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

CONTENTS

Annexes

SECTION A. General description of project activity

A.1 Title of the project activity:

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Xinjiang Jimunai CGN Phase I Wind Farm Project
Version number of the document: 3
Date: 19/08/2011

A.2. Description of the project activity:

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The Xinjiang Jimunai CGN Phase I Wind Farm Project (hereafter refers to the proposed project) is to utilize wind resources for electricity generation through the construction of a wind farm with the installation of 33 wind turbines with capacities of 1500 kW each, which amount to a total installed capacity of 49.5 MW in Jimunai County, Xinjiang Uygur Autonomous Region, P. R. China. The electricity generated from the proposed project will be sold to Xinjiang Uygur Power Grid, an integral part of the Northwest China Power Grid (NWPG). By replacing the electricity generated from fossil fuel-fired power plants dominated NWPG; the proposed project will achieve greenhouse gas (GHG) emission reductions by avoiding CO_2 emissions. The estimated annual net electricity output and emission reductions of the proposed project are 117,315 MWh and 107,695 tCO_2e, respectively. The proposed project is a grid-connected renewable energy project.

The purpose of the proposed project is to generate renewable wind power and deliver it to NWPG. For the proposed project,

(a) Prior to the start of implementation of the project activity, there is no power generation unit at the site of the proposed project, and the electricity was supplied by the NWPG which was dominated by fossil fuel-fired power plants.
(b) The project scenario is the implementation of the proposed project which will supply an average annual electricity of 117,315MWh to NWPG and replace the same amount of electricity supplied by NWPG which is dominated by fossil fuel-fired power plants. According to ACM0002 (version 12.1.0) applied, the proposed project is a renewable electricity generating activity.
(c) The baseline scenario of the proposed project is the electricity supply of equal amount as the proposed project from the NWPG. The baseline scenario of the proposed project is the same against the scenario prior to the start of the implementation of the project activity.

The proposed project makes contribution to the local sustainable development as follows:

1. GHG emission reduction
The proposed project activity will achieve greenhouse gas (GHG) emission reductions by reducing CO_2 emissions, as grid-connected fossil fuel-fired power dominates in the NWPG.

2. Pollutants emission reduction through replacing fossil fuel combustion
The proposed project is to reduce grid-connected fossil fuel-fired power plants in the NWPG, and thus reduce fossil fuel consumption and avoid pollutants emission, such as sulphur dioxide and dust, brought by fossil fuel combustion. Therefore, the proposed project has obvious environmental benefit.

3. Employment opportunities

The conducting of the proposed project will offer job opportunities for local people. The temporary work includes assembly and installation of the wind turbines and the long-term work can be the maintenance of the facilities, etc.

4. Contribution to the Development of the local Region
The construction and operation of the project will be favourable to the economic growth of the local city with expected revenues.

A.3. Project participants:

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Please list project participants and Party(ies) involved and provide contact information in Annex 1. Information shall be in indicated using the following tabular format.

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)	Xinjiang Jimunai CGN Wind Power Co., Ltd.	No
The United Kingdom of Great Britain and Northern Ireland	Deutsche Bank AG (Filiale London)	No

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

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A.4.1.1. Host Party(ies):

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People's Republic of China

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

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Xinjiang Uygur Autonomous Region

A.4.1.3. City/Town/Community etc:

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Jimunai County, Altay City

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

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The proposed project is located at the southwest of Jimunai County, Xinjiang Uygur Autonomous Region, P. R. China. The geographical coordinates of the proposed project is 86.0054°- 86.8443° east longitude and 47.5454°- 47.5796° north latitude. Figures 1 and 2 below show the geographical location of the proposed project.

Figure A1. The location of the proposed project in the map of P. R. China

Figure A2. The location of the proposed project in the map of Xinjiang Uygur Autonomous Region, P. R. China

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

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Category: Renewable electricity in grid connected applications
Sectoral Scope: 1 Energy industries

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

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The proposed project is to utilize wind resources for electricity generation in Jimunai County, Xinjiang Uygur Autonomous Region, P. R. China. The proposed project is a grid-connected renewable energy project.

Prior to the start of implementation of the project activity, there is no power generation unit at the site of the proposed project, and the electricity was supplied by the NWPG. The baseline scenario of the proposed project is the electricity supply of equal amount as the proposed project from the NWPG. In the NWPG, installed thermal power plants account for 72.44% of the total installed capacity in 2008, hydropower plants account for 25.60%, wind power plants and other kinds of power plants account for 2.08%.[1] The baseline scenario of the proposed project is the same as the scenario prior to the start of the implementation of the project activity.

The project scenario is the implementation of the proposed project, the installation and operation of 33 sets of wind turbines with a total capacity of 49.5MW which will supply an average annual electricity of 117,315MWh to NWPG and replace the same amount of electricity supplied by fossil fuel-fired power plants connected to NWPG. In accordance with the EB's guidelines for the reporting and validation of plant load factors (version 01, EB48, 2009), the plant load factor provided to the government while applying the project activity for implementation approval will be adopted, which is defined ex-ante to be 27.05%[2].

The wind turbines will be supplied by a domestic manufacturer –Goldwind Co., Ltd. The proposed project uses domestic wind turbines. Therefore, it does not involve any technology transfer.

The main technical specifications of the wind turbine are provided in the following table.

Table A.1 The main technical parameters of wind turbine and generator[3]

Wind Turbine		
Item	Unit	Index
Model		77/1500
Rated capacity	kW	1500
Number of blades		3
Rotor diameter	m	77
Swept area	m^2	4656
Rotor speed	m/s	36.28/69.75
Cut-in speed	m/s	3.0
Rated wind speed	m/s	11.5
Cut-off speed	m/s	22
Height of hub	m	65
Generator		
Rated power	kW	1580
Rated voltage	V	620
Rated current	A	660
Lifetime	year	20

[1] China Electric Power Yearbook 2009, Page 694

[2] The Feasibility Study Report (FSR), which was developed by the qualified and contracted third party ---- the Xinjiang Survey and Design Institute of Water Resources and Hydropower Ministry of Water Resource.

[3] The source of the parameters is wind turbine purchase contract

A 35kV/110kV substation will be set up at the project site. The electricity supplied by the proposed project will be delivered to the 35kV/110kV on-site substation via a 35kV transmission line, and then the electricity supplied by the proposed project will delivered to Longwan Substation through 110kV transmission line. The electricity will be transmitted to the NWPG finally. The electricity supplied to the grid by the proposed project will be monitored through metering equipment (meter monitoring both electricity input and electricity output) at the on-site substation. The data will be also monitored and recorded at the on-site control centre using a computer system.
The proposed project will use domestic wind turbines. Hence, it does not involve technology transferred to the host parties.

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

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A crediting period of 7 (01/01/2012-31/12/2018) years (renewable twice) is selected for the project activity. An estimation of emissions reductions expected over the crediting period is provided in the table below.

Table A.2 Estimated emission reduction of the proposed project

Years	**Annual estimation of emission reductions in tonnes of CO_2e**
01/01/2012~31/12/2012	**107,695**
01/01/2013~31/12/2013	**107,695**
01/01/2014~31/12/2014	**107,695**
01/01/2015~31/12/2015	**107,695**
01/01/2016~31/12/2016	**107,695**
01/01/2017~31/12/2017	**107,695**
01/01/2018~31/12/2018	**107,695**
Total estimated reductions (tonnes of CO_2e)	**753,865**
Total number of the first crediting years	**7**
Annual average over the crediting period of estimated reductions (tonnes of CO_2e)	**107,695**

A.4.5. Public funding of the project activity:

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There is no public funding for this project.

SECTION B. Application of a baseline and monitoring methodology

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

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The approved methodology applied in the proposed project activity is ACM0002 (version 12.1.0) – "Consolidated baseline methodology for grid-connected electricity generation from renewable sources".
Reference:
http://cdm.unfccc.int/UserManagement/FileStorage/VA17EM2PNDJWBTFY34KGRLZO68S9UQ

"Tool for the demonstration and assessment of additionality (version 05.2)" and
Reference:
http://cdm.unfccc.int/methodologies/PAmethodologies/AdditionalityTools/Additionality_tool.pdf
"Tool to calculate the emission factor for an electricity system (version 02.1.0)" is also applied in the proposed project.
Reference:
http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v2.1.0.pdf

The following are the justification of choice of tools:

"Combined tool to identify the baseline scenario and demonstrate additionality (version 02.2)" is not applied in the proposed project, since the project activity is a Greenfield plant, the retrofit or replacement of existing grid-connected renewable power plant/unit(s) at the project site is not involved.

"Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion (version 02)" is not applied in the proposed project, since no fossil fuel combustion is involved in the proposed project.

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

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The proposed project is a grid-connected renewable power generation project activity that installs a new power plant at a site where no renewable power was operated prior to the implementation of the project activity (greenfield plant). It meets all applicability conditions of methodology ACM0002 (version 12.1.0) which is listed as follows:

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

   The project activity is the installation of a new wind power plant.

2) **In the case of capacity additions, retrofits or replacements: the existing plant started commercial operation prior to the start of a minimum historical reference period of five years, used for the calculation of baseline emissions and defined in the baseline emission section, and no capacity expansion or retrofit of the plant has been undertaken between the start of this minimum historical reference period and the implementation of the project activity;**

The project doesn't belong to these types, so it doesn't need to consider this applicability condition.

3) **In case of hydro power plants, one of the following conditions must apply: The project activity is implemented in an existing reservoir, with no change in the volume of reservoir; or The project activity is implemented in an existing reservoir, where the volume of reservoir is increased and the power density of the project activity, as per definitions given in the Project Emissions section, is greater than 4 W/m^2; The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the Project Emissions section, is greater than 4 W/m^2.**

The Project is not a hydro power plant, so it doesn't need to consider this applicability condition.

4) **The methodology is not applicable to the following: Project activities that involve switching from fossil fuels to renewable energy sources at the site of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site; Biomass fired power plants; Hydro power plants that result in new reservoirs or in the increase in existing reservoirs where the power density of the power plant is less than 4W/m^2.**

The Project is a new grid-connected wind power plant, therefore: The Project doesn't involve switching from fossil fuels to renewable energy sources at the site of the project activity; The Project isn't a biomass fired power plant; The Project isn't a hydro power plant.
So it doesn't need to consider this applicability condition.

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

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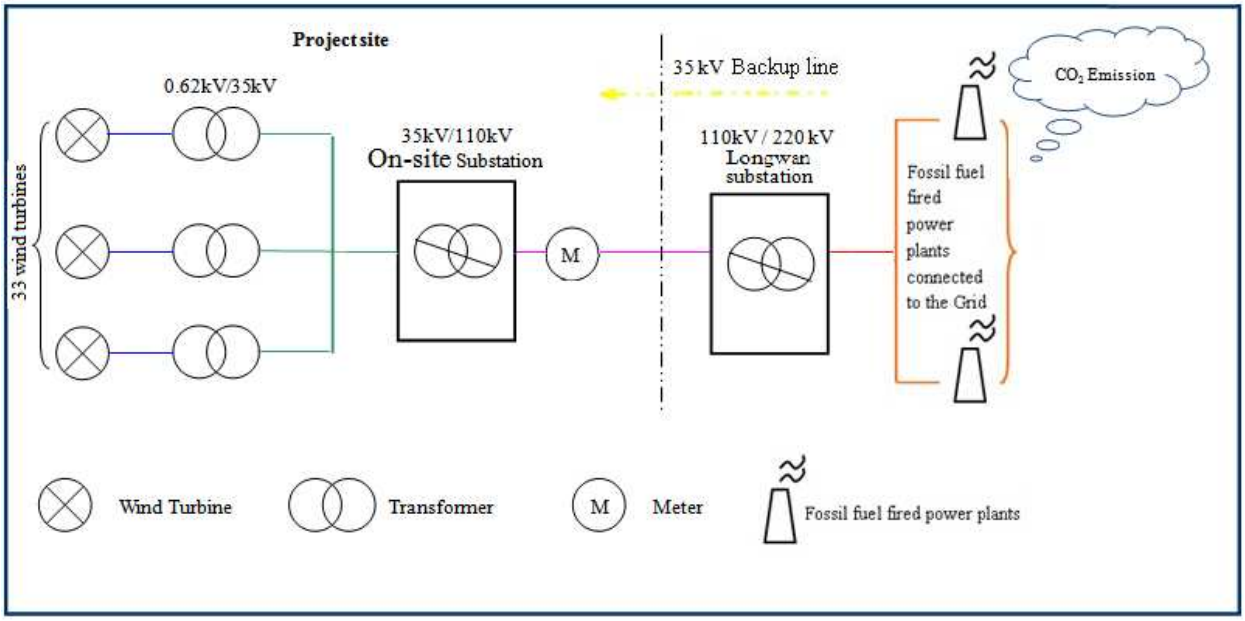
Table B.1 sources and gases included in the project boundary

	Source	Gas	Included?	Justification / Explanation
Baseline	CO2 emissions from electricity generation in fossil fuel-fired power plants that is displaced due to the project activity.	CO_2	Yes	Main emission source.
		CH_4	No	Minor emission source.
		N_2O	No	Minor emission source.
Project Activity	The wind power plant	CO_2	No	No GHG emissions from wind power projects.
		CH_4	No	Excluded according to methodology.
		N_2O	No	Excluded according to methodology.

The flow diagram of the proposed project is illustrated as below:



The spatial extent of the proposed project boundary includes the proposed project site and all power plants connected physically to the NWPG (NWPG).

The NWPG is the project electricity system, which is defined by the spatial extent of the power plants that can be dispatched without significant transmission constraints. In determining this project electricity system, all the scenarios mentioned are taken into account.

According to the "Tool to calculate the emission factor for an electricity system" (version 02.1.0), the delineation of grid boundaries as provided by the DNA[4] of China is used. In accordance with the *Notification on Baseline Emission Factor of China's Grid* issued by Chinese DNA on 20/12/2010, NWPG consists of Shaanxi, Gansu, Qinghai, Ningxia and Xinjiang Power Grids, which covers Xinjiang Uygur Autonomous Region where the proposed project located.

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

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The project activity is the installation of a new grid-connected wind power project and the generated power shall be exported to the NWPG, according to the applied ACM0002 (version 12.1.0), the baseline scenario is identified as below:

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 within NWPG, as reflected in the combined margin (CM) calculations described in the "Tool to calculate the emission factor for an electricity system"(version 02.1.0).

[4] Source: 2010 Baseline Emission Factors for Power Grids in China

http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File2552.pdf

The NWPG only possesses 21.82% of its total electricity generation that comes from renewable energy sources in 2008, 22.426% in 2007, 24.71% in 2006, 27.45% in 2005, and 20.57% in 2004[5]. Hence, the low operating cost/must run sources is much less than 50% of the total grid generation, Consequently, Simple OM method is selected to calculate the Operating Margin emission factor (OM) of the proposed project.

Parameters used to determine the baseline emission are listed in the following table:

Parameter	Data	Source
$EF_{grid,OM,y}$ (tCO_2/MWh)	0.9947	Calculated in Annex 3
$EF_{grid,BM,y}$ (tCO2/MWh)	0.6878	Calculated in Annex 3
$EF_{grid,CM,y}$ (tCO2/MWh)	0.9180	Calculated in Annex 3

Therefore, supply of equivalent annual power output by the Northeast China Power Grid is the baseline scenario for the proposed project activity.

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

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The additionality of the proposed project is demonstrated and assessed by the approved "Tool for the Demonstration and Assessment of Additionality (Version 05.2)". Following steps include:

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

As per the clause 105 of CDM validation and verification manual version 01.2: the PDD shall identify credible alternatives to the project activity in order to determine the most realistic baseline scenario, unless the approved methodology that is selected by the proposed CDM project activity prescribes the baseline scenario and no further analysis is required.

The proposed project is a new grid-connected renewable power plant, the electricity supplied by the proposed project will be delivered to the NWPG, and methodology ACM0002 (version 12.1.0) has clearly prescribed the baseline scenario for the project activity, therefore, no further analysis is required for the identification of alternatives to the project activity.

Step 2. Investment analysis

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

Sub-step 2a. Determine appropriate analysis method

The three analysis methods suggested by *Tools for the demonstration and assessment of additionality* are simple cost analysis (Option I), investment comparison analysis (Option II) and benchmark analysis (Option III). Since the proposed project will earn revenues from not only the CDM but also the electricity

[5] China Electric Power Yearbook *2005-2009*

output, the simple cost analysis method is not appropriate. Investment comparative analysis method is only applicable to the case that alternative baseline scenario is similar to the proposed projects, so that comparative analysis can be conducted. The alternative baseline scenario of the proposed project is to supply electricity from the NWPG rather than a new investment project. Therefore, Option II is not an appropriate method either. The proposed project will use benchmark analysis method based on Project IRR (post tax).

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

With reference to *Interim Rules on Economic Assessment of Electric Engineering Retrofit Projects* issued by the State Power Corporation of China in 2002, the benchmark of project financial internal rate of return (IRR) of China electricity industry is 8%, and only if the project IRR (post tax) of the project is higher than or equivalent to this benchmark, the proposed project is financially feasible to investors. Therefore, 8% is adopted.

The benchmark is adopted by State Power Corporation which is in charge of the power industry. In section 1.11 of the reference document, it indicates that the economic benchmark is regulated for the entire power industry. The proposed project's FSR also adopts the 8% Project IRR (post tax) for financial analysis. Developed by an accredited entity in China, the FSR was also approved by the local authority. As the wind farm technology applied is a mature new technology available in the wind turbine market, and thus it is applicable to use this benchmark of 8%. In addition, this benchmark is also commonly applied in China's CDM projects for the benchmark of power industry.

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

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

(1) Basic parameters for calculation of financial indicators

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

Table B.2 Parameters for calculation of the Project IRR (post tax)

Parameter	Value	Data Source
Installed capacity	49.5 MW	FSR P1-6
Annual Power Generation:	117,315 MWh	FSR P5-11
Total Static Investment	489.60 million RMB	FSR P13-2
Operational Hour	2,370h	FSR P5-11
Annual O&M cost	17.84 million RMB	FSR Table in Chapter 14
Depreciation period	15 years	FSR Table in Chapter 14
Tariff	0.58 RMB/KWh (Including VAT)	FSR P14-5
Tax Rate	17% (VAT)[6]	Natioanl Tax Document and Feasibility Study Report
	25% (income tax)[7]	
	3% (Educational surtax)[8]	

[6] The Interim Regulation of the People's Republic of China on Value Added Tax, Order No.538 of the State Council, http://www.gov.cn/zwgk/2008-11/14/content_1149516.htm;

[7] Law of Enterprise Income Tax of the People's Republic of China, Order No. 63 of the President of the People's Republic of China, http://www.gov.cn/ziliao/flfg/2007-03/19/content_554243.htm

	5% (City maintenance and construction tax)[9]	
Expected CERs price:	10.5 Euro/tCO_2e	Emission Eductions Purchased agreement

Annual Electricity output

The annual electricity output in the FSR is calculated based on the wind resources assessment and professional software that is widely used in Feasibility Study of Wind Farm Projects. The wind resources assessment of the proposed project were assessed based on one year (16/05/2008- 15/05/2009) wind resource data measured by the anemometer tower and justified with 36 years (Jan. 1971-Dec. 2008) wind resource data from Jimunai Weather Station. The FSR of the proposed project was evaluated and approved by Xinjiang Uygur Autonomous Region Development and Reform Commission, including the annual electricity output assessment. In the FSR, the annual theoretical power generation is 166,500 MWh.

Considering 1) Wake effects correction of 96%, 2) Transmission line loss and own consumption correction of 94%, 3) Turbine breakdown correction of 95%, 4) Power curve adjustment of 95%, 5) Blade soiling correction of 95%, 6) Control and turbulence correction of 97%, 7) wind turbines direction adjustment correction of 97%, 8) air density correction of 96.8%,

the net annual power generation is calculated as:

166,500×96%×94%×95%×95%×95%×97%×97%×96.8%=117,315 MWh.

Annual O&M Cost

With the related basic information of the proposed project, the annual O&M cost in FSR is estimated according to relative national standards and regulations. The annual O&M cost consist of maintenance cost, salary and welfare of employee, material cost, insurance cost and miscellaneous cost[10]. The FSR is finished by a qualified FSR developer---Xinjiang Survey and Design Institute of Water Resources and Hydropower Ministry of Water Resource, and approved by Xinjiang Uygur Autonomous Region Development and Reform Commission. Considering all wind farm projects in Xinjiang Uygur Autonomous Region which have been registered, the highest percentage of annual O&M cost in the total investment cost is 5.78%[11], and the proposed project is 3.65%, which is lower than 5.78%. Thus it is demonstrated that the estimated annual O&M cost is reasonably applied in the financial analysis.

Tariff

Before 11 November 2001, policies were issued for developing the manufacture of the domestic wind farm equipments and providing the priorities of connection with grid for wind power projects that used domestic equipment. But these policies do not have impact on the tariff determination for the wind farm

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[8] The amendment of "Interim regulations of Educational Surtax", Order No.448 of the State Council, http://www.gov.cn/gongbao/content/2005/content_91662.htm

[9] Interim regulations of City Maintenance and Construction Surtax, Guofa[1985]19, http://www.kaifeng.gov.cn/html/1220585518375/1229494966726.html

[10] Miscellaneous cost is the costs which are additional to the depreciation, amortization, maintenance, insurance, material, welfare and financial costs, including administration costs, travelling expenses, costs of labour-union, staff training expense, cost of board meetings, occupation & health safety costs, business entertainment expense, pollution discharge expenses, technical development expense, land use tax, house tax, vehicle and vessel tax, stamp duty etc.

[11] Referring to all the PDD of registered wind farm projects in Xinjiang Uygur Autonomous Region, 19 wind farm projects were referenced. The highest percentage of annual O&M cost in the total investment cost is from The Bogeda 40.5 MW Wind-Farm Project in Urumqi, Xinjiang, China (2537).

projects.

In 2006, the Chinese government issued National Renewable Energy Law[12] and Interim Measures for Renewable Energy Power Tariff and Cost-sharing (Fagaijiage [2006] No.7) [13]and other polices to increase the domestic rate of wind power equipment to reduce wind power generation cost and stimulate the investment incentives. From then on, the installation capacity of wind power projects increase rapidly in China.

It indicates that the total installed capacity of grid-connected wind farms in China at the end of 1989 is 4.2MW, and it increased to 568.4MW at the end of the Year 2003. And the total installed capacity of wind farms in China is 12,000MWh at the end of Year 2008.

On 09/06/2007 and 03/12/2007, NDRC issued two "Notification of electricity tariff for wind power projects" (Fagaijiage [2007]1260[14] and (Fagaijiage [2007]3303[15]). According to these two notifications, the tariff of wind power projects in Xinjiang is 0.51 RMB / kWh (including VAT).

On 23/07/2008, China NDRC issued the document "Notification of electricity tariff for wind power projects"(Fagaijiage [2008]No.1876) or wind power projects in China, but there was no wind power projects located in Xinjiang included in this document.

On 20/07/2009, NDRC released the "Circular on Improving Wind Power On-grid Tariff Policy" (Fagaijiage [2009]1906)[16], which clarified the policy for wind farm tariffs. Four different wind resource regions were defined based on wind resource status and project construction conditions with corresponding guiding tariffs. The proposed project belongs to the third wind resource region, and the tariff is 0.58 RMB/kWh,

Therefore, the tariff of 0.58 RMB/kWh was used in the FSR (and thus also used in the PDD), which was the latest available on-grid tariff at the time of the preparation of the FSR.

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

In accordance with the benchmark analysis (Option III), the proposed project will not be considered as financially attractive if its financial indicators (such as IRR) are lower than the benchmark.

Table B.3 shows the IRR of the proposed project, with and without CDM-related revenue. Without CDM-related revenue, the project IRR (post tax) is lower than the benchmark 8% and the proposed

[12] National Renewable Energy Law, Order No. 33 of the President of the People's Republic of China

http://www.gov.cn/ziliao/flfg/2005-06/21/content_8275.htm

[13] Interim Measures for Renewable Energy Power Tariff and Cost-sharing , Fagaijiage[2006]7,

http://www.luzhou.gov.cn/zwgk/sjbm/wjj/flfg/200610/20061018153310_12446.html

[14] Tariff approval for renewable energy power generation projects in Hebei Province and other regions issued by NDRC, Fagaijiage[2007]1260), http://www.hebwj.gov.cn/upfiles/xy_col32gjc___20070718164220007126.htm

[15] Tariff approval for wind farm projects including Hebei Zhangjiewan and Heilongjiang in Hebei Province issued by NDRC, Fagaijiage[2007]3303, http://www.ndrc.gov.cn/jggl/zcfg/t20080218_193008.htm

[16] Circular on Improving Wind Power On-grid Tariff Policy, Fagaijiage [2009]1906, http://www.ndrc.gov.cn/jggl/jggs/t20090727_292846.htm

project is not financially attractive to the investors. With it, the Project IRR is significantly improved and exceeds the benchmark rate. Therefore, the proposed project with CDM revenue can be considered as financially viable to the investors.

Table B.3 Financial indicators of the Proposed Project

	Project IRR (post tax) (benchmark=8%)
Without CDM-related income	6.55%
With CDM-related income	9.58%

Sub-step 2d. Sensitivity analysis (only applicable to options II and III):
The purpose of the sensitivity analysis is to examine whether the conclusion regarding the financial /economic attractiveness is robust to reasonable variations in the critical assumptions. The investment analysis provides a valid argument in favour of additionality only if it consistently supports (for a realistic range of assumptions) the conclusion that the project activity is unlikely to be the most financially /economically attractive or is unlikely to be financially/economically attractive.

According to "Guideline on the assessment of investment analysis" (version 05), only variables, including the initial investment cost, that constitute more than 20% of either total project costs or total project revenues should be subjected to reasonable variation, and a general point of departure variations in the sensitivity analysis should at least cover a range of +10% and -10%.

Because total static investment and annual O&M cost are more than 20% of the total investment. And the tariff and annual power supply are selected as the factors for the reason that these two parameters decide the total project revenues. Therefore, four financial parameters including: total static investment, annual O&M cost, tariff and annual power supply are identified as the main variable factors for sensitive analysis of financial attractiveness.

Except for total static investment, annual O&M cost, tariff and annual power supply, the other financial indicators presented in Table B.2 have insignificant impact on the sensitivity analysis, thus excluded from the analysis. The results of the sensitivity analysis are generalized in the Table B.4 and Figure B1.1.

The sensitive analysis will be conducted with the fluctuation of the four parameters with the range from -10% to +10% according to the "Guidance on the Assessment of Investment Analysis" (version 03.1).

1) Total Static Investment;
2) Annual Power Supply;
3) Annual O&M cost;
4) Tariff

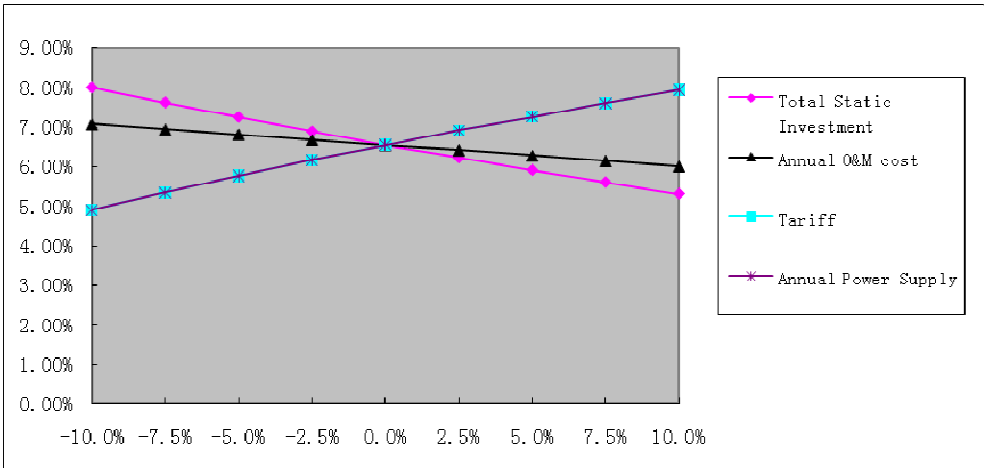
For detailed results of sensitive analysis of the four indicators, please see Table B.4.

Table B.4 Sensitivity of Project IRR (post tax) to different financial parameters

Parameter	Range				
	-10%	-5%	0%	5%	10%

Total Static Investment	8.00%	7.25%	6.55%	.5.91%	5.31%
Annual O&M cost	7.08%	6.82%	6.55%	6.28%	6.01%
Annual Power Supply	4.90%	5.76%	6.55%	7.26%	7.94%
Tariff	4.90%	5.76%	6.55%	7.26%	7.94%

Figure B.1.1 Sensitivity of Project IRR (post tax) to different financial parameters



As shown in Table B.4 and Figure B.1.1, the Project IRR (post tax) of the proposed project varies to different extents, when the above four financial indicators fluctuated within the reasonable range from -10% to +10% and the Project IRR (post tax) does not surpass the benchmark of 8%.

Total Static Investment
When the total static investment decreases by 10.0%, the Project IRR (post tax) reaches the benchmark. The total static investment couldn't be reduced by 10.0%, because there are more than 93% of total static investment has already happened, so the total static investment is impossible to be decreased by over 10.00% to exceed benchmark.

Annual Power Supply
When the annual power supply increases by 10%, the Project IRR (post tax) is 7.94%, and is lower than the benchmark. Only when the annual power supply increases by 10.45% does the Project IRR (post tax) reach the benchmark. According to the FSR of the proposed project, the annual generation supply is estimated basing on the long term weather statistic data provided by local meteorological station and wind resources measurement, which first using professional software WAsP to select the rich wind source area, then using software Wind Farmer to optimize the location of each turbine for maximize power generation. Moreover, the annual electricity supply is positive correlation with the wind speed, and the annual average wind speed of the project site is steady and tends to decrease over the past 30 years for which data are available recently as described in the FSR. Therefore, the annual power supply of the proposed project is not possible to be increased by 10.45%.

Tariff
When the tariff increases by 10%, the Project IRR (post tax) is 7.94%, lower than the benchmark. Only when the tariff increases by 10.45% does the Project IRR (post tax) reach the benchmark. The tariff of

wind farm project would be approved by the government. The tariff of 0.58RMB/kWh of the proposed project in the FSR was estimated based on the "Circular on Improving Wind Power On-grid Tariff Policy"[17] (Fagaijiage[2009]1906) issued by NDRC on July 20, 2009, which clarified the policy for wind farm tariffs. Four different wind resource regions were defined based on wind resource status and project construction conditions with corresponding guiding tariffs. The proposed project belongs to the third wind resource region. And the tariff is 0.58RMB/kWh (including VAT).
Hence, the tariff of the proposed project could not increase to make the proposed project financially attractive.

Annual O&M Cost
When the annual O&M cost decreases by 10%, the Project IRR (post tax) is 7.08%, lower than the benchmark. Only when the annual O&M cost decreases by 27.8%, does the Project IRR (post tax) reach the benchmark.

Annual O&M cost consists of five basic parameters which are maintenance expense, raw material cost, employee salary and welfare, insurance and miscellaneous calculated by some fixed parameters such as the installed capacity, the normal standard for utilization of equipments etc.

Furthermore, the price of material and fuel are gradually increasing in China, which leads annual O&M cost gradually increasing[18]. Besides, compared with the O&M costs of previous wind projects which have been registered as CDM project in Xinjiang Uygur Autonomous Region, the ratios of annual O&M per total static investment (%) is adopted to compare with the similar CDM projects in Xinjiang Uygur Autonomous Region. The O&M per total static investment of the proposed project is 3.65%, which all fall into the range 2.13%～5.78%[19].

In conclusion of the sensitive analysis, as the financial indicators vary within reasonable range, the proposed project is unlikely to be financially attractive without CDM support. Hence, the Scenario 1) is not a realistic alternative.

Step 4. Common practice analysis

Sub-step 4a. Analyze other activities similar to the proposed project activity:
Choose similar year
In April 2002, China implemented the policy "Separate power plants from network and compete in price to enter network[20]". The objective of this power sector reform is to establish a more commercialized power market in China. Power project investment has to be under a more commercialized condition and

[17] Circular on Improving Wind Power On-grid Tariff Policy, Fagaijaige[2009]1906, http://www.ndrc.gov.cn/zcfb/zcfbtz/2009tz/t20090727_292827.htm

[18] http://www.ic37.com/htm_news/2008-1/15834_66520.htm; http://www.beinet.net.cn/fxyj/yjbg/201009/t686622.htm

[19] Referring to all the PDD of registered wind farm projects in Xinjiang Uygur Autonomous Region, 19 wind farm projects were referenced. The highest percentage of annual O&M cost in the total investment cost is from The Bogeda 40.5 MW Wind-Farm Project in Urumqi, Xinjiang, China (2537).

[20] "S*eparate power plants from network and compete in price to enter network*", http://www.ctgpc.com.cn/fhzt/news.php?mnewsid=1219

Source: http://www.ndrc.gov.cn/xwfb/t20050708_28096.htm

considers project investment return more seriously. Since market condition for wind power project development changes much since 2002, this common practice analysis starts from 2002 up to GSP.

Choose similar area

The proposed project is located in the Xinjiang Uygur Autonomous Region, and the electricity generated from the proposed project will be supplied to the Xinjiang Uygur Power Grid. Due to the difference in price policy, especially the approved on-grid tariff of wind farm; grid-connected structure; geological conditions and economic development status in different Province/Autonomous Region, the geographical scope is defined within the Xinjiang Uygur Power Grid.

Choose similar scale

As UNFCCC classifies projects above 15MW as large scale projects, and the proposed project is a large scale project, therefore projects with installed capacity over 15MW are chosen.

The proposed project is a newly built 49.5 MW wind farm sited in Xinjiang Uygur Autonomous Region, therefore, activities similar to the proposed project should be wind farms sited in Xinjiang Uygur Autonomous Region with a starting date of operation later than 1st January, 2002 and with an installed capacity bigger than 15MW.

Similar activities identified with such criteria are listed in Table B.5 below.

Table B.5 Wind Farm Development in Xinjiang Uygur Autonomous Region (since 2002 to the date of GSP)

No.	Project name	The starting date	Installed capacity (MW)	CDM project or not	Remarks
1	Dabancheng Sangecunzhuang (No.1) Wind Farm	2003	28.26	No	Supported by national debt fund[21]
2	Dabancheng Chaiwopu (No.2) Wind Farm	2003	25	No	Supported by funds from The Netherlands[22]
3	The 30 MW Tuoli Wind-Farm Project in Urumqi, Xinjiang of China	01/10/2004	30	Yes	Registered[23]
4	Xinjiang Dabancheng Sanchang First Phase Wind Farm Project	01/01/2006	30	yes	Registered[24]

[21] http://www.dlwg.net/news/news_view.asp?newsid=954;

http://www.xjwind.com/newsdetail.asp?id=123

[22] http://www.cofortune.com.cn/moftec_cn/dsbgx/europe/hl-jmhz.html

[23] http://cdm.unfccc.int/Projects/DB/TUEV-SUED1153820162.56/view

[24] http://cdm.unfccc.int/Projects/DB/DNV-CUK1169706843.29/view

5	Xinjiang Tianfeng Dabancheng Second Phase Wind Farm Project	10/07/2006	30	yes	Registered[25]
6	The Wulabo 30 MW Wind-Farm Project in Urumqi, Xinjiang of China	06/09/2006	30	Yes	Registered[26]
7	Xinjiang Xiaocaohu Wind Power Project	06/03/2007	49.5	Yes	Registered[27]
8	The Bogeda 40.5 MW Wind-Farm Project in Urumqi, Xinjiang, China	21/08/2007	40.5	Yes	Registered[28]
9	Xinjiang Dabancheng Sanchang Phase Ⅲ Wind Power Project	23/08/2007	49.5	Yes	Registered[29]
10	Xinjiang Mayitasi Wind Farm Project	29/08/2007	49.5	Yes	Registered[30]
11	Xinjiang Huadian Xiaocaohu the 2nd phase of No.1 Wind Farm project	22/02/2008	49.5	Yes	Registered[31]
12	Xinjiang Buerjin Tianrun Windpower Co. Ltd. Wind Farm 1st Stage Project	10/04/2008	49.5	Yes	Registered[32]
13	Xinjiang Dabancheng Sanchang Phase IV Wind Power	29/12/2008	49.5	Yes	Registered[33]

[25] http://cdm.unfccc.int/Projects/DB/DNV-CUK1204883080.98/view

[26] http://cdm.unfccc.int/Projects/DB/TUEV-SUED1184340663.84/view

[27] http://cdm.unfccc.int/Projects/DB/TUEV-SUED1198161445.87/view

[28] http://cdm.unfccc.int/Projects/DB/TUEV-SUED1240399224.97/view

[29] http://cdm.unfccc.int/Projects/DB/TUEV-SUED1249376981.75/view

[30] http://cdm.unfccc.int/Projects/DB/DNV-CUK1218272714.01/view

[31] http://cdm.unfccc.int/Projects/DB/DNV-CUK1235499732.85/view

[32] http://cdm.unfccc.int/Projects/DB/TUEV-RHEIN1295317456.16/view

[33] http://cdm.unfccc.int/Projects/DB/DNV-CUK1256791260.58/view

	Project				
14	Xinjiang Alashankou Phase I Wind Power Project	17/03/2009	49.5	Yes	Registered[34]
15	Huadian Xinjiang Xiaocaohu Second Wind Farm Phase I Project	30/07/2009	49.5	Yes	Registered[35]
16	Huaneng Xinjiang Hami Santanghu Phase I Wind Farm Project	01/08/2009	49.5	Yes	Registered[36]
17	Xinjiang Alashankou Wind Power Project	29/01/2010	49.5	Yes	Registered[37]
18	Xinjiang Huadian Buerjin Chengnan Phase I Wind Farm Project	01/04/2011	49.5	Yes	Registered[38]
19	Xinjiang Urumqi Dabancheng Huaran Wind Farm Phase I Project	01/01/2007	30	Yes	Under validation[39]
20	Xinjiang Urumqi Dabancheng Huaran Wind Farm Phase I Project	20/06/2010	49.5	Yes	Under Validation[40]
21	Xinjiang Alashankou Phase II Wind Power Project	25/06/2010	49.5	Yes	Under Validation[41]
22	Huaneng Xinjiang Hami Santanghu Phase II Wind	01/08/2010	49.5	Yes	Under Validation[42]

[34] http://cdm.unfccc.int/Projects/DB/DNV-CUK1254208747.5/view

[35] http://cdm.unfccc.int/Projects/DB/BVQI1260942478.95/view

[36] http://cdm.unfccc.int/Projects/DB/BVQI1269930150.92/view

[37] http://cdm.unfccc.int/Projects/DB/DNV-CUK1285583939.07/view

[38] http://cdm.unfccc.int/Projects/DB/BVQI1296012548.72/view

[39] http://cdm.unfccc.int/Projects/Validation/DB/NDIBATE6S02BJNE2VL1KPEJHA2KD79/view.html

[40] http://cdm.unfccc.int/Projects/Validation/DB/AGVFG7D91ERVBZFJCCELDQLQCB2Y9P/view.html

[41] http://cdm.unfccc.int/Projects/Validation/DB/AGVFG7D91ERVBZFJCCELDQLQCB2Y9P/view.html

[42] http://cdm.unfccc.int/Projects/Validation/DB/LPQU3SV8X041XL4X6814KSLORZDRKA/view.html

	Farm Project				
23	Xinjiang Dabancheng Phase I Wind Power Project	15/01/2011	49.5	Yes	Under Validation[43]

Data source: Shi Pengfei (Deputy Director, Chinese Wind Energy Association), Statistics on China Wind Farm Installed Capacity in 2007[44].
http://cdm.unfccc.int/index.html
http://cdm.ccchina.gov.cn/web/index.asp

Among the wind farm projects listed in Table B.5, only Dabancheng Sangecunzhuang (No.1) Wind Farm and Dabancheng Chaiwopu (No.2) Wind Farm projects are not CDM projects, all the other projects are CDM projects.

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

The Dabancheng Sangecunzhuang (No.1) Wind Farm was supported by the 4th Special Fund for Treasury bond[45],which is the demonstration project enjoys favorable treatments and not be available for the proposed project. The Dabancheng Chaiwopu (No.2) Wind Farm was supported by the loan from the Netherlands government[46]. Since the Project has no comparable financial or the tariff advantage as these projects, the Project fulfils the requirement of additionality.

Moreover, some wind farm project have been registered as CDM projects in the last few years, and others are applying for CDM registration, because they are financially unattractive without the additional income from CER sales, and face barriers.

As described above, the proposed project activity passed all criteria of "Tool for the demonstration and assessment of additionality (version 05.2)". In conclusion, the proposed project is not common practice and is additional.

Consideration of CDM before construction started

Table B.6 The implementation timeline of the proposed project

Time	Milestones	Note
08/2009	EIA Completed	Completed by Xinjiang Uygur Autonomous Region Environment Protect Consultancy Center
27/10/2009	EIA Approval obtained	Issued by the Environment Protection

[43] http://cdm.unfccc.int/Projects/Validation/DB/ZFQUMZVHBJQVZO2P0GPVZJSFKJWWBP/view.html

[44] http://wenku.baidu.com/view/373efb6825c52cc58bd6be40.html

http://www.cwea.org.cn/download/display_info.asp?cid=2&sid=16&id=19;

http://wenku.baidu.com/view/a6e0c3c30c22590102029de5.html;

http://www.cwea.org.cn/upload/20090305.pdf;

[45] http://www.dlwg.net/news/news_view.asp?newsid=954;

[46] http://www.cofortune.com.cn/moftec_cn/dsbgx/europe/hl-jmhz.html

		Bureau of Xinjiang Uygur Autonomous Region
12/2009	Feasibility Study Report (FSR) completed	Completed by Xinjiang Survey and Design Institute of Water Resources and Hydropower Ministry of Water Resource
18/05/2010	EIA Rename Approval	Issued by the Environment Protection Bureau of Xinjiang Uygur Autonomous Region
31/05/2010	Feasibility Study Report (FSR) Approved	Issued by the Development & Reform Committee of Xinjiang Uygur Autonomous Region
15/06/2010	Board Meeting	Investment Decision
07/07/2010	Consulting Contract Signed	With Easy Carbon Consultancy
12/07/2010	Prior Consideration of the CDM form approved by EB	
18/07/2010	Construction Contract Signed	
20/07/2010	Purchase contract of Wind Turbine was signed.	
25/07/2010	Order to commence	By the project supervision company
09/08/2010	Prior Consideration of the CDM form approved by NDRC	
10/12/2010	The emission reductions purchase agreement signed with Deutsche Bank AG (Filiale London)	
19/01/2011	Public stakeholder comment process of PDD (version 01, 05/01/2011)	UNFCCC website

The Feasibility Study Report (FSR) of the proposed project was developed by Xinjiang Survey and Design Institute of Water Resources and Hydropower Ministry of Water Resource in December 2009. However, when the approval of the proposed project was issued by the Xinjiang Uygur Autonomous Region Development and Reform Commission on 31th May 2010, the project developer realized that the Investment Return of the proposed project is much lower than the expectation in FSR and the IRR of the proposed project would also much lower than the benchmark of electricity industry.

The proposed project is thus financially unattractive to investors. Hence, the project developer had to seek additional financial support from CDM to make the proposed project feasible. China Guangdong Nuclear Power Group, as the parent company of the project owner, organized a CDM meeting to discuss the feasible way to develop the proposed project on 16/06/2010, and decided to develop the project as a CDM project. Later, a CDM consulting contract was signed with Easy Carbon consultancy on 21st June 2010.

With the expected CDM revenue into consideration, the project owner finally started the construction of the proposed project on 18/07/2010 which was earliest date of real action of the project and the proposed project was started. The wind turbine purchase contract was signed on 20/07/2010.

The Notification of Prior Consideration of the CDM Form was approved by UNFCCC secretariat on 12/07/2010 and approved by NDRC on 09/08/2010, due to the starting date of the proposed project is 18/07/2010, therefore, the notifications of Prior Consideration of CDM were made within six months n line with “Guideline on the Demonstration and Assessment of Prior CDM Consideration (version 04)”. In

the Prior Consideration of the CDM Form, precise geographical location and a brief description of the proposed project was included.

The development procedure shows that CDM was serious considered before the proposed project started.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

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The key methodological steps are as follows:

1. Calculating the Baseline Emission (BE_y)
2. Calculating the Project Emission (PEy)
3. Calculating the Leakage Emission (LE_y)
4. Calculating the Emission Reduction (ER_y)

1. Calculating the Baseline emissions

The baseline emissions (BE_y) is the product of the baseline emissions factor ($EF_{grid,CM,y}$ in tCO_2e/MWh) calculated, times the electricity supplied by the project activity to the grid ($EG_{PJ,y}$ in MWh), as follows:

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

Where:
BE_y : Baseline emissions in year y (tCO_2/yr);
$EG_{PJ,y}$: Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y (MWh/yr);
$EF_{grid,CM,y}$: Combined Margin CO_2 emission factor for grid connected power generation in year y, calculated using the latest version of the "Tool to calculate the emission factor for an electricity system".

Calculation of $EG_{PJ,y}$
The project activity is the installation of a new grid-connected renewable power plant/unit at a site where no renewable power plant was operated prior to the implementation of the project activity:

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

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

1.1 Calculation of the baseline emissions factor

Following ACM0002, the baseline emission factor (EF_y) is calculated as a combined margin ($EF_{grid,CM}$), consisting of the combination of operating margin ($EF_{grid,OM}$,) and build margin ($EF_{grid,BM}$,) factors according to the following seven steps defined in the "Tool to calculate the emission factor for an

electricity system" (version 02.1.0). Data for the calculations are based on official national statistics books: China Energy Statistical Yearbook and China Electric Power Yearbook.

STEP 1. Identify the relevant electric power system
As per the Tool to calculate the emission factor of an electricity system, a project electricity system is defined by the spatial extent of the power plants that are physically connected through transmission and distribution lines to the project activity and that can be dispatched without significant transmission constraints. Similarly, a connected electricity system, e.g. national or international, is defined as an electricity system that is connected by transmission lines to the project system. Power plants within the connected electricity system can be dispatched without significant transmission constraints but transmission to the project electricity system has significant transmission constraint. Chinese DNA has published a delineation of the project electricity system and connected electricity systems, which will be used in the document.

As per Chinese DNA, the project electricity system is the NWPG. The NWPG covers Shaanxi, Gansu, Qinghai, Ningxia and Xinjiang Power Grids. The connected electricity system is the Central China Power Grid (CCPG), consisting of six provincial grids: Jiangxi, Henan, Hubei, Hunan, Chongqing, Sichuan. There is no power exchange between NWPG and CCPG. However, according to the latest version 02.1.0 of the "Tool to calculate the emission factor for an electricity system", as power is exported to the connected electricity system, CCPG is not included in the project boundary: electricity exports are not subtracted from electricity generation data used for calculating and monitoring the baseline emission rate.

For the purpose of determining the build margin emission factor, the spatial extent is limited to the project electricity system, except where recent or likely future additions to transmission capacity enable significant increases in imported electricity. In such cases, the transmission capacity may be considered a build margin source. For the project, the spatial extent is limited to the project electricity system, the NWPG.

STEP 2. Choose whether to include off-grid power plants in the project electricity system (optional)
Project participants may choose between the following two options to calculate the operating margin and build margin emission factor:
Option I: Only grid power plants are included in the calculation.
Option II: Both grid power plants and off-grid power plants are included in the calculation.

According to the Approval of electricity connection to NWPG, all the power generated by the project activity will be supplied to the power grid company. Thus, the proposed project does not include off-grid power plants in the project electricity system referred in apply to "Tool to calculate the emission factor for an electricity system".

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

STEP 3. Select an operating margin (OM) method
The calculation of the operating margin emission factor ($EF_{grid,OM,y}$) is based on the following methods:

(a) Simple OM, or

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

Although Dispatch Data Analysis should be considered the first methodology choice as required in the "Tool to calculate the emission factor for an electricity system (version 02.1.0)", unavailability of detailed information in China, such as the dispatch data make Option C not feasible for the calculation in China.

In China, specific data from the grid or each power plant is treated as business confidential and thus not publicly available. Therefore, the Simple adjusted OM (Option B) cannot be possibly used for the proposed project either.

The NWPG only possesses 21.820% of its total electricity generation that comes from renewable energy sources in 2008, 22.426% in 2007, 24.731% in 2006, 27.445% in 2005 and 20.565% in 2004[47]. Hence, the low operating cost/must run sources is much less than 50% of the total grid generation, which accords with the defined condition of Option A, but not Option D. Consequently, Simple OM method is selected to calculate the Operating Margin emission factor of the proposed project.

STEP 4. Calculate the operating margin emission factor according to the selected method
The Simple OM emission factor is calculated as the generation-weighted average CO2 emissions per unit net electricity generation (tCO_2/MWh) of all generating power plants serving the system, not including low-cost / must-run power plants / units. It may be calculated:

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

- 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 B), or

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

For the proposed project activity, the required data for the exercise of Option A and B are not available and those of Option C can be obtained from official sources, and therefore, Option C is chosen to calculate the operating margin emission factor:

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

Where:
$EF_{grid,OMsimple,y}$ = Simple operating margin CO_2 emission factor in year *y* (tCO_2 /MWh)
$FC_{i,y}$ = Amount of fossil fuel type *i* consumed in the project electricity system in year *y* (mass or volume unit)

[47] China Electric Power Yearbook *2005(P485 2006(P568)2007(P638)2008(P733)2009(P695)*

$NCV_{i,y}$ = Net calorific value (energy content) of fossil fuel type *i* in year *y* (GJ / mass or volume unit)
$EF_{CO2,i,y}$ = CO_2 emission factor of fossil fuel type *i* in year *y* (tCO_2 /GJ)
EG_y = Net electricity generated and delivered to the 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

STEP 5. Identify the cohort of power units to be included in the build margin(BM)
The sample group of power units *m* used to calculate the build margin consists of either:

(a) The set of five power units that have been built most recently, or

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

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

However, it is very difficult to obtain the data of the five power plants built most recently because these data are considered as confidential information by the company itself and the Grid in China. Therefore, a deviation[48] approved by the EB is applied here in the calculation that is to calculate the new capacity additions and the proportion of each technology of power generation. Then the weighing of capacity additions of different technologies will be worked out. Finally the emission factor will be calculated by employing the efficiency factor representing the best technology commercially available.

STEP 6. Calculate the build margin emission factor
The build margin emission factor is the generation-weighted average emission factor (tCO_2/MWh) of all power units *m* during the most recent year *y* for which power generation data is available, calculated as follows:

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

Where:
$EF_{grid,BM,y}$ = Build margin CO_2 emission factor in year *y* (tCO_2 /MWh)
$EG_{m,y}$ = Net quantity of electricity generated and delivered to the grid by power unit *m* in year *y* (MWh)
$EF_{EL,m,y}$ = CO2 emission factor of power unit *m* in year *y* (tCO_2 /MWh)
m = Power units included in the build margin

[48] Source: http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File2552.pdf

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

As discussed in STEP 4, a deviation of this method is used to calculate build margin emission factors in China:

Deviated Calculation of Build Margin (BM)

Sub-step 1. Calculation of weights of CO_2 emissions of solid, liquid and gaseous fossil fuels in total emissions for power generation

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

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

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

Where:

$FC_{i,j,y}$ = Amount of fossil fuel type *i* consumed in province *j* in year *y* (mass or volume unit)

$NCV_{i,y}$ = Net calorific value (energy content) of fossil fuel type *i* in year *y* (GJ/t or GJ/m^3)

$EF_{CO2,i,y}$ = CO_2 emission factor of fossil fuel type *i* in year *y* (tCO_2e/GJ)

Sub-step 2: Calculation of Emission Factor of Relevant Thermal Power

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

Where:

$EF_{Coal,Adv}$, $EF_{Oil,Adv}$ and $EF_{Gas,Adv}$ refer to the emission factors representing best technologies commercially available for coal, oil and gas fired power plants, respectively.

Sub-step 3: Calculation of BM of the Grid

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

Where:

$CAP_{Total,y}$ = The total newly added electricity generation capacity (MW)
$CAP_{Thermal,y}$ = The newly added electricity generation capacity of thermal power (MW)

STEP 7. Calculate the combined margin emission factor
The combined margin emission factor is calculated as follows:

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

Where:
$EF_{grid,BM,y}$ = Build margin CO_2 emission factor in year *y* (tCO2/MWh)
$EF_{grid,OM,y}$ = Operating margin CO_2 emission factor in year *y* (tCO2/MWh)
w_{OM} = Weighting of operating margin emissions factor (%)
w_{BM} = Weighting of build margin emissions factor (%)

The default values of w_{OM} and w_{BM} are:
w_{OM} = 0.75 and w_{BM} = 0.25

Baseline Emissions are calculated by multiplying the ex-ante Baseline Emission factor by annual power generation.

$$BE_y = EG_{Facility,y} \times EF_{grid,CM,y} \quad (11)$$

Where:
BE_y = Baseline emissions in year *y* (tCO_2 /yr)
EG_y = Electricity supplied by the project activity to the grid (MWh)
$EF_{grid,CM,y}$= Combined margin emission factor for grid connected power generation in year *y* calculated using the latest version of the "Tool to calculate the emission factor for an electricity system".

2. Project Emissions (PE_y)
The Xinjiang Jimunai CGN Phase I Wind Farm Project is a greenhouse gas zero-emission electricity generating activity; therefore no emissions from the project activity were identified.

3. Leakage (LE_y)

The project does not consider leakage according to the requirements of methodology applied.

4. Emission Reductions (ER_y)

The annual emission reductions ER_y for the project activity are calculated as the baseline emissions minus the project emissions. Being the project of a greenhouse gas zero-emission activity the final GHG emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y - LE_y \quad (12)$$

Where:

ER_y = Emission reductions in year *y* (tCO_2e/year)
BE_y = Baseline emissions in year *y* (tCO_2e /year)
PE_y = Project emissions in year *y* (tCO_2e year)
LE_y = Leakage emissions in year *y* (tCO_2e /year)

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

Data / Parameter:	$\mathbf{FC_{i,m,y}}$
Data unit:	tonnes or m^3
Description:	Amount of fossil fuel type *i* consumed by power plant / unit *m* in year *y*
Source of data used:	China Energy Statistical Yearbook（2007~2009）
Value applied:	See Annex 3 for details
Justification of the choice of data or description of measurement methods and procedures actually applied :	Official statistical data
Any comment:	

Data / Parameter:	$\mathbf{NCV_{i,y}}$
Data unit:	kJ/kg or kJ/m^3
Description:	Net calorific value (energy content)of fossil fuel type *I* in year *y*
Source of data used:	China Energy Statistical Yearbook（2009）
Value applied:	See Annex 3 for details
Justification of the choice of data or description of measurement methods and procedures actually applied :	Official statistical data
Any comment:	

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

Any comment:	

Data / Parameter:	**Carbon Oxidation Factor**
Data unit:	%
Description:	Carbon Oxidation Factor of fossil fuel type *I* consumed by the power plants in the grid
Source of data used:	2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value applied:	See Annex 3 for details
Justification of the choice of data or description of measurement methods and procedures actually applied :	IPCC default value
Any comment:	

Data / Parameter:	**Installed Capacity**
Data unit:	MW
Description:	The Installed Capacity of the power plants in the grid in the year y
Source of data used:	China Electric Power Yearbook(2007~2009)
Value applied:	See Annex 3 for details
Justification of the choice of data or description of measurement methods and procedures actually applied :	Official statistical data
Any comment:	

Data / Parameter:	GEN_y
Data unit:	MWh
Description:	The electricity generation of the power plants in the grid in the year y
Source of data used:	China Electric Power Yearbook(2007~2009)
Value applied:	See Annex 3 for details
Justification of the choice of data or description of measurement methods and procedures actually applied :	Official statistical data
Any comment:	

Data / Parameter:	**Electricity self-consumption ratio**
Data unit:	%
Description:	The ratio of electricity self-consumption to the total electricity generation of the power plants
Source of data used:	China Electric Power Yearbook
Value applied:	See Annex 3 for details

Justification of the choice of data or description of measurement methods and procedures actually applied :	Official statistical data
Any comment:	

Data / Parameter:	**Efficiency of the best technology commercially**
Data unit:	%
Description:	Best commercial available efficiency of coal, gas, oil fuel power plant
Source of data used:	Chinese DNA's Guideline of emission factors of Chinese grids
Value applied:	Best efficiency for coal plant is 39.08% Best efficiency for oil plant is 51.46% Best efficiency for gas plant is 51.46%
Justification of the choice of data or description of measurement methods and procedures actually applied :	
Any comment:	

B.6.3 Ex-ante calculation of emission reductions:

>>

As described in B.6, the emission reductions of the proposed project are calculated as follows:

Baseline emissions

Annual net power generation is estimated as 117,315MWh.

$EF_{grid,OM,y}$= 0.9947 tCO_2/ MWh
$EF_{grid,BM,y}$ = 0.6878 tCO_2/ MWh

$EF_{grid,CM,y}$＝0.9947× 0.75+0.6878 × 0.25=0.9180 tCO_2/ MWh

BE_y =117,315×0.9180=107,695 tCO_2e

The ex-ante baseline emission factor: **0.9180 tCO_2/ MWh**
Annual baseline emissions: **107,695 tCO_2e** (details in Annex 3)

Project emissions

According to the baseline methodology ACM0002, the GHG emission of the proposed project within the project boundary is zero, i.e.
PE_y=0

Leakage

According to the baseline methodology ACM0002, the leakage of the proposed project is not considered,

Project Emission Reductions

$ER_y = BE_y - PE_y$

The total annual baseline emissions are 107,695 $tCO_{2..}$
The total annual project emissions are 0 tCO_2.

$ER_y = BE_y - PE_y = 107,695 – 0 = 107,695\ tCO_2$

The annual emission reductions are estimated to be: 107,695tCO_2. The proposed project activity is expected to achieve 753,865tCO_2e of net emission reductions during the first 7-year crediting period.

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

>>

Year	**Estimation of project activity emissions (tonnes of CO_2e)**	**Estimation of baseline emissions (tonnes of CO_2e)**	**Estimation of overall emission reductions (tonnes of CO_2e)**
01/01/2012~31/12/2012	0	**107,695**	**107,695**
01/01/2013~31/12/2013	0	**107,695**	**107,695**
01/01/2014~31/12/2014	0	**107,695**	**107,695**
01/01/2015~31/12/2015	0	**107,695**	**107,695**
01/01/2016~31/12/2016	0	**107,695**	**107,695**
01/01/2017~31/12/2017	0	**107,695**	**107,695**
01/01/2018~31/12/2018	0	**107,695**	**107,695**
Total (tonnes of CO_2e)	**0**	**753,865**	**753,865**

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

Data / Parameter:	$EG_{Facility,y}$
Data unit:	MWh/yr
Description:	Quantity of net electricity generation supplied to the grid by the proposed project to the Grid in year y.
Source of data to be used:	Electricity meter readings from the meters at the project site
Value of data applied for the purpose of calculating expected emission reductions in section B.5	117,315

Description of measurement methods and procedures to be applied:	The readings of the electricity meter will be continuously measured and monthly recorded. Data will be archived for 2 years following the end of the last crediting period by means of electronic and paper backup. The accuracy of electricity meter will be 0.2s. The meter would be calibrated once a year according to the rules of Relative Technical Administrative Code of Electric Energy Metering (DL/T448-2000).
Monitoring frequency:	Continuously measurement and monthly recording
QA/QC procedures to be applied:	The net electricity supplied to the grid by the proposed project will also can be monitored and recorded at the central control room. The project operator is responsible for recording such data. Receipts for electricity sales will be kept for further verification.
Any comment:	Quantity of net electricity generation supplied to the grid by the proposed project will be measured as electricity supplied to the grid by the proposed project ($EG_{export,y}$) minus imports ($EG_{import,y}$ and $EG_{im-backup,y}$), $EG_{export,y}$, $EG_{import,y}$ and $EG_{im-backup,y}$ will measured by electricity meters as the following table shows.

Data / Parameter:	$EG_{export,y}$
Data unit:	MWh
Description:	Electricity supplied to the grid by the proposed project in year *y*.
Source of data to be used:	Electricity meter reading (M1 as main meter, M2 as backup meter) at the on-site substation
Value of data applied for the purpose of calculating expected emission reductions in section B.5	117,315
Description of measurement methods and procedures to be applied:	The readings of the electricity meter will be continuously measured and monthly recorded. Data will be archived for 2 years following the end of the last crediting period by means of electronic and paper backup. The accuracy of electricity meter will be 0.2s. The meter would be calibrated once a year according to the rules of Relative Technical Administrative Code of Electric Energy Metering (DL/T448-2000).
Monitoring frequency:	Continuously measurement and monthly recording
QA/QC procedures to be applied:	The electricity exported to the grid by the proposed project will be monitored and recorded at the central control room. The project operator is responsible for recording such data. Receipts for electricity sales will be kept for further verification.
Any comment:	

Data / Parameter:	$EG_{import,y}$
Data unit:	MWh
Description:	Electricity purchased from the grid by the proposed project in year *y*.
Source of data to be used:	Electricity meter reading (M1 as main meter, M2 as backup meter) at the on-site substation.

Value of data applied for the purpose of calculating expected emission reductions in section B.5	0 (actual value will be applied during the monitoring period)
Description of measurement methods and procedures to be applied:	The readings of the electricity meter will be continuously measured and monthly recorded. Data will be archived for 2 years following the end of the last crediting period by means of electronic and paper backup. The accuracy of electricity meter will be 0.2s. The meter would be calibrated once a year according to the rules of Relative Technical Administrative Code of Electric Energy Metering (DL/T448-2000).
Monitoring frequency:	Continuously measurement and monthly recording
QA/QC procedures to be applied:	The electricity purchased from the grid will also can be monitored and recorded at the central control room. The project operator is responsible for recording such data. Receipts for electricity sales will be kept for further verification.
Any comment:	

Data / Parameter:	$EG_{im\text{-}backup,y}$
Data unit:	MWh
Description:	Electricity imported from the grid by the proposed project through the backup power line in the year *y*.
Source of data to be used:	Electricity meter reading (M3) at the project site.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	0 (actual value will be applied during the monitoring period)
Description of measurement methods and procedures to be applied:	Continuously measurement and monthly recording. Data will be archived for 2 years following the end of the crediting period. The accuracy of electricity meter is 1.0. The metering equipments at the substation will be calibrated once a year according to relevant national regulatory standard.
Monitoring frequency:	Continuously measurement and monthly recording
QA/QC procedures to be applied:	Electricity imported from the grid through the backup line will be double checked according to electricity sales receipts.
Any comment:	

B.7.2 Description of the monitoring plan:

>>

This Monitoring plan will set out a number of monitoring tasks in order to ensure the complete, consistent, clear and accurate monitoring and the accurate calculation of the emission reduction in the crediting period. This plan is mainly implemented by the project owner with the cooperation of the grid company.

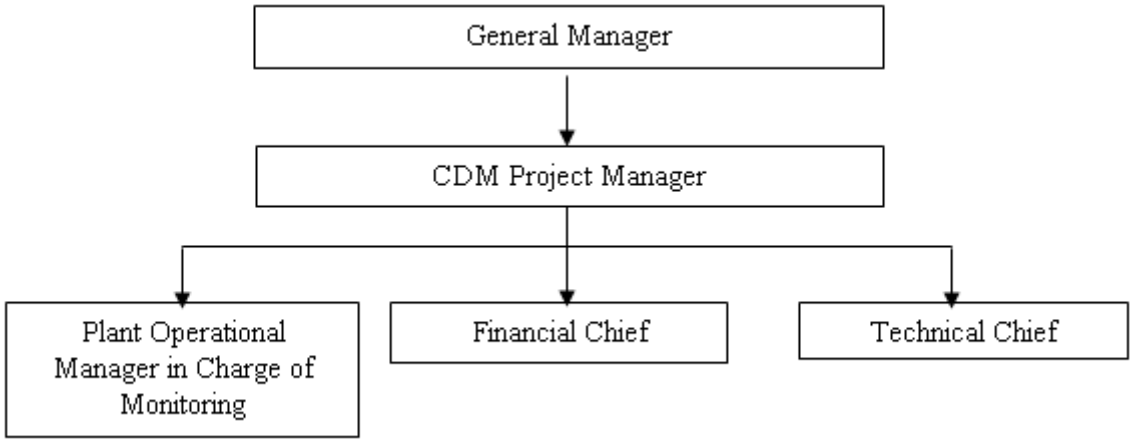
1. **Monitoring Object**

The main objective data is the net electricity, which is calculated according to the generated electricity and the purchased electricity and supplied to the grid, thus to calculate the emission reduction of the project.

2. **Monitoring Implementers**

The General Manager of the project entity will appoint a CDM project manager or a chief officer. The operational and monitoring manager of the plant, the Financial Chief, and the Technical Chief are responsible for the collection of the data and information required in the monitoring plan. The collected information will be documented and sent to the CDM manager or responsible staffs of the project entity monthly. The CDM manager will in charge of the implementation of the Monitoring Plan and report to the General Manager of the company. The General Manager of the company will make the confirmations on monitoring, calculation data and reports.

The organization of the monitoring implementers is illustrated in the table below:



3. **Monitoring Program and Equipment**

Grid-connected electricity generated by the proposed project will be monitored through metering equipment (a meter monitoring both electricity output generated from the proposed project and electricity input provided by the grid) at the on-site substation.

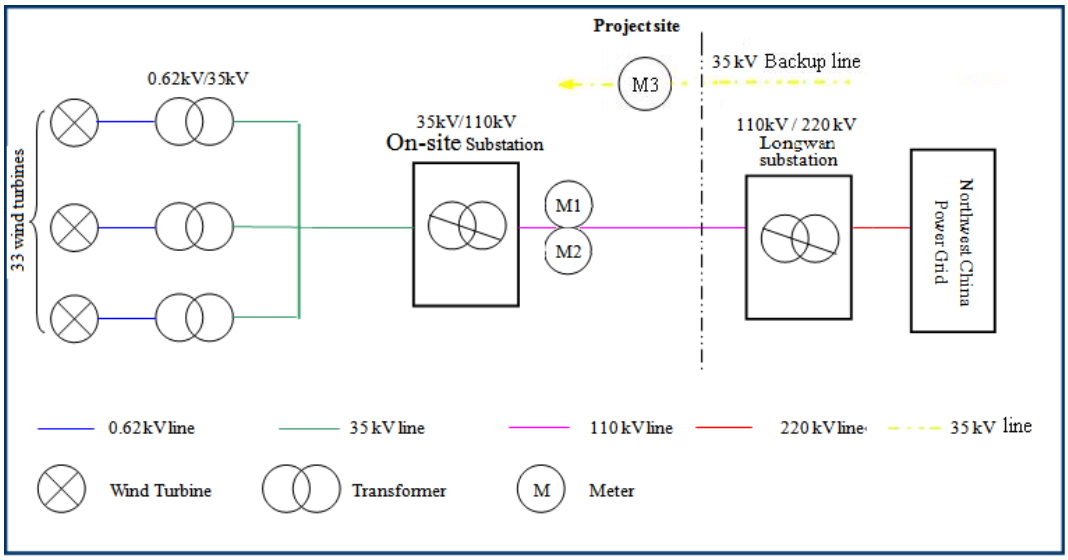
Monitoring equipments include two meters, the main meter (M1) and the backup meter (M2). All the meters are the multifunctional electricity meters (accuracy degree is 0.2s, bidirectional). M1 as the main meter will be used to monitor the electricity supplied to the grid by the proposed project and the electricity purchased from the Grid. M2 will monitor the electricity supplied to the grid and imported from the grid by the proposed project in case M1 is damaged. The main meter (M1) and backup meter (M2) are equipped at the high pressure site (110kV) of the 110kV on-site substation of the proposed project and the project owner is responsible for conducting the meters monitoring.

A backup power line will be used for supplied electricity in emergent case that the main power line fails to supply power. A meter (hereafter referred as meter M3) will be installed to measure the electricity imported via this line. This meter is owned, maintained and monitored by the local grid company. The accuracy of the meter will be 1.0.

The receipts of the electricity supplied to the power grid by the proposed project and the electricity purchased from the grid will be issued based on the power purchase agreement (PPA) signed between the project owner and the grid company and the readings from the main meter (M1).

The net electricity supplied by the proposed project is calculated as electricity supplied to the grid by the proposed project minus imports.

A diagram shows how parameters are monitored and the location of meters is presented as follows.



Having been cross-checked by the project owner and the Grid Company every month, the metered values of electricity exported and imported will confirmed by the Grid Company and then the Grid Company will give the related sales invoices.

Before the project is in operation, both the project owner and the grid company will check the equipments to ensure their work properly.

4. Quality Assurance and Quality Control

The quality assurance and quality control procedures for recording, maintaining and archiving data are developed as part of this CDM project activity. This is an on-going process that will be ensured through the CDM activity in terms of the need for verification of the emissions on an annual basis according to this PDD and the CDM manual.

Monthly data of electricity supply and import will be approved and signed by the Manager before it is accepted and stored. This audit will check compliance with monitoring procedures in this monitoring plan. This internal audit will also identify potential improvements to procedures to improve monitoring and reporting in future years. The monitoring staff will also attend a training session organized by the CDM consultant. The purpose of training is to assure those staff are competent to conduct the monitoring plan, thus to make the monitored data accurate. Sales invoices will be used and kept for checking consistency of the recorded data.

The verification will use the main meter's data as long as the inaccuracy of the meter is within the permissible tolerance. The main procedures are as follows:

I According to the requirements of power purchase/sales agreement, the project owner and the grid company should collect the two meters' data periodically, and check them at the same time.

II The project owner supplies the electricity to the grid company, and provides an electricity sales invoice to the Grid Company. A copy of the invoice is stored by the project owner, together with a record of the payment by the grid company.

III When the electricity generated by this project cannot meet the electricity self-use requirement of the power plant, the grid company supplies the electricity to the project owner. The Grid Company provides an electricity sales invoice to the project owner and the invoice is stored by the project owner.

IV The project owner records the power supplied to and purchased from the grid, and hence calculate the net electricity supplied to the grid;
V The records of the main meter's data readings will be provided by the Grid company to the project owner monthly and for verification by the DOE.

Emergency Procedure:
If the fault of the main meter exceeds the allowable tolerance or its malfunction occurs, the grid-connected electricity generated by the proposed project will be resolved by following measures:
I Adopting the backup meter's data, unless a test by either party reveals it is inaccuracy;
II If the inaccuracy of the backup meter is not within the acceptable limits or it cannot work properly, the project owner and the grid company will discuss and calculate a conservative estimate of power supplied to the grid. A statement will be prepared indicating
► the background to the damage to metering equipment
► the assumptions used to estimate net electricity generation supplied to the grid for the days when no record was available
► the estimation of electricity supplied to the grid. The statement will be signed by representatives from the project owner and the grid company.

If any error is detected, the party owning the meter shall repair, recalibrate or replace the meter and give the other party sufficient notice to allow a representative to attend during any corrective activity.

The project entity will furthermore document all efforts taken to restore normal monitoring procedures.

5. **Calibration of Meters & Metering**
The metering equipment will be properly calibrated and checked annually for accuracy. The project owner will prepare backup procedures to deal with any errors occurred to the meters. The calibration records carried out by the third party designated should be provided to the proposed project owner and these records will be maintained.

Meters should be tested by a qualified organization co-agreed by the project owner and the grid company within 10 days after:
I The detection of the reading difference between the main meter and the backup meter that exceeds the allowable tolerance.
II The equipments malfunction caused by improper operation. All the calibration test records should be maintained safely for the verification.

6. **Data Management System**
To keep safely the record of the data collected during monitoring, this project will set up a complete data management system. The project will perfect the whole monitoring procedure by developing the CDM manual, tracking information from the primary source to the end-data calculations in paper document format. Physical documentation such as paper-based maps, diagrams and environmental assessment will be collated in a central place, together with this monitoring plan. All paper-based information will be stored by the proposed project owner and kept at least one copy.

At the end of each month, the monitoring data will be filed in a spreadsheet and stored electronically, and the paper-based printout should be also archived. Furthermore, the project owner collects the sales invoices for the electricity supplied to the grid as a cross-check, and compiled the monitoring report including the monitoring data and relevant evidence at the end of each crediting year.

All the data will be kept for two years following the end of the last crediting period.

7. **Monitoring Report**
After the CDM project manager collects and sorts the monitored data, the monitoring report is prepared by the project developer alone or with some consultancy Company. The project developer and/or the designated third party have to make sure that the format and content of the monitoring report are consistent with the monitoring methodology in the registered PDD.

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

>>
Date of completion of Baseline Study: 19/08/2011

Name of person/entity determining the baseline:

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Above persons are not Project Participants.

SECTION C. Duration of the project activity / crediting period

C.1 Duration of the project activity:

C.1.1. Starting date of the project activity:

>>
18/07/2010[49](the date when the first construction contract signed)

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

>>
20 years 0 months (Operation years)

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

C.2.1. Renewable crediting period

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

>>
01/01/2012 (or the registration date whichever is later)

C.2.1.2. Length of the first crediting period:

>>
7 years 0 months

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

>>
Not applicable

C.2.2.2. Length:

>>
Not applicable

[49] The date of the first construction contract signed, which is the earliest date among the implementation of construction and real action of a project activity begins. The earliest real action of the proposed project begun when the first construction contract was signed, which is in conformity with the EB33, Para 76/CDM Glossary of terms/EB41, Para 67.

SECTION D. Environmental impacts

>>

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

>>

The environmental impact assessment for this project was carried out by Xinjiang Uygur Environmental Protection Technique Consulting Centre in August 2009 and approved by Xinjiang Uygur Environmental Protection Bureau on October 27th 2009 (xinhuanjianjianhan 212) and then renamed the EIA approval at May 18th 2010 (xinhuanpingjiahan 249). A summary of the report is illustrated as below:

Ambient air

The impact on ambient air quality of the proposed project is mainly from dust during the construction phase. The excavation work is the primary emission source, however, it is a ground source and the particle size is quite large so that dust will deposit quickly on the ground. Immediately replant the areas where construction has completed, and sprinkling water on the road frequently should be conducted. Therefore, the proposed project will not cause any threat on the quality of ambient air.

Impact from noise

There is some noise during the operation of wind turbines. The equipments and techniques with lower noise will be chosen to apply. Improvement on construction process and strengthening of equipment maintenance is emphasized. However, no village or resident exists near the project location within 200 meters. Consequently, the noise arising from operation and construction period has little impact to the surrounding environment.

Electromagnetic impact

The operation of the wind farm will generate electromagnetic pollution, whereas the pollution is slight. In addition, the project is very far from local residents and village. Therefore, the electromagnetic pollution to the surrounding environment is insignificant.

Impact from Solid waste

Solid wastes generated from the proposed project activity are excavated earth material and domestic solid waste. Part of the excavated earth material will be backfilled, and the rest will be used for land levelling and road construction near the project site. The domestic solid waste will be legally collected and treated together with the waste from local residents.

Impact from Wastewater

Wastewater is mainly domestic wastewater. Wastewater quantity is fairly small and treatment methods will be applied for on-site primary treatment, and then the wastewater will be treated together with the local wastewater. Small-scale septic tanks should be built on the site, through which the wastewater can meet the national second degree standard of water discharge after treatment. Therefore, the impact of wastewater is limited and mitigated.

Impact on natural environment

The lands permanently taken by wind farms are normally mountain ridges, where most of the vegetation is grass and shrub, without rare plants. No re-settlement is involved for construction of the project. The land taken by the proposed project is approximate of 20 mu (about3.29 acres) permanently and 85mu (about 14 acres) temporarily. In order to protect the landscape, vehicles are prohibited from driving on the landscape randomly and afforestation is required; hunting wild animals is strictly forbidden at the same time. Hence, the project construction has little impact on the mountain's eco-environment.

Impact on birds

The fly height of birds is usually higher than 150m, which is about 50m higher than the height of wind turbines and birds usually can avoid obstacles as far as 100 to 200 meters away. In addition, the project site locates on mountainous area, with no lakes and marshes around, thus it is not a habitat for birds. Hence, the project construction and operation will have insignificant influence to the birds.

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

>>

The environmental impacts of the Xinjiang Jimunai CGN Phase I Wind Farm Project are not considered significant.

SECTION E. Stakeholders' comments

>>

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

>>

The project developer has sent out questionnaires to the stakeholders in the local County Jimunai Community for the comments of the proposed project construction on 30/06/2010. 40 copies of questionnaire were distributed, and 38 pieces of reply were received. The recovery ratio is 95%. Among the interviewees, there were 35 farmers, 2 government official and1student. 15 of them have educational level of middle school or below middle school, 22 of high school and 1 of college.

An invitation notice for stakeholder comments was later issued by the project owner, representatives of local stakeholders, including governmental officials of the local county and local residents, etc attended the meeting in Jimunai County government meeting room on 02/07/ 2010 to discuss the questionnaires collected, introduce the project and further expressed their concerns or opinions. No negative opinion on construction of the project is heard and environmental considerations expressed by stakeholders are discussed on the meeting.

The questions regarding the proposed project were mainly as follows:

a) Is the current living and/or working environment quiet?
b) Do you currently experience electromagnetic interference when watching TV at home?
c) Are there any negative impacts of the proposed project on the everyday life of local residents?
d) Is the proposed project going to help improve the living and/or working environment?
e) Which is the environmental topic that concerns you the most during the construction and operation of the proposed project?
f) Do you support the proposed project?

E.2. Summary of the comments received:

>> The summary of survey is listed as the following:

- 37 of them consider their current living and/or working environment quiet, only one person is unsure;
- 37 of them currently do not experience electromagnetic interference when watching TV at home and only one person is unsure;
- 38 of them think there will not be any negative impacts on their daily life;
- 38 of them think the proposed project will help improve their living and/or working environment;
- Regarding the construction and operation of the propose project, 32 of them are most concerned with the noise level, and 6 of them are most concerned with wastewater from the project;
- 38 of them support the implementation of the proposed project.

Conclusion:

The local community possesses basically positive comments on the effects of the proposed project. The interviewees considered that local social, economic and environmental development would be beneficial from the proposed project. The response was overall supportive to the project implementation.

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

>>
As shown in the questionnaires, local residents were most concerned with noise level, and some of them were concerned with wastewater. As discussed in the EIA report, these issues are well illuminated and instructions were given to mitigate the potential impacts of these issues. With good implementation of the above-mentioned measures by the project developer, the proposed project will not have significant negative impact on the local environment.

Annex 1

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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

There is no public funding for the Xinjiang CGN Jimunai Phase I Wind Farm Project.

Annex 3

Emission Factor of NWPG

Calculation of Operating Margin (OM):

Table A1. Simple OM Emission Factor of NWPG in 2006

Fuel types	**Unit**	**Shaanxi**	**Gansu**	**Qinghai**	**Ningxia**	**Xinjiang**	**Subtotal**	**Carbon Content** （tc/TJ）	**Oxidation rate** （%）	**Emission Coefficient of Fuel** ($kgCO_2/TJ$)	**Average low Caloric value** （$MJ/t,km^3$）	**CO_2 emission （tCO_2e） K=F×I×J/10000（unit of mass）**
		A	**B**	**C**	**D**	**E**	**F=A+B+C+D+E**	**G**	**H**	**I**	**J**	**K=F×I×J/10000 (unit of volume)**
Raw coal	10000 ton	2,834.44	1,660.92	421.86	1,833.72	1,547.69	**8,298.63**	25.8	100	87,300	20,908	151,472,271
Cleaned coal	10000 ton						**0**	25.8	100	87,300	26,344	0
Other washed coal	10000 ton				112.7	8.45	**121.15**	25.8	100	87,300	8,363	884,504
Coal Briquette	10000 ton						**0.00**	29.2	100	95,700	28,435	0
Coke	10000 ton				0.01		**0.01**	29.2	100	95,700	28,435	272
Coke oven gas	10^8m^3	0.2				0.08	**0.28**	12.1	100	37,300	16,726	17,469

Other coal gas	10^8m^3	0.1					**0.1**	12.1	100	37,300	5,227	1,950
Crude oil	10000 ton					0.02	**0.02**	20	100	71,100	41,816	595
Gasoline	10000 ton	0.01					**0.01**	18.9	100	67,500	43,070	291
Diesel	10000 ton	1.14	0.24	0.61		1.25	**3.24**	20.2	100	72,600	42,652	100,328
Fuel oil	10000 ton		0.6			0.11	**0.71**	21.1	100	75,500	41,816	22,415
LPG	10000 ton						**0**	17.2	100	61,600	50,179	0
Refinery gas	10000 ton						**0**	15.7	100	48,200	46,055	0
Natural gas	10^8m^3	1.59	0.56	1.06		7.49	**10.7**	15.3	100	54,300	38,931	2,261,930
Other oil product	10000 ton						**0**	20	100	72,200	41,816	0
Other coking product	10000 ton	1.86					**1.86**	25.8	100	95,700	28,435	50,615
Other fuel	10000 tce	33.57	8.81			2.2	**44.58**	0	0	0	0	0
											Subtotal	154,812,639

Source: China Energy Statistical Yearbook 2007

Table A2. Thermal Power Generation of NWPG in 2006

Province	Power Generation (MWh)	Ratio of Self Power Consumption of Plant (%)	Power Supply(MWh)

Shaanxi	54,482,000	6.97	50,684,605
Gansu	35,738,000	4.29	34,204,840
Qinghai	7,204,000	2.57	7,018,857
Ningxia	36,731,000	0	36,731,000
Xinjiang	29,901,000	8.02	27,502,940
Total			156,142,241

Source: China Electric Yearbook 2007

Table A3. Emission Factor of NWPG in 2006

	Parameter	**Unit**	**Value**	**Source**
A	Total Power Supply of NWPG	MWh	156,142,241	China Electric Yearbook 2007
B	Total Emissions of NWPG	tCO_2e	154,812,639	China Electric Power Yearbook and China Energy Statistical Yearbook
C	Emission Factor of NWPG	tCO_2e /MWh	0.991485	C=B/A

Table A4. Simple OM Emission Factor of NWPG in 2007

Fuel types	**Unit**	**Shaanxi**	**Gansu**	**Qinghai**	**Ningxia**	**Xinjiang**	**Subtotal**	**Carbon Content (tc/TJ)**	**Oxidation rate (%)**	**Emission Coefficient of Fuel ($kgCO_2/TJ$)**	**Average low Caloric value (MJ/t,km3)**	**CO_2 emission (tCO_2e) K=F×I×J/100000 (unit of mass)**
		A	**B**	**C**	**D**	**E**	**F=A+B+C+D+E**	**G**	**H**	**I**	**I**	**K=F×I×J/10000 (unit of volume)**
Raw coal	10000 ton	3303.44	1969.03	470.85	2165.8	1762.11	**9671.23**	25.8	100	87,300	20,908	176,525,905
Cleane	10000						**0**	25.8	100	87,300	26,344	0

d coal	ton											
Other washed coal	10000 ton	3.73			124.31	7.73	**135.77**	25.8	100	87,300	8,363	991,243
Coke	10000 ton	3.53					**3.53**	26.6	100	87,300	20,908	64,432
Coal Briquette	10000 ton						**0**	29.2	100	95,700	28,435	0
Coke oven gas	$10^8 m^3$	0.52	0.65			0.26	**1.43**	12.1	100	37,300	16,726	89,215
Other coal gas	$10^8 m^3$	14.14	0.71				**14.85**	12.1	100	37,300	5,227	289,526
Crude oil	10000 ton					0.09	**0.09**	20	100	71,100	41,816	2,676
Gasoline	10000 ton	0.02					**0.02**	18.9	100	67,500	43,070	581
Diesel	10000 ton	1.12	0.26	0.42		1.77	**3.57**	20.2	100	72,600	42,652	110,546
Fuel oil	10000 ton	0.01	1.05	0.04		0.05	**1.15**	21.1	100	75,500	41,816	36,307
LPG	10000 ton						**0**	17.2	100	61,600	50,179	0
Refinery gas	10000 ton					5.99	**5.99**	15.7	100	48,200	46,055	132,969
Natural gas	$10^8 m3$	1.68	0.49	1.93		8.66	**12.76**	15.3	100	54,300	38,931	2,697,404
Other oil	10000 ton						**0**	20	100	72,200	41,816	0

product												
Other coking product	10000 ton						**0**	25.8	100	95,700	28,435	0
Other fuel	10000 tce	94.36	9.73				**104.09**	0	0	0	0	0
											Subtotal	180,940,805

Source: China Energy Statistical Yearbook 2008

Table A5. Thermal Power Generation of NWPG in 2007

Province	**Power Generation (MWh)**	**Ratio of Self Power Consumption of Plant (%)**	**Power Supply(MWh)**
Shaanxi	59,100,000	6.77	55,098,930
Gansu	42,400,000	5.89	39,902,640
Qinghai	9,700,000	7.19	9,002,570
Ningxia	43,500,000	0	43,500,000
Xinjiang	34,600,000	9.2	31,416,800
Total			178,920,940

Source: China Electric Yearbook 2008

Table A6. Emission Factor of NWPG in 2007

	Parameter	**Unit**	**Value**	**Source**
A	Total Power Supply of NWPG	MWh	178,920,940	China Electric Yearbook 2008
B	Total Emissions of NWPG	tCO_2e	180,940,805	China Electric Power Yearbook and China Energy Statistical Yearbook

C	Emission Factor of NWPG	tCO_2e /MWh	1.011289	C=B/A

Table A7. Simple OM Emission Factor of NWPG in 2008

Fuel types	**Unit**	**Shaanxi**	**Gansu**	**Qinghai**	**Ningxia**	**Xinjiang**	**Subtotal**	**Carbon Content**	**Oxidation rate**	**Emission Coefficient of Fuel**	**Average low Caloric value**	**CO_2 emission（tCO_2e）**
								（tc/TJ）	**（%）**	**(kgCO2/TJ)**	**（MJ/t,km3）**	**K=F×I×J/10000（unit of mass）**
		A	**B**	**C**	**D**	**E**	**F=A+B+C+D+E**	**G**	**H**	**I**	**J**	**K=F×I×J/10000 (unit of volume)**
Raw coal	10000 ton	3,620.00	2,216.90	507.44	2,330.72	1,924.90	**10,599.96**	25.8	100	87,300	20,908	193,477,720
Cleaned coal	10000 ton							25.8	100	87,300	26,344	0
Other washed coal	10000 ton	9.22			53.85	8.2	**71.27**	25.8	100	87,300	8,363	520,335
Coal Briquette	10000 ton						**0**	29.2	100	95,700	28,435	0
Coke	10000 ton							29.2	100	87,300	28,435	0
Coke oven gas	10^8 m^3	0.35	0.74			0.13	**1.22**	12.1	100	95,700	16,726	76,113

Other coal gas	10^8 m^3	18.38	0.2				**18.58**	12.1	100	37,300	5,227	362,249
Crude oil	10000 ton							20	100	37,300	41,816	0
Gasoline	10000 ton	0.05				0.01	**0.06**	18.9	100	71,100	43,070	1,744
Diesel	10000 ton	1.03	0.44	0.26	0.05	1.64	**3.42**	20.2	100	67,500	42,652	105,902
Fuel oil	10000 ton		0.86	0.04		0.02	**0.92**	21.1	100	72,600	41,816	29,045
LPG	10000 ton							17.2	100	75,500	50,179	0
Refinery gas	10000 ton					7.25	**7.25**	15.7	100	61,600	46,055	160,939
Natural gas	10^8 m^3	0.94	0.24	2.99		7.2	**11.37**	15.3	100	48,200	38,931	2,403,565
Other oil product	10000 ton					0.01	**0.01**	20	100	54,300	41,816	302
Other coking product	10000 ton							25.8	100	72,200	28,435	0
Other fuel	10000 tce	93.67	10.58		21.24		**125.49**	0	0	95,700	0	0
											Subtotal	197,137,915

Source: China Energy Statistical Yearbook 2009

TableA8. Thermal Power Generation of NWPG in 2008

Province	Power Generation （MWh)	Ratio of Self Power Consumption of Plant （%）	Power Supply （MWh)
Shaanxi	71,500,000	6.95	66,530,750
Gansu	46,800,000	6.4	43,804,800
Qinghai	10,700,000	7.14	9,936,020
Ningxia	44,000,000	7.57	40,669,200
Xinjiang	39,700,000	0	39,700,000
Total			200,640,770

Source: China Electric Yearbook 2009

Table A9. Emission Factor of NWPG in 2008

	Parameter	Unit	Value	Source
A	Total Power Supply of NWPG	MWh	200,640,770.0	China Electric Yearbook 2009
B	Total Emissions of NWPG	tCO_2e	197,137,929	China Energy Statistical Yearbook and China Electric Yearbook
C	Emission Factor of NWPG	tCO_2e /MWh	0.982542	C=B/A

Table A10. Operating Margin Emission Factor of NWPG

		Year 2006	Year 2007	Year 2008	Total
A	Emissions (tCO_2e/year)	154,812,639	180,940,805	197,137,915	532,891,358
B	Power Supply (MWh)	156,142,241	178,920,940	200,640,770	535,703,951
C	CO_2 Emission Factor (tCO_2e/MWh)	C = A/B			0.9947

Calculation of Build Margin (BM):

Step 1. Calculation of weights of CO_2 emissions of solid, liquid and gas fuel in total emissions for power generation

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

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

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

Where:

$FC_{i,j,y}$: Amount of fossil fuel type *i* consumed in province *j* in year *y* (mass or volume unit, for solid and wet fuel, the unit is ton, for gas fuel, the unit is m^3);

NCV_{ij} : Net thermal value of fuel type *i* in year *y* (for solid and wet fuel, the unit is GJ/t, for gas fuel, the unit is GJ/m^3);

$EF_{CO2,i,y}$: CO_2 emission factor of fossil fuel type *i* in year *y* (tCO_2 /GJ);
COAL,OIL and GAS respectively refers to the group of solid, liquid, and gas fuels.

Based on China Energy Statistical Yearbook 2009, the calculation of the weights of solid, liquid, and gas fuels in NWPG are:

λ_{Coal} =98.41%， λ_{Oil} =0.07%， λ_{Gas} =1.52%

Step 2: Calculation of Emission Factor of Relevant Thermal Power

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

Where: $EF_{Coal,Adv}$, $EF_{Oil,Adv}$ and $EF_{Gas,\ Adv}$ respectively refers to the emission factor representing best technology commercially available for fuel of coal, oil or gas fired power plants. For specific workings, see the following:

Table A11. Emission factor representing best technology commercially available for fuel of coal, oil or gas fired power plants

	Variable	Efficiency of Power Supply	Emission Coefficient of Fuel **($kgCO_2/TJ$)**	Oxidation Rate	Emission Factor (tCO_2e/MWh)
		A	B	C	D=3.6/A/1,000,000×B×C
Coal-fired Power Plant	$EF_{Coal,Adv}$	39.08%	87,300	1	0.8042
Oil-fired Power Plant	$EF_{Oil,Adv}$	51.46%	75,500	1	0.5282
Gas-fired Power Plant	$EF_{Gas,Adv}$	51.46%	54,300	1	0.3799

$EF_{Thermal} = \lambda_{Coal} \times EF_{Coal,Adv} + \lambda_{Oil} \times EF_{Oil,Adv} + \lambda_{Gas} \times EF_{Gas,Adv}$ =0.7975 (tCO_2e/MWh)

Step 3: Calculation of BM of the Grid

$$EF_{grid,BM,y} = \frac{CAP_{Thermal,y}}{CAP_{Total,y}} \times EF_{Thermal,y},$$

Where: CAP_{Total} is the total of new capacity additions, and $CAP_{Thermal}$ is the new capacity addition of thermal power.

Table A12. Installed Capacity of NWPG in 2008

Installed Capacity	Unit	Shaanxi	Gansu	Qinghai	Ningxia	Xinjiang	Total
Thermal Power	MW	17,850.0	8,980.0	2,000.0	7,540.0	8,200.0	44,570.0
Hydro Power	MW	1,810.0	5,440.0	5,910.0	430.0	2,190.0	15,780.0
Nuclear Power	MW	0.0	0.0	0.0	0.0	0.0	0.0
Wind Power and Others	MW	0.0	600.0	0.0	170.0	510.0	1,280.0
Total	MW	19,660.0	15,020.0	7,910.0	8,140.0	10,900.0	61,630.0

Source: China Power Yearbook 2009

Table A13. Installed Capacity of NWPG in 2007

Installed Capacity	Unit	Shaanxi	Gansu	Qinghai	Ningxia	Xinjiang	Total
Thermal Power	MW	12,290	7,840	1,900	7,030	6,560	35,620
Hydropower	MW	1,790	4,400	5,830	430	2,140	14,590
Nuclear Power	MW	0	0	0	0	0	0
Wind Power and Others	MW	72.5	346	0	50	330	798.5
Total	MW	14,152.5	12,586	7,730	7,510	9,030	51,008.5

Source: China Power Yearbook 2008

Table A14. Installed Capacity of NWPG in 2006

Installed Capacity	**Unit**	Shaanxi	**Gansu**	**Qinghai**	**Ningxia**	**Xinjiang**	**Total**
Thermal Power	MW	9,723	6,448	1,517	6,002	5,937	29,627
Hydropower	MW	2,165	4291	5,423	429	1,766	14,074
Nuclear Power	MW	0	0	0	0	0	0
Wind Power and Others	MW	0	199	0	11	189	399
Total		11,888	10,938	6,940	6,442	7,892	44,100

Source: China Power Yearbook 2007

Table A15. Calculation of BM of NWPG (MW)

	Installation in year 2006	**Installation in year 2007**	**Installation in year 2008**	**New Additions from 2006 to 2008***	**New Additions from 2007 to 2008***	**Ratio in New Additions**
	A	B	C	D	E	
Thermal Power（MW）	29,627.0	35,620.0	44,570.0	16,216.0	9,609.0	86.24%
Hydro Power（MW）	14,074.0	14,590.0	15,780.0	1,707.0	1,190.0	9.08%
Nuclear Power（MW）	0.0	0.0	0.0	0.0	0.0	0.00%
Wind Power and Others（MW）	399.0	798.5	1,280.0	881.0	482.0	4.69%
Total（MW）	44,100.0	51,008.5	61,630.0	18,804.0	11,281.0	
Percentage compared with installation of 2008				30.51%	18.30%	

* Calculation from installed capacity, shut-off, suspended and pumped storage capacity

$EF_{grid,BM,y}$ =0.7975×86.24%=0.6878 tCO_2/MWh

Table A16. Baseline Emission Factor of NWPG

	Parameter	**Unit**	**Amount**
A	Operating Margin Emission Factor	tCO_2e/MWh	0.9947
B	Build Margin Emission Factor	tCO_2e/MWh	0.6878
C	Combined Emission Factor (C=0.75*A+0.25*B)	tCO_2e/MWh	**0.9180**

Table A17. Electricity Generation Baseline Emissions

	Parameter	**Unit**	**Amount**	**Source or Equation**
A	Project installed capacity	MW	49.5	FSR
B	Annual electricity supplied	MWh	117,315	FSR
C	Baseline Emissions Factor	tCO_2e/MWh	0.9180	Table A.17
D	Electricity generation baseline emissions	tCO_2e/year	**107,695**	D=B*C

Annex 4

MONITORING PLAN

Please refer to B 7.2 in the PDD.