option 2.* For the first crediting period, the build margin emission factor shall be updated annually, *ex-post*, including those units built up to the year of registration of the project activity

The BM emission factor ($EF_{grid,BM,y}$) is calculated *ex-ante* using the data from 2005 to 2007, available in the China Energy Statistics Yearbook 2008 and the China Electric Power Yearbooks 2006-2008. This data vintage remains fixed during the first crediting period and will be updated for the second crediting period.

Step 6. Calculate the build margin emission factor

According to the “Tool to calculate the emission factor for an electricity system”, $EF_{grid,BM,y}$ is the generation-weighted average emission factor of all power units m during the most recent year y for which power generation data is available. However, due to the fact that data on both electricity generation and emission factor of each power plant / unit in the grid is currently not available in P. R. China (see Step 3), EB guidance on the estimation of the build margin in P.R. China can also be applied for the purpose of estimating the BM emission factor²⁴ and $EF_{grid,BM,y}$ is calculated as follows:

$$EF_{grid,BM,y} = \frac{CAP_{thermal,y-n,y}}{\sum_j CAP_{j,y-n,y}} \times EF_{thermal,adv} \quad (3)$$

²⁴ See: <http://cdm.unfccc.int/UserManagement/FileStorage/6POIAMGYOEDOTKW25TA20EHEKPR4DM> and http://cdm.unfccc.int/UserManagement/FileStorage/AM_CLAR_QEJWJEF3CFBP1OZAK6V5YXPQKK7WYJ



- $EF_{grid, BM, y}$ = Build margin CO₂ emission factor in year y (tCO₂/MWh)
- $CAP_{thermal, y-n, y}$ = The incrementally installed power capacity of thermal power generation sources (MW) in the NCPG in year y compared to that of year $y-n$
- $\sum_j CAP_{j, y-n, y}$ = the aggregate incrementally installed power capacity of all kinds of power generation sources j (MW) in the NCPG in year $y-n$ compared to that of year $y-n$
- $EF_{thermal, adv}$ = The emission factor of thermal power generation sources of the NCPG with the efficiency level of the best commercially available technology in P. R. China, for y the most recent historical year for which power generation data is available

$EF_{Thermal, Adv}$ is calculated as follows:

$$EF_{Thermal, Adv} = \lambda_{Coal} \times EF_{Coal, Adv} + \lambda_{Oil} \times EF_{Oil, Adv} + \lambda_{Gas} \times EF_{Gas, Adv} \quad (4)$$

Where:

- $EF_{i, Adv}$ = The CO₂ emission factor of fuel i (tCO₂/MWh) using the best commercially available technology in P. R. China and taking into account the carbon content and the oxidation factor of fuel i ²⁵
- $Coal, Oil$ = Solid fuel, liquid fuel and gaseous fuel respectively
- and Gas
- λ_i = The weight of CO₂ emissions from fuel i fired power plants in the total CO₂ emissions from thermal power, using the most recent available data

And

$$\lambda_{Coal} = \frac{\sum_{i=Coal} FC_{i, y} \times EF_{CO2, i, y}}{\sum_i FC_{i, y} \times EF_{CO2, i, y}} \quad (5)$$

$$\lambda_{Oil} = \frac{\sum_{i=Oil} FC_{i, y} \times EF_{CO2, i, y}}{\sum_i FC_{i, y} \times EF_{CO2, i, y}} \quad (6)$$

$$\lambda_{Gas} = \frac{\sum_{i=Gas} FC_{i, y} \times EF_{CO2, i, y}}{\sum_i FC_{i, y} \times EF_{CO2, i, y}} \quad (7)$$

Where $FC_{i, y}$ and $EF_{CO2, i, y}$ are defined as in equation 1.

$$EF_{grid, BM, y} = 0.7802 \text{ tCO}_2/\text{MWh}$$

For detailed information, please see Annex 3.

²⁵ See <http://qhs.ndrc.gov.cn/qjzfzjz/W020090703644239079814.doc>

**Step 7. Calculate the combined margin emission factor**

The combined margin (CM) emissions factor ($EF_{grid,CM,y}$) is calculated as follows:

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

Where:

$EF_{grid,CM,y}$ = Combined margin CO₂ emissions factor in year y (tCO₂/MWh)

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

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

w_{OM} = Weighting of operating margin emissions factor, which is 0.75 by default

w_{BM} = Weighting of build margin emissions factor, which is 0.25 by default

$$EF_{grid,CM,y} = 0.75 \times 1.0069 + 0.25 \times 0.7802 = 0.9502 \text{ tCO}_2/\text{MWh}$$

For detailed information, please see Annex 3.

Baseline emissions

The baseline emissions (BE_y) are obtained as:

$$BE_y = EG_{PJ,y} \times EF_{grid,CM,y} \quad (9)$$

Where:

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

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

$EF_{grid,CM,y}$ = Combined margin CO₂ emissions factor in year y (tCO₂/MWh)

y

Calculation of $EG_{PJ,y}$

As the Project activity is the installation of a new grid-connected hydropower plant at a site where no hydropower plant was operated prior to the implementation of the Project activity, the following formula applies:

$$EG_{PJ,y} = EG_{facility,y} \quad (10)$$

Where:

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

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

y

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



Data / Parameter:	EF_{OM}
Data unit:	tCO ₂ / MWh
Description:	Operating Margin Emission Factor
Source of data used:	Baseline Emission Factors for Power Grids in China, sourced from http://cdm.ccchina.gov.cn/
Value applied:	1.0069
Justification of the choice of data or description of measurement methods and procedures actually applied :	Calculated according to the updated Baseline Emission Factors for Power Grids in China based on ACM0002 and EB guidance
Any comment:	

Data / Parameter:	EF_{BM}
Data unit:	tCO ₂ / MWh
Description:	Build Margin Emission Factor
Source of data used:	Baseline Emission Factors for Power Grids in China, sourced from http://cdm.ccchina.gov.cn/
Value applied:	0.7802
Justification of the choice of data or description of measurement methods and procedures actually applied :	Calculated according to the updated Baseline Emission Factors for Power Grids in China based on ACM0002 and EB guidance.
Any comment:	

Data / Parameter:	EF_{grid,CM,y}
Data unit:	tCO ₂ / MWh
Description:	Combined margin CO ₂ emission factor for the NCPG
Source of data used:	Baseline Emission Factors for Power Grids in China, sourced from http://cdm.ccchina.gov.cn/
Value applied:	0.9502
Justification of the choice of data or description of measurement methods and procedures actually applied:	Calculated according to the updated Baseline Emission Factors for Power Grids in China based on ACM0002 and EB guidance
Any comment:	

Data / Parameter:	FC_{i,y}
Data unit:	t, m ³
Description:	Amount of fossil fuel type <i>i</i> consumed in the project electricity system in year <i>y</i> (mass or volume unit)
Source of data used:	China Energy Statistics Yearbooks (2006-2008)
Value applied:	See Annex 3
Justification of the choice of data or description of measurement methods and	Official released statistics; publicly accessible and reliable data source



procedures actually applied :	
Any comment:	

Data / Parameter:	$NCV_{i,y}$
Data unit:	MJ/t, kJ/m³
Description:	Net calorific value (energy content) of fossil fuel type <i>i</i> in year <i>y</i>
Source of data used:	China Energy Statistics Yearbook (2006-2008)
Value applied:	See Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Official released statistics; publicly accessible and reliable data source
Any comment:	

Data / Parameter:	$EF_{CO_2,i,y}$
Data unit:	Tco₂/TJ
Description:	CO ₂ emission factor of fossil fuel type <i>i</i> in year <i>y</i>
Source of data used:	2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value applied:	See Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	IPCC default value
Any comment:	

Data / Parameter:	$GEN_{j,y}$
Data unit:	MWh
Description:	The electricity generation by source <i>j</i> in year <i>y</i> of each province connected to the NCPG
Source of data used:	China Electric Power Yearbooks (2004-2008)
Value applied:	See Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Official released statistics; publicly accessible and reliable data source
Any comment:	

Data / Parameter:	<i>Rate of internal use by the power station</i>
Data unit:	%
Description:	The rate of internal use of power source <i>j</i> in each province connected to the NCPG.
Source of data used:	China Electric Power Yearbooks (2006-2008)
Value applied:	See Annex 3



Justification of the choice of data or description of measurement methods and procedures actually applied :	Official released statistics; publicly accessible and reliable data source
Any comment:	

Data / Parameter:	$CAP_{j,y}$
Data unit:	MW
Description:	The aggregate incrementally installed power capacity of all kinds of power generation sources j (MW) in the NCPG in year y
Source of data used:	China Electric Power Yearbooks (2006-2008)
Value applied:	See Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Official released statistics; publicly accessible and reliable data source
Any comment:	

Data / Parameter:	$CAP_{thermal,y-n,y}$
Data unit:	MW
Description:	The aggregate incrementally installed power capacity of thermal power generation sources (MW) in the NCPG in year y compared to that of year $y-n$
Source of data used:	China Electric Power Yearbooks (2006-2008)
Value applied:	See Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Official released statistics; publicly accessible and reliable data source
Any comment:	

B.6.3 Ex-ante calculation of emission reductions:

The *ex-ante* emission reductions (ER_y) are calculated as follows:

$$ER_y = BE_y - PE_y$$

Where:

ER_y = Emission reductions in year y (tCO₂)

BE_y = Baseline emissions in year y (tCO₂)

PE_y = Project Emissions in year y (tCO₂)

Project emissions

According to ACM0002, there are no expected project emissions related to the generation of electricity, as generation is based on a renewable resource.

Therefore $PE_y=0$



According to ACM0002, no leakage needs to be considered.

As a result, $ER_y = BE$

Refer to Section B.6.1. for equations used to estimate baseline emissions.

See Table B.6.1. below for a summary of the values used and the results of the calculation.

Table B.6.1 Key Information and Data Used to calculate the Baseline Emissions

	Per year (average)	7 years
Operating Margin Emissions Factor ($EF_{OM,y}$ in tCO ₂ /MWh)	1.0069	1.0069
Build Margin Emissions Factor ($EF_{BM,y}$ in tCO ₂ /MWh)	0.7802	0.7802
Baseline Emissions Factor (EF_y in tCO ₂ /MWh)	0.9502	0.9502
Electricity supplied to the grid by the Project ($EG_{facility,y}$ MWh)	126,821	887,747
Baseline Emissions (BE tCO ₂)	120,508	843,559

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

Year	Estimation of project activity emissions (tonnes of CO ₂ e)	Estimation of baseline emissions (tonnes of CO ₂ e)	Estimation of leakage (tonnes of CO ₂ e)	Estimation of overall emission reductions (tonnes of CO ₂ e)
2010*	0	120,508	0	120,508
2011	0	120,508	0	120,508
2012	0	120,508	0	120,508
2013	0	120,508	0	120,508
2014	0	120,508	0	120,508
2015	0	120,508	0	120,508
2016	0	120,508	0	120,508
Total (tonnes of CO ₂ e)	0	843,559	0	843,559

*From May 2010 to April 2011.

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

B.7.1 Data and parameters monitored:



Data / Parameter:	$EG_{facility,y}$
Data unit:	MWh/yr
Description:	Quantity of net electricity generation supplied by the project to the grid in year y
Source of data to be used:	Project activity site
Value of data applied for the purpose of calculating expected emission reductions in section B.5	126,821
Description of measurement methods and procedures to be applied:	Net electricity generation is calculated as the difference between power exported to and used from the grid, which are continuously measured and recorded monthly.
QA/QC procedures to be applied:	Cross check measurement results with ETN issued by Grid Company
Any comment:	-

Please refer to Annex 4 for further background documentation.

B.7.2 Description of the monitoring plan:

This section details the steps taken to monitor the GHG emissions reductions on a regular basis from the Inner Mongolia Wujier Phase I Wind Power Project in the Host Country.

The monitoring set-up for this Project has been developed to ensure that from the start, the Project is well-organised in terms of the collection and archiving of complete and reliable data.

1. CDM monitoring Organisation

Roles and responsibilities will be defined for relevant staff involved in CDM monitoring, and the prospect of nominating a CDM Manager will be considered. If appointed, the CDM Manager will have the overall responsibility for the monitoring system on this project. All staff involved in the collection of data and records will be coordinated by him.

2. Staff training

Training is conducted on-site to ensure that staffs are capable of performing their designated tasks to high standards. This will include CDM specific training to warrant that they understand the importance of complete and accurate data and records for CDM monitoring.

3. Maintenance and calibration of monitoring equipment

The electricity meter(s) measuring power output to the grid will be calibrated in line with the relevant and applicable standard. This will ensure that the accuracy of the meters will be within $\pm 0.5\%$.

4. Data collection and record-keeping arrangements



The meter installed at the high voltage side of the on-site transformer is used to obtain the amount of electricity effectively supplied to the Grid and the amount of imported electricity from the Grid. The line loss from the high voltage side of the on-site transformer to the substation of Grid Company has been deducted in the calculation of emission reductions accordingly. The Grid Company has calculated a theoretical line loss rate for this Project as following method:

$$\Delta P = 3 \times I^2 \times S \times R$$

Where:

ΔP : the power loss (kW)

I: the current during the transmission (A)

S: the transmission distance (km)

R: the electric resistance of the transmission line (Ω/km)

$$L = \Delta P / P \times F$$

Where:

L: Line loss rate (%)

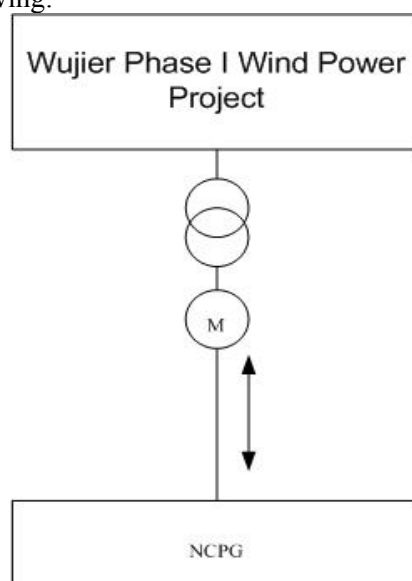
P: the power capacity of transformer (kW)

F: Power factor

The calculated line loss rate is 0.406%.

The meter recording value should be cross checked with the ETN issued by Grid Company.

The monitoring system is as following:



All CDM relevant data will be measured and collected as detailed in Section B.7.1. All data required for verification and issuance will be backed-up and retained for at least two years after the end of the crediting period or the last issuance of CERs of the Project, whichever occurs later.

Data collected on-site will be compiled in an electronic format which will be sent to EcoSecurities on a regular basis.



5. Data Quality Control and Quality Assurance

All data collected on-site will be checked internally before being compiled in an electronic format, to ensure that it is complete and of appropriate quality. EcoSecurities will perform a final check of the data, and analyse project performance prior to any verification.

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 was completed on 13/07/2009. The entity determining the baseline study and the monitoring methodology, and participating in the Project as Carbon Advisor is EcoSecurities International Limited, listed in Annex 1 of this document as a project participant.

Contact: Fang Tan, EcoSecurities International Limited

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People's Republic of China

Telephone: +8610-65181081

e-mail: fang.tan@ecosecurities.com;

Detailed baseline information is provided in Annex 3.

**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:**

>>

18/11/2008²⁶ (the date of the equipment purchase agreement)**C.1.2. Expected operational lifetime of the project activity:**

>>

20 years²⁷**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:**

>>

The crediting period will begin on 01/05/2010, or on the date of registration of the CDM project activity, whichever is later.

C.2.1.2. Length of the first crediting period:

>>

7 years

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

>>

Not applicable.

C.2.2.2. Length:

>>

Not applicable.

²⁶ See the signature list for the equipment purchase agreement.

²⁷ See the Feasibility Study of the Project

**SECTION D. Environmental impacts**

>>

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

>>

According to Clauses 13 and 19 of the Environmental Evaluation Law of the Host Country, the Project entity must analyse the environmental impacts of project activities in the Host Country before utilising natural resources and beginning Project construction. The Project Developer therefore commissioned a third party, the Inner Mongolia Institute of Electricity Power Survey and Design, to conduct the required Environmental Impact Assessment (EIA) in 2008, and the EIA report was approved by the Inner Mongolia Environmental Protection Bureau on 7th May, 2008.

There is no transboundary impact related to the Project, and there is no requisite resettlement or relocation of population, buildings, or public services. Therefore social and environmental influences are considered partial, short-term, and reversible.

Where impacts of the project were identified, mitigation measures were suggested and defined. The EIA highlights the following with regards to the Project, as shown in the following discussion.

Noise

The noise pollution mainly comes from the manual drills and cement mixers during the construction period, and aerodynamic interaction between the wind and turbine blades during operation. The noise levels will be naturally attenuated by ambient conditions. It is stated in the EIA that the project location is far away from the nearest resident area. Therefore, the noise of the turbines will not affect the local residents.

Solid Waste

Most of the waste produced during the construction shall be landfilled or disposed of in an appropriate solid waste disposal site. The household waste will be collected and sent to the local refuse dump.

Wastewater and sewage

The total amount of waste water and sewage from the operation of the project will be very small. The wastewater and sewage from the construction and operational periods will be treated and reused for plant irrigation, which indicates no impact on the surrounding environment.

Dust and Air Quality

The air impact during the construction period mainly comes from airborne dust produced by excavating, by land transportation vehicles, and some exhaust discharge from using and moving construction machinery. Regarding this problem, the project owner will use enclosed or semi-enclosed transportation the construction controls, advocating ‘civilized construction’, and regularly spaying and cleaning the branch roads, material dump sites and other construction work surfaces.

Ecological impact

The proposed wind farm is located in an area of natural grassland. During the construction period, some vegetation will be affected, but this will be restored within a short period. The installation height of the turbines is lower than 100m, so there is not expected to be any significant effect on birds’ migration. In



conclusion, the construction work of this proposed project is not expected to affect the local ecological environment.

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

>>

With mitigation controls planned as part of the Project construction and EIA process, and the contribution made by the project to sustainable development for the local and national area, the Project is expected to have an overall positive impact on the local and global environments. Mitigation measures will ensure that there are no significant residual impacts associated with the Project.

**SECTION E. Stakeholders' comments**

>>

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

>>

The stakeholder consultation for the Project activity took place during May 2009. The consultation invited local stakeholders to submit comments on the Project activity by filling in a questionnaire sent out by the Project Developer. The Project Developer put the notice at the gate of the Hangjin County government office which made the local stakeholders aware that the project developer would undertake a consultation on the Proposed Project. The notice included a technical description of the Project as well as a brief explanation of how the project activity mitigates climate change through the Clean Development Mechanism of the Kyoto Protocol, and brings other sustainable development benefits.

The questionnaires were sent out around the project site. The questions asked were as follows:

- What impacts do you think the CDM Project activity will have on the local environment?
- What impacts do you think the CDM Project activity will have on employment in the local area?
- What impacts do you think the CDM Project activity will have on your livelihood?
- What impacts do you think the CDM Project activity will have on social welfare in the local area?
- What would be the overall effects of the construction and operation of the CDM Project?
- What is your attitude towards the construction of the CDM Project?

34 questionnaires were sent to the stakeholders by the Project Developer. The stakeholders are all local residents including governmental officials (4 people), local residents (27 people) and related employees (3 people). A full list of stakeholders consulted is available from the Project Developer.

E.2. Summary of the comments received:

>>

The survey received 100% participation (34 questionnaires returned out of 34). The survey shows the stakeholders believe that the proposed CDM project activity will have positive impacts on the local ecological, environmental, employment and social life. All stakeholders expressed their support for the proposed project. A full list of the filled-in questionnaires is available from the project developer.

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

>>

No negative comments were received on the project.

**Annex 1****CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY****Project developer:**

Organization:	Inner Mongolia Xinjin Wind Power Co., Ltd.
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State/Region:	Inner Mongolia
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FAX:	0471-4223486
E-Mail:	cfsh@vip.sina.com
URL:	-
Represented by:	Sheng Yanfeng
Title:	Director
Salutation:	Mr.
Last Name:	Sheng
Middle Name:	
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**Project Annex 1 participant:**

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Represented by:	
Title:	Director
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Last Name:	Browne
Middle Name:	-
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Department:	-
Mobile:	-
Direct FAX:	-
Direct tel:	-
Personal E-Mail:	cdm@ecosecurities.com



Annex 2

INFORMATION REGARDING PUBLIC FUNDING

This Project will not receive any public funding.

**Annex 3****BASELINE INFORMATION****Calculation of the Operating Margin Emission Factor of North China Power Grid**Table A1 CO₂ emissions from thermal power plants of the North China Power Grid (2005)

Fuel Type	Unit	Beijing	Tianjin	Hebei	Shanxi	Inner Mongolia	Shandong	Subtotal	EF (tC/TJ)	NCV (MJ/t,kJ/m ³)	CO ₂ emissions (tCO ₂ e) I=G*H*44/(12*100) (mass unit) I=G*H*44/(12*10) (volume unit)
		A	B	C	D	E	F	G=A+B+C+D+E+F	H	I	
Raw Coal	10000t	897.75	1675.2	6726.5	6176.45	6277.23	10405.4	32158.53	25.8	20,908	586,979,486
Clean Coal	10000t						42.18	42.18	25.8	26,344	970,069
Other washed coal	10000t	6.57		167.45	373.65		108.69	656.36	25.8	8,363	4,792,018
Coke	10000t					0.21	0.11	0.32	29.2	28,435	8,708
Coke Oven Gas	10 ⁸ m ³	0.64	0.75	0.62	21.08	0.39		23.48	12.1	16,726	1,464,870
Other Coal Gas	10 ⁸ m ³	16.09	7.86	38.83	9.88	18.37		91.03	12.1	5,227	1,774,786
Crude oil	10000t					0.73		0.73	20	41,816	21,704
Gasoline	10000t			0.01				0.01	18.9	43,070	291
Diesel	10000t	0.48		3.54		0.12		4.14	20.2	42,652	128,197
Fuel Oil	10000t	12.25		0.23		0.06		12.54	21.1	41,816	395,901
PLG	10000t							0	17.2	50,179	0
Refinery Gas	10000t			9.02				9.02	15.7	46,055	200,231
Natural Gas	10 ⁸ m ³	0.28	0.08		2.76			3.12	15.3	38,931	659,553
Other petroleum products	10000t							0	20	38,369	0
other coking products	10000t							0	25.8	28,435	0
Other energy	10000tce	8.58		32.35	69.31	7.27	118.9	236.41	0	0	0
										Total	597,395,812

Data source: China Energy Statistics Yearbook 2006



Table A2 Electricity Generation of North China Power Grid (2005)

Province	Power generation (100GWh)	Electricity generation (MWh)	Used by the power station (%)	Power output (MWh)
Beijing	208.80	20,880,000	7.73	19,265,976
Tianjin	369.93	36,993,000	6.63	34,540,364
Hebei	1,343.48	134,348,000	6.57	125,521,336
Shanxi	1,287.85	128,785,000	7.42	119,229,153
Inner Mongolia	923.45	92,345,000	7.01	85,871,616
Shandong	1,898.80	189,880,000	7.14	176,322,568
total		603,231,000		560,751,013

Data source: China Energy Statistics Yearbook 2006

transferred from Northeast China Grid MWh	3929000
EF of Northeast China Grid tCO ₂ e/MWh	1.16489
total emissions tCO ₂	601,972,682
total power output	564680013
EF tCO ₂ e/MWh	1.06604

Table A3 CO₂ emissions from thermal power plants of the North China Power Grid (2006)

Fuel Type	Unit	Beijing	Tianjin	Hebei	Shanxi	Inner Mongolia	Shandong	Subtotal	EF	NCV	CO ₂ emissions (tCO ₂ e)
									(tC/TJ)	(MJ/t,kJ/m ³)	J=G*H*I*44/12/100 (mass unit)
		A	B	C	D	E	F	G=A+B+C+D+E+F	H	I	J=G*H*I*44/12/10 (volume unit)
Raw Coal	10000t	796.63	1639.2	6867.99	6968.88	8404.05	10930.66	35607.41	25.8	20,908	649,930,803
Clean Coal	10000t						39.77	39.77	25.8	26,344	914,643
Other washed coal	10000t	6.36		214.13	371.14	61.77	544.6	1198	25.8	8,363	8,746,477
briquette	10000t	7.97					27.77	35.74	26.6	20908	652,351
Coke	10000t						3.23	3.23	29.2	28,435	87,896
Coke Oven Gas	10 ⁸ m ³	0.38	0.63	5.8	22.32	0.64	5.79	35.56	12.1	16,726	2,218,517
Other Coal Gas	10 ⁸ m ³	20.66	6.58	69.72	13.79	22.76	7.22	140.73	12.1	5,227	2,743,772
Crude oil	10000t					0.74		0.74	20	41,816	22,001
Gasoline	10000t			0.01				0.01	18.9	43,070	291
Diesel	10000t	0.21		3.01		0.07	6.32	9.61	20.2	42,652	297,577
Fuel Oil	10000t	6.38		0.08			4.1	10.56	21.1	41,816	333,391
LPG	10000t						0.01	0.01	17.2	50,179	309
Refinery Gas	10000t			2.43			2.32	4.75	15.7	46,055	105,443
Natural Gas	10 ⁸ m ³	3.41	0.73		0.53			4.67	15.3	38,931	987,216
Other petroleum products	10000t						0.28	0.28	20	38,369	8,840
other coking products	10000t							0	25.8	28,435	0
Other energy	10000tce	6.83		47.11	230.76	12.51	132.29	429.5	0		0
										Total	667,049,525

Data source: China Energy Statistics Yearbook 2007



Table A4 Electricity Generation of North China Power Grid (2006)

Province	electricity generation	Electricity generation	Used by the power station	Power output
	(100GWh)	(MWh)	(%)	(MWh)
Beijing	207.05	20705000	7.51	19,150,055
Tianjin	359.24	35924000	6.86	33,459,614
Hebei	1438.88	143888000	6.63	134,348,226
Shanxi	1502.5	150250000	7.45	139,056,375
Inner Mongolia	1395.93	139593000	7.58	129,011,851
Shandong	2309.22	230922000	7.12	214,480,354
total		721282000		669,506,473

Data source: China Energy Statistics Yearbook 2007

transferred from Northeast China Grid MWh	2,618,060
EF of Northeast China Grid tCO ₂ e/MWh	1.14972
transferred from Central China Power Grid MWh	497,060
EF of Northeast China Grid tCO ₂ e/MWh	1.12157
total emissions tCO ₂	670,617,037
total power output	672,621,593
EF tCO ₂ e/MWh	0.99702

Table A5 CO₂ emissions from thermal power plants of the North China Power Grid (2007)

Fuel Type	Unit	Beijing	Tianjin	Hebei	Shanxi	Inner Mongolia	Shandong	Subtotal	EF (tC/TJ)	NCV (MJ/t,kJ/m ³)	CO ₂ emissions (tCO ₂ e) J=G*H*44/12/100 (mass unit) J=G*H*44/12/10 (volume unit)
		A	B	C	D	E	F	G=A+B+C+D+E+F	H	I	
Raw Coal	10000t	816.17	1753.99	7716.13	7510.06	10434.25	11884.83	40115.43	25.8	20,908	732,214,267
Clean Coal	10000t						18.43	18.43	25.8	26,344	423,859
Other washed coal	10000t	5.76		156.89	478.81	48.57	756.84	1446.87	25.8	8,363	10,563,452
Coke	10000t	7.93					42.86	50.79	26.6	20,908	927,054
Coke Oven Gas	10 ⁸ m ³			0.02			4.09	4.11	29.2	28,435	111,843
Other Coal Gas	10 ⁸ m ³	0.07	0.72	3.13	25.46	2.58	13.61	45.57	12.1	16,726	2,843,020
Crude oil	10000t	11.8	7.6	88.38	72.8	28.17	29.64	238.39	12.1	5,227	4,647,821
Gasoline	10000t							0	20	41,816	0
Diesel	10000t			0.01				0.01	18.9	43,070	291
Fuel Oil	10000t	0.33		2.35		0.62	5.08	8.38	20.2	42,652	259,490
LPG	10000t	4.74		0.18			2.35	7.27	21.1	41,816	229,522
Refinery Gas	10000t							0	17.2	50,179	0
Natural Gas	10 ⁸ m ³	0.06		2.85			1.65	4.56	15.7	46,055	101,225
Other petroleum products	10000t	5.03	0.73		0.54	4.22	0.01	10.53	15.3	38,931	2,225,993
other coking products	10000t	1.72						1.72	20	41,816	54,302
Other energy	10000tce	4.74						4.74	25.8	28,435	128,986
										0	0
										小计	754,731,124

Data source: China Energy Statistics Yearbook 2008



Table A6 Electricity Generation of North China Power Grid (2007)

Province	Power generation	Electricity generation	Used by the power station	Power output
	(100GWh)	(MWh)	(%)	(MWh)
Beijing	223	22,300,000	7.51	20,625,270
Tianjin	399	39,900,000	6.53	37,294,530
Hebei	1633	163,300,000	6.67	152,407,890
Shanxi	1734	173,400,000	7.99	159,545,340
Inner Mongolia	1801	180,100,000	7.77	166,106,230
Shandong	2591	259,100,000	7.23	240,367,070
total		838,100,000		776,346,330

Data source: China Energy Statistics Yearbook 2008

transferred from Northeast China Grid MWh	1,789,750
EF of Northeast China Grid tCO ₂ e/MWh	1.08186
transferred from Central China Power Grid MWh	803,000
EF of Northeast China Grid tCO ₂ e/MWh	1.10197
total emissions tCO ₂	757,552,268
total power output	778,939,080
EF tCO ₂ e/MWh	0.97254

Table A7 Operating Margin Emission Factor of the North China Power Grid

	Emission Factor	Electricity generated(MWh)	Emission
OM2005	1.06604	564680013	652198327.1
OM2006	0.99702	672,621,593	726,789,037
OM2007	0.97254	778,939,080	757,552,268
Average EF_{OM} (tCO₂/MWh)	1.0069		

**Calculation of the Build Margin Emission Factor of North China Power Grid**Table A8 Calculation of CO₂ Emission of Solid, Liquid and Gas Fuel for Power Grid

Fuel Type	Unit	Beijing	Tianjin	Hebei	Shanxi	Shandong	Inner Mongolia	Subtotal	NCV	EF	CO ₂ emissions (tCO ₂ e)
									(MJ/t,kJ/m ³)	(tC/TJ)	J=G*H*44/(12*100) (mass unit)
		A	B	C	D	E	F	G=A+B+C+D+E+F	H	I	J=G*H*44/12/10 (volume unit)
Raw Coal	10000t	816.17	1,753.99	7,716.13	7,510.06	11,884.83	10,434.3	40,115.43	20,908	87,300	732,214,267
Clean Coal	10000t	0	0	0	0	18.43	0	18.43	26,344	87,300	423,859
Other washed coal	10000t	5.76	0	156.89	478.81	756.84	48.57	1,446.87	8,363	87,300	10,563,452
Briquette	10000t	7.93	0	0	0	42.86	0	50.79	20,908	87,300	927,054
Coke	10000t	0	0	0.02	0	4.09	0	4.11	28,435	95,700	111,843
Subtotal	10000t	4.74	0	0	0	0	0	4.74	28,435	95,700	128,986
Crude oil	10000t										744,369,461
Gasoline	10001t	0	0	0	0	0	0	0	41,816	71,100	0
Kerosene	10000t	0	0	0.01	0	0	0	0.01	43,070	67,500	291
Diesel	10000t	0.33	0	2.35	0	5.08	0.62	8.38	42,652	72,600	259,490
Fuel Oil	10000t	4.74	0	0.18	0	2.35	0	7.27	41,816	75,500	229,522
Other petroleum products	10000t	1.72	0	0	0	0	0	1.72	41,816	75,500	54,302
Other Coke products											543,604
Subtotal		50.3	7.3	0	5.4	0.1	42.2	105.3	38,931	54,300	2,225,993
Natural Gas	10 ⁷ m ³	0.7	7.2	31.3	254.6	136.1	25.8	455.7	16,726	37,300	2,843,020
Coke Oven Gas	10 ⁷ m ³	118	76	883.8	728	296.4	281.7	2,383.9	5,227	37,300	4,647,821
Other Coal Gas	10 ⁷ m ³	0	0	0	0	0	0	0	50,179	61,600	0
PLG	10000t	0.06	0	2.85	0	1.65	0	4.56	46,055	48,200	101,225
Subtotal											9,818,059
Total											754,731,124

Data source: China Energy Statistical Yearbook 2008



Table A9 Installed capacities of North China Power Grid (2007)

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

Data source: China electricity statistical yearbook 2008

Table A10 Installed capacities of North China Power Grid (2006)

Type	Unit	Beijing	Tianjin	Hebei	Shanxi	Inner Mongolia	Shandong	Total
Thermal power	MW	3984	6512	26087	26661	28899	49395	141538
Hydro power	MW	1053	5	785	790	818	553	4004
Nuclear power	MW	0	0	0	0	0	0	0
Wind farm and others	MW	24	24	218	0	565	106	937
Total	MW	5061	6541	27090	27451	30282	50054	146479

Data source: China electricity statistical yearbook 2007

Table A11 Installed capacities of North China Power Grid (2005)

Type	Unit	Beijing	Tianjin	Hebei	Shanxi	Inner Mongolia	Shandong	Total
Thermal power	MW	3833.5	6149.9	22333.2	22246.8	19173.3	37332	111068.7
Hydro power	MW	1025	5	784.5	783	567.9	50.8	3216.2
Nuclear power	MW	0	0	0	0	0	0	0
Wind farm and others	MW	24	24	48	0	208.9	30.6	335.5
Total	MW	4882.5	6178.9	23165.7	23029.8	19950.2	37413.4	114620.4

Data source: China electricity statistical yearbook 2006



Table A12 Emission factor of coal-fired plants, gas-fired plants and oil-fired plants in the North China Power Grid

	Efficiency	Carbon content (tC/TJ)	Oxidation factor (%)	Emission factor (tCO ₂ /MWh) D=3.6/A/1,000,000×B×C
	A	B	C	
EF_{coal,Adv}	38.10	87,300	1	0.8249
EF_{gas,Adv}	49.99	75,500	1	0.5437
EF_{oil,Adv}	49.99	54,300	1	0.3910
Source	Data from the NDRC http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File1875.pdf	2006 IPCC Guidelines for National Greenhouse Gas Inventories	2006 IPCC Guidelines for National Greenhouse Gas Inventories	

Table A.13. Share of different fossil fuels in the total CO₂ emissions from thermal power plants of the North China Power Grid

Item	Value
Λ _{coal}	98.63%
Λ _{oil}	0.07%
Λ _{gas}	1.30%

Therefore $EF_{thermal} = \lambda_{coal} * 0.8249 + \lambda_{oil} * 0.5437 + \lambda_{gas} * 0.3910 = 0.8191 \text{ tCO}_2\text{e/MWh}$



Table A14 Incremental installed capacity from 2005-2007

Type	installed capacity in 2005 A	installed capacity in 2006 B	installed capacity in 2007 C	new added installed capacity from 2005 to 2007 D=C-A	Split of new capacity
Thermal power	111,068.7	141,538	164,800	53,731.3	95.25%
Hydro power	3,216.2	4,004	4,510	1,293.8	2.29%
Nuclear power	0	0	0	0	0.00%
Wind farm and others	335.5	937	1,719.2	1,383.7	2.45%
Total	114,620.4	146,479	171,029.2	56,408.8	100.00%
Compared to the capacity in 2006	67.02%	85.65%	100%		

$$EF_{\text{grid,BM,y}} = 0.8191 * 95.25\% = 0.7802 \text{ tCO}_2/\text{MWh}$$

Table A15 Baseline Emission Factor of the North China Power Grid (tCO₂/MWh)

A	Operating Margin Emission Factor	1.0069
B	Build Margin Emission Factor	0.7802
C	Combined Emission Factor (C=0.75*A+0.25*B)	0.9502

**Annex 4****MONITORING INFORMATION****Table 4.1.** CDM Monitoring System Procedures

Procedure name	Description
CDM staff training	This procedure outlines the steps to ensure that staff receive adequate training to collect and archive complete and accurate data necessary for CDM monitoring.
CDM data and record keeping arrangements	This procedure provides details of the site's data and record-keeping arrangements. The arrangements ensure that complete and accurate records are retained by the CDM Manager, or an appropriate senior manager, within the quality control system.
Data collection	This procedure will outline the steps to collect data from the electricity meter(s)
CDM data Quality Control and Quality Assurance	Data and records will be checked prior to being stored and archived. Data from the Project will be checked to identify possible errors or omissions. The data checks will include cross-checks of the electricity figures on the receipts. All records will be checked for completeness.
Equipment failure	This procedure details the process of data collection in the event a problem with any meter occurs.
Equipment calibration	This procedure details the process of organising and managing the calibration process. The procedure includes details of how a suitable company or organisation is commissioned to undertake calibration to the relevant standards.

The above procedures will be available during the verification, and will be documented as part of the monitoring support material. The procedures may be contained in a single document (e.g. a 'Monitoring Manual') for CDM monitoring rather than separate procedures. Some of these procedures may exist in the form of existing on-site practises.

**Table 4.2.** Operational procedures and responsibilities for monitoring and quality assurance of emissions reductions from the project activity

Task	On-site technician	Operations manager	Project developer's head office	Head of Maintenance / External company	EcoSecurities
Collect Data	E	R	-	-	-
Enter data into Spreadsheet	-	E	R	-	-
Make monitoring reports	-	E	R	-	I
Archive data & reports	-	E	R	-	-
Calibration/ Maintenance	I	I	I	E	I

Legend: *E* = responsible for executing data collection, *R* = responsible for overseeing and assuring quality, *I* = to be informed, - = not applicable
