



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

**CONTENTS**

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

**Annexes**

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

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

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**Xinjiang Xiaocaohu Wind Power Project**

Version number of the document: 3

Date: 12 December, 2007

**A.2. Description of the project activity:**

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Xinjiang Xiaocaohu Wind Power Project (hereafter refers to the proposed project) is to utilize wind resources for electricity generation through the installation and operation of 49.5MW wind farm in Tuokexun County, Turfan Basin, Xinjiang Uygur Autonomous Region, People's Republic of China and an 110kV substation. The project is designed to supply 116.255GWh of electricity per year, from which the electricity generated will be sold to the Xinjiang Power Grid, an integral part of the Northwest China Power Grid. The grid-connected fossil fuel-fired power plants are dominated in the Northwest China Power Grid. The proposed project activity will achieve obvious greenhouse gas (GHG) emission reductions by avoiding CO<sub>2</sub> emissions. The annual average estimated emission reduction over the first crediting period is 108,924 tCO<sub>2</sub>e.

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

## 1. GHG emission reduction

The proposed project activity will achieve obvious greenhouse gas (GHG) emission reductions by avoiding CO<sub>2</sub> emissions, as grid-connected fossil fuel-fired power plants are dominated in the Northwest China Power Grid. The annual average estimated emission reduction over the first crediting period is 108.924 tCO<sub>2</sub>e.

## 2. Pollutants emission reduction through replacing fossil fuel combustion

The proposed project is to replace grid-connected fossil fuel-fired power plants in the Northwest China Power Grid, and thus reduce fossil fuel consumption and avoid pollutants emission, such as sulfur 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 about 50 job opportunities for local people, and achieve the economic growth in the region. Furthermore, the proposed project plans to utilize domestic made state-of-the-art wind turbines to promote Chinese wind turbine manufacturing industry by increasing its market share and the employment opportunities.

**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 indicated using the following tabular format.

Name of Party involved (*) (host) indicates a host	Private and/or public entity(ies)	Kindly indicate if the Party involved
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Party)	project participants (*) (as applicable)	wishes to be considered as project participant (Yes/No)
Peoples' Republic of China (host)	Xinjiang Huadian Xiaocaohu Wind Power Co., Ltd.	No
U.K.	NATIXIS Environnement&Infrastructures	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):**

&gt;&gt;

People's Republic of China

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

&gt;&gt;

Xinjiang Uygur Autonomous Region

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

&gt;&gt;

Tuokexun County, Turfan Basin

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

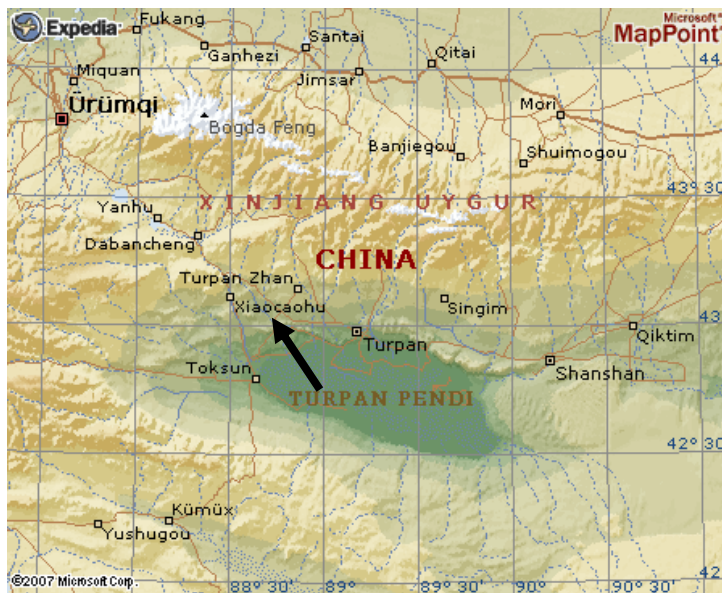
&gt;&gt;

The proposed project is located in the Tuokexun County, Turfan Basin, Xinjiang Uygur Autonomous Region, People's Republic of China. The project is 25 km away from the Tuokexun County, and in the north of Lanxin Railway. Its geographical co-ordinates are east longitude 88°42'06" and north latitude 43°04'25" . Geographical location of the project is shown in Figure A1, A2 and A3.

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



Figure A2. 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 involves the installation of 54 wind turbines with each capacity of 750 kW and 6 wind turbines with each capacity of 1500kW, and totals up an installation capacity of 49.5MW. The 54



wind turbines of 750kW will be supplied by the biggest Chinese wind turbine manufacturer – Goldwind Science & Technology Ltd while the other 6 will be supplied by Dalian Heavy Industry Co., Ltd. The FL1500 from Dalian currently is the wind turbine with largest capacity that is made domestically. The main technical parameters of the wind turbine are provided in the following table.

Item	Unit	Index	Index
Nominal capacity	kW	750	1500
Power conditioner		Pitch regulated and variable speed	Pitch regulated and variable speed
Number of blades		3	3
Rotor diameter	m	48.4	77.4
Swept area	M <sup>2</sup>	1885.7	3902
Cut-in speed	m/s	4	3
Rated wind speed	m/s	14-15	15
Cut-out speed	m/s	25	25
Rated voltage of generator	V	690	690
Rated frequency of generator	HZ	50	50
Rated current of generator	A	690	1250
Height of tower	m	48	63
Control system		PLC	PLC

The proposed project is therefore expected to supply approximately 116.255GWh of electricity per year that will be transmitted to the Xinjiang Power Grid, which is an integral part of the Northwest China Power Grid, through a 110kV substation in Xiaocaohu Wind Farm. The proposed project is to use the domestic equipment, and therefore won't involve with technical transfer.

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

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A crediting period of 7 (seven) years (renewable twice) is selected for the project activity (2008-2014). An estimation of emissions reductions expected over the crediting period is provided in the table below<sup>1</sup>.

Years	Annual estimation of emission reductions in tonnes of CO <sub>2</sub> e
<b>Year 1 15/03/2008- 14/03/2009</b>	108,924
<b>Year 2 15/03/2009- 14/03/2010</b>	108,924
<b>Year 3 15/03/2010- 14/03/2011</b>	108,924
<b>Year 4 15/03/2011- 14/03/2012</b>	108,924
<b>Year 5 15/03/2012- 14/03/2013</b>	108,924

<sup>1</sup> The proposed project started construction on 6<sup>th</sup> March, 2007 and the first wind turbine was installed on 30<sup>th</sup> July 2007. The first wind turbine is expected to be put into delivery in the end of December 2007 and all the turbines will be settled and are expected to generate power on 1<sup>st</sup> October 2007. The construction and installation of 110kV substation will be finished on 30<sup>th</sup> September 2007. The Control Center (including 110kV substation) will finish debugging and final acceptance on 30<sup>th</sup> December 2007.



<b>Year 6 15/03/2013- 14/03/2014</b>	108,924
<b>Year 7 15/03/2014- 14/03/2015</b>	108,924
<b>Total estimated reductions (tonnes of CO<sub>2</sub>e)</b>	<b>762,468</b>
<b>Total number of the first crediting years</b>	<b>7</b>
<b>Annual average over the crediting period of estimated reductions (tonnes of CO<sub>2</sub>e)</b>	<b>108,924</b>

**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(the 6<sup>th</sup> version) – “Consolidated methodology for grid-connected electricity generation from renewable sources”.

Version 3 of Tool for the Demonstration and Assessment of Additionality is also applied in the proposed project.

For more information regarding the methodology please refer to <http://cdm.unfccc.int/methodologies/approved>.

**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 meets all applicability conditions of methodology ACM0002 which are listed as follows:

- 1) The proposed project is a new wind power project;
- 2) The proposed project does not involve switching from fossil fuels to renewable energy at the site;
- 3) The geographic and system boundaries of Northwest China Power Grid to which the proposed project will be connected can be clearly identified and information on the characteristics of the grid is available.

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

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The boundary of the proposed project includes the physical range and geographical range of the proposed project and all the power plants connected with the proposed project in the Northwest China Power Grid. Therefore, the proposed project is within the boundary of the Northwest China Power Grid, which geographical range includes Shanxi Province, Gansu Province, Qinghai Province, Ningxia Hui Autonomous Region and Xinjiang Uygur Autonomous Region.<sup>2</sup>

	Source	Gas	Included?	Justification / Explanation
<b>Baseline</b>	Fossil fuels	CO <sub>2</sub>	Yes	Major emission sources

<sup>2</sup> The electricity import and output between Northwest China Power Grid and other grids (Central China Power Grid) is very insignificant and not necessary to be considered when calculating EF of grid. According to power dispatch information on the website of Northwest China Grid Company Limited, Northwest China Power Grid exported  $13.6 \times 10^8$  KWh power to Central China Power Grid in 2005 and exported  $30.29 \times 10^8$  KWh power to Central China Power Grid in 2006.



	fired power plants	CH <sub>4</sub>	No	Excluded for simplification. This is conservative.
		N <sub>2</sub> O	No	Excluded for simplification. This is conservative.
<b>Project Activity</b>		CO <sub>2</sub>	No	Excluded for simplification.
		CH <sub>4</sub>	No	Excluded for simplification.
		N <sub>2</sub> O	No	Excluded for simplification.

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

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In absence of the proposed project, reasonable and credible baseline scenarios to the proposed project that are in accordance with current laws and regulations include:

- 1) The proposed project not taken as CDM project;
- 2) Construction of a fossil fuel power plant with equivalent amount of annual electricity output;
- 3) Construction of a power plant using other source of renewable energy with equivalent amount of annual electricity output; and
- 4) Supply of equivalent annual power output by the Grid where the proposed project is connected.

Specific analysis on the four alternative scenarios in absence of the proposed project is as follows:

- 1) According to the investment analysis in B5, the IRR of the proposed project is only 6.63 %, which is lower than the sector benchmark 8%. The development of the proposed project under a fully commercialized condition without CDM could not be financially attractive. Therefore, the Scenario 1) could not be considered as an alternative baseline scenario.
- 2) The annual utilization hour of thermal units in the Northwest China Power Grid is approximately 5472 hours<sup>3</sup>, while that of the proposed project is 2349 hours. Therefore, the alternative fossil fuel-fired power plant with equivalent power output as the proposed project corresponds to an installed capacity of 21MW or less, while coal-fired plants with a capacity of 135MW or less are prohibited from development in large grid such as provincial grids<sup>4</sup>, and the fossil fuel-fired power units with less than 100MW capacity is strictly regulated for installation<sup>5</sup> according to current regulations in China. Consequently, this is not a feasible alternative scenario to replace the proposed project.
- 3) Besides wind energy, solar PV, geothermal, biomass and hydro are the possible grid-connected renewable energy technologies that could be applied in the Northwest China Power Grid. Due to the

<sup>3</sup> The annual electricity output of thermal units in the Northwest China Power Grid is  $1286.82 \times 10^8$  kWh (China Electric Power Yearbook 2006, P572), and the annual total installed capacity of coal-fired plants in the Northwest China Power Grid is  $2351.45 \times 10^4$  kW (China Electric Power Yearbook 2006, P571), therefore, the annual utilization hour of the thermal units in the Northwest China Power Grid is 5472 hours.

<sup>4</sup> Notice on Strictly Prohibiting the Installation of Fuel-fired Generation with the Capacity of 135MW or below issued by the General Office of the State Council, decree no. 2002-6

<sup>5</sup> Interim Rules on the Installation and Management of Small-scale Fuel-fired Generators issued in August 1997



technology development status and the high cost for power generation, solar PV<sup>6</sup>, geothermal<sup>7</sup> and biomass<sup>8</sup> of the similar installed capacity as the proposed project are alternatives far from being attractive investment in the grid in China. Only hydropower projects have the investment return rate that can compete over that of wind power projects in China. However, according to the Feasibility Study, Xijiang Xiaocaohu Wind Power Project is about 25 km away from the north of Tuokexun County in Turfan Basin and lies in a piece of desert,<sup>9</sup>. Due to the lack of available hydro resources in the area around the proposed project, it is impossible to develop a hydropower station with similar capacity around the site of the proposed project. Hence the Scenario 3) is not feasible as an alternative scenario.

- 4) The installed capacity of Northwest China Power Grid keeps increasing for many years, and it is in compliance with Chinese relevant laws and regulations, and without financial barrier. Therefore, the alternative 4) is a feasible alternative. As a result, supply of equivalent annual power output by the Northwest China Power Grid where the proposed project is connected is the baseline for the proposed project.

In conclusion, the practical and feasible baseline scenario is the alternative 4).

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

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

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

Define realistic and credible alternatives to the project activity(s) that can be (part of) the baseline scenario through the following sub-steps:

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

In absence of the proposed project, reasonable and credible alternatives that are in accordance with current laws and regulations include:

- 1) The proposed project not taken as CDM project;
- 2) Construction of a fossil fuel power plant with equivalent amount of annual electricity output;

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<sup>6</sup> Source: Page 54, *China Solar PV Report 2007*, China Environment Science Press. The cost of solar PV is USD 0.5/kWh, which is around RMB 3.7/kWh. The cost of solar PV is significant higher than that of wind power, and thus not a attractive renewable energy technology for China at this moment

<sup>7</sup> Source: Page 6 of *Overview of Chinese Renewable Energy Development*, NDRC/GEF/World Bank China Renewable Energy Development Project, May 2004. Geothermal technology is still in demonstration stage in China.

<sup>8</sup> Source: Biomass generation needs policy supply due to the high investment cost <http://finance.21cn.com/news/cydt/2007/06/28/3319602.shtml>. The investment cost of the first biomass generation project (Shandong Shanxian Biomass Generation Project) which was put into delivery in Dec 2006 is around RMB 13 thousand/kW. The investment cost of the proposed project is RMB 7.8 thousand/kW (total investment cost/installed capacity). Therefore, it can be seen clearly that the unit investment of biomass is higher than that of the proposed project.

<sup>9</sup> Source: Feasibility Study of Xinjiang Xiaocaohu Wind Power Project, Page 1.



- 3) Construction of a power plant using other source of renewable energy with equivalent amount of annual electricity output; and
- 4) Supply of equivalent annual power output by the Northwest China Power Grid where the proposed project is connected.

In conclusion, as discussed in B4, the only practical and feasible baseline scenarios are the alternative 4).

***Sub-step 1b. Enforcement of mandatory laws and regulations:***

Considering China's regulations of energy conservation for electric power industry, coal-fired plants with a capacity of 135MW or less are prohibited from building in large grid such as provincial grids and the fossil fuel-fired power units with less than 100MW capacity is strictly regulated for installation in China as discussed in B.4, therefore, the Alternative 2) is not a realistic and acceptable alternative.

The alternative 1), 3) and 4) are in line with the existing Chinese laws and regulations.

However, for the alternative 3), as described in B.4, besides wind energy, solar PV, geothermal, biomass and hydro are the possible grid-connected renewable energy technologies that could be applied in the North East China Power Grid. Due to the technology development status and the high cost for power generation, solar PV, geothermal and biomass of the similar installed capacity as the proposed project are alternatives far from being attractive investment in the grid in China. Only hydropower projects have the investment return rate that can compete over that of wind power projects in China. However, according to the Feasibility Study, Xijiang Xiaocaohu Wind Power Project is about 25 km away from the north of Tuokexun County in Turfan Basin and lies in a piece of desert. (Please see footnote5, 6,7,8 at previous page.) Due to the lack of available hydro resources in the area around the proposed project, it is impossible to develop a hydropower station with similar capacity around the site of the proposed project. Hence the Scenario 3) is not feasible as an alternative scenario.

**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 output, the simple cost analysis method is not appropriate. The alternative baseline scenario of the proposed project is the Northwest China Power Grid 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.

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

With reference to *Methodology and Parameter for Financial Analysis of Construction Projects (effective since 03/07/2006)*, the financial benchmark IRR of Chinese power industry is 8% the total investment, which has been used widely for Feasibility Studies of the power project investments, including wind power projects in China.

***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 of the proposed project, basic parameters for calculation of financial indicators are as follows:

**Installed capacity:** 49.5MW (Source: Feasibility Study)

**Annual output:** 116.255GWh (Source: Feasibility Study)

**Project lifetime:** 21years (Source: Feasibility Study)

**Total investment:** RMB 385.044million yuan (equity/debt ratio: 20/80, source: Feasibility Study)

**O&M cost:** RMB12.903 million yuan/year (average amount, source: Feasibility Study)

**Depreciable life:** 17 years (Source: Feasibility Study)

**Tariff:** RMB 0.4332yuan/KWh (excluding VAT) (Source: Reply on Tariff from Xinjiang Turfan Development and Reform Committee<sup>10</sup>)

**Tax:** 8.5% (VAT), 33% (income tax) (Source: Feasibility Study)

**Expected CERs price:** Euro 8.5Euro/t CO<sub>2</sub>e (Source: Project developer)

### (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 rate.

Table 1 shows the fluctuating situation of IRR of the proposed project, with and without CDM revenues. Without the CDM revenue, project IRR is lower than the benchmark rate 8%. Thus the proposed project does not look financially attractive to the investors. However, with the CDM revenue, project IRR is significantly improved and exceeds the benchmark rate. Therefore, the proposed project with the CDM revenue can be considered as financially viable to the investors.

**Table 1. Financial indicators of the Xinjiang Xiaocaohu Wind Power Project**

	Project IRR (benchmark=8%)
Without CDM revenue	6.63%
With CDM revenue	9.44%

#### **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 viability of the proposed project is sound and tenable with those reasonable variations in the 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 attractive or is unlikely to be financially attractive.

<sup>10</sup> The document, *Reply on Tariff from Xinjiang Turfan Development and Reform Committee*, was issued at the time of preparing the FS on September 25, 2006.

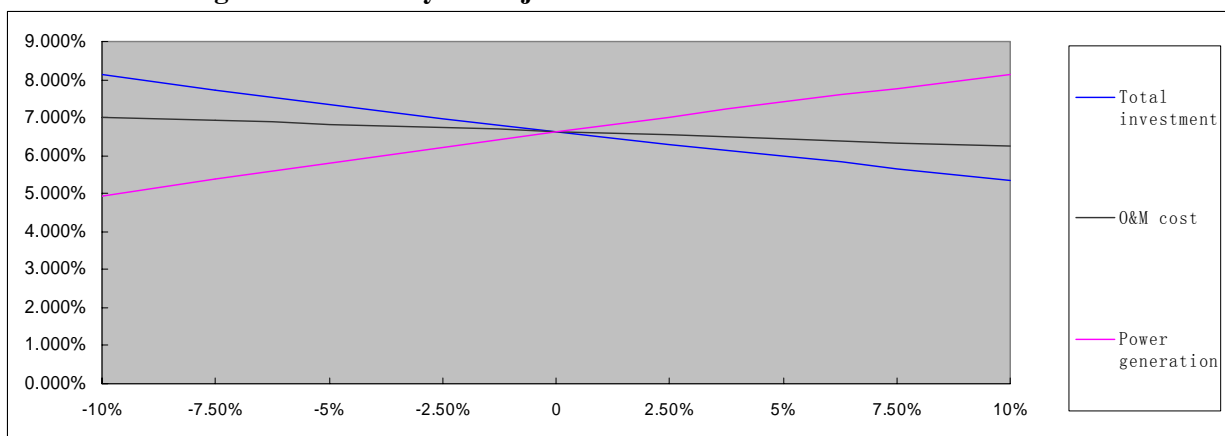
Three financial parameters including: total investment, power generation and annual O&M cost were identified as the main variable factors for sensitive analysis of financial attractiveness, because total investment and power generation were considered as two main financial parameters for sensitive analysis and fluctuated within the range from -10% to +10% in Feasibility Study which was approved by Provincial Development and Reform Committee. And according to the conservative principle, annual O&M cost was also considered as one of the main parameters for sensitive analysis in PDD. Their impacts on project IRR were analyzed in this step.

For detailed results of sensitive analysis of the three indicators, please see Table 2.

**Table 2. Sensitivity of Project IRR to different financial parameters**

Range \ Parameters	-10%	-7.50%	-5%	-2.50%	0	2.50%	5%	7.50%	10%
Total investment	8.12%	7.73%	7.35%	6.98%	6.63%	6.30%	5.97%	5.66%	5.36%
O&M cost	7.01%	6.92%	6.82%	6.73%	6.63%	6.54%	6.44%	6.34%	6.24%
Power generation	4.95%	5.39%	5.81%	6.23%	6.63%	7.02%	7.40%	7.76%	8.12%

**Figure 2. Sensitivity of Project IRR to Different Financial Parameters**



As shown in Table 2 and Figure 2, the project IRR varies to different extents, when the above three financial indicators fluctuated within the range from -10% to +10%. In comparison, the impact of the power generation on IRR is most significant. When the power generation increases by 10%, project IRR is 8.12%, and exceeds the benchmark 8%. According to the Feasibility Study, the power generation of the proposed project is calculated based on the years wind assessment records and output of the turbines to be employed by the proposed project with scientific approach applied internationally. The power generation of the proposed project is a yearly average figure for the whole life time of the proposed project. Although the wind resource might be variable year by year, but the years average wind resource is not likely to be changed comparing wind historic wind resource. The anticipated power generation is also approved to by the local government and wind energy experts. Therefore, the annual power supply of the project is designed to be 116,255MWh, and annual operating hours is 2349 hours. The power generation



of the wind turbines are assumed to be kept the same for the whole project life time. Facing the risk that not all the turbines of the proposed project could operate well for 20 years, the power generation is likely to be decreased in the last years of the project life time. Since it is based on years wind assessment, the figure is considered as an accuracy figure and not likely to change in the life time of the proposed project. Therefore, it is not possible for the power generation to be raised by 10%

Next is the total investment. It's displayed in the graphics that project IRR is 8.12% and exceeds the benchmark when the total investment decreases by 10%. Considering the price rising of raw materials during construction and local geological conditions and the possibility of the change on bidding for wind turbine units<sup>11</sup>, the total investment is increasing since the construction started. Hence, the total investment of the proposed project is not possible to be reduced.

Among the three indicators, it's displayed in the graphics that the financial parameter, annual O&M cost varies from -10% to 10%, project IRR is below benchmark 8%. So the impact of annual O&M cost on IRR is least sensitive.

After above sensitive analysis, when financial indicators change within reasonable range, the proposed project is not financially feasible without CDM support. Therefore, the Scenario 1) is not feasible as an alternative baseline scenario.

#### Step 4. Common practice analysis

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

Table 4 shows the wind farms developed and under development in Xinjiang, where the proposed project happens since Year 2000.

**Table 4 Wind Farm Development in Xinjiang Uygur Autonomous Region since Year 2000<sup>12</sup>**

Project name	Delivery year	Total capacity	Wind turbine employed	Project developer	CDM activities
Dabancheng No. 1 Wind Farm Project	May 2000	0.6MW	XWEC-Jacobs	Xinjiang Water Resources Bureau	Without CDM
	June 2003	4.8MW	Goldwind		
	October 2003	1.5MW	Goldwind		
Dabancheng Chaiwupu No. 2 Wind Farm Project	November 2001	15.5MW	Nedwind	Xinjiang Reginal Electric Power Bureau	Without CDM
	March 2003	7.5MW	NEG Micon		
Xinjiang Dabancheng Sanchang First Phase Wind	November 10 2006	30MW	GoldWind	Xinjiang Tianfeng Wind Power Co.,Ltd	Registered

<sup>11</sup> Source: Feasibility Study of Xinjiang Xiaocaohu Wind Power Project, Chapter 14.1.6, Sensitive analysis

<sup>12</sup> Installed capacity of wind farms in China by Mr Shi Pengfei, Vice Chairman of Chinese Wind Association



Farm Project					
The 30MW Tuoli Wind Farm Project in Urumqi, Xinjiang of China	2006	30MW	GE Wind	Beijing Guotou Energy Conservation Co.	Registered
Xinjiang Tianfeng Dabancheng Second Phase Wind Farm Project	10/11/2006	30MW	GoldWind	Xinjiang Tianfeng Wind Power Co.,Ltd	Under CDM developed, selected DOE is DNV
The 30MW Wulabo Wind Farm Project in Urumqi, Xinjiang of China	September 1 2007	30MW	GE Wind	China Energy Conservation Investment Co., Ltd	Under CDM developed, selected DOE is TUV SUD

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

As it is demonstrated in *Sub-step 4a*, earlier wind energy developments in Xinjiang Uygur Autonomous Region were quite small in scale. Therefore, these projects are not comparable with the proposed project. Since 2004, some new wind farms with similar scale as the proposed project are under development. These new wind farms under development are commercial projects without government's preferential tariff policies and international financial support. Therefore, CDM revenue is a very effective solution for these wind farms to overcome the barriers. Xinjiang Dabancheng Sanchang First Phase Wind Farm Project and the 30MW Tuoli Wind Farm Project in Urumqi, Xinjiang of China have been successfully registered. Other two projects, Xinjiang Tianfeng Dabancheng Second Phase Wind Farm Project and the 30MW Wulabo Wind Farm Project in Urumqi, Xinjiang of China, are in the CDM development process<sup>13</sup>. Without CDM, new wind farms in Xinjiang Uygur Autonomous Region including the proposed project are not likely to happen. It is concluded that the proposed project is not common practice, as it was undertaken without the preferential tariff or preferential financing.

Before the proposed project started construction on 6<sup>th</sup> March 2007<sup>14</sup>, the feasibility study report was carried out by Northwest Hydro Consulting Engineers, CHECC in September 2006, which indicates that the IRR of the proposed project is much lower than the benchmark of 8% without CDM revenue. Because the proposed project was assessed as financially unattractive, the proposed project owner considered applying for CDM so as to make the proposed project overcome the barrier. When the Feasibility Study Report of the proposed project was made, considering developing the proposed project as CDM project was written in the Feasibility Study<sup>15</sup>. In September 2006, the project owner called for bids for CDM of

<sup>13</sup> <http://cdm.ccchina.gov.cn>

<sup>14</sup> The evidence on the date of starting construction of the proposed project has been provided to DOE.

<sup>15</sup> The Feasibility Study Report of the Xinjiang Xiaocaohu Wind Power Project, Chapter14.2, *Analysis on the Effect of Applying for CDM*



Xinjiang Xiaocaohu Wind Power Project<sup>16</sup> and through the invitation for bids, the project owner confirmed Easy Carbon as the consultant company on the CDM. After that, on 5<sup>th</sup> March 2007, the entities related to the proposed project such as local government officers and the representatives of the project owner and the villagers from Yaer County and Daheyan Town around the project site held the meeting in the first-floor meeting room of Turfan Municipal government Building to discuss Xinjiang Xiaocaohu Wind Power Project developed as CDM project<sup>17</sup>.

In conclusion, the proposed project is additional and the project owner considered applying for CDM project to overcome the difficulties before the construction of the proposed project.

## **B.6. Emission reductions:**

### **B.6.1. Explanation of methodological choices:**

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The GHG emission calculation of the proposed project was based on the instruction of ACM0002. All the data employed in the calculation is based on the available data from Northwest China Power Grid. The baseline emission factor (EF<sub>y</sub>) is calculated as a combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) factors according to the following three steps(OM and BM of the proposed project has been pre-determined):

#### **STEP 1. Calculate the Operating Margin emission factor(s) ( $EF_{OM,y}$ )**

Calculation of the Operating Margin should be based on one of the four following methods according to the instruction of ACM0002:

- (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 ACM0002, unavailability of detailed information in China and the load curvation is not available, such as the dispatch data make method (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 (b) cannot be possibly used for the proposed project either.

Without any nuclear source, the Northwest China Power Grid possesses 19.916% of its total electricity generation that come from renewable energy sources in 2004, 18.751% in 2003, 22.821% in 2002, 25.221% in 2001 and 26.275% in 2000<sup>18</sup>. 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 method (a), but not

<sup>16</sup>The Invitation to Tender for CDM of Xinjiang Xiaocaohu Wind Power Project by China Huadian Corporation has been provided to DOE.

<sup>17</sup> The related minute has been provided to DOE.

<sup>18</sup> China Electric Power Yearbook



method (d). Consequently, Simple OM method is selected to calculate the Operating Margin emission factor of the proposed project.

The Simple OM emission factor ( $EF_{OM, simple, y}$ ) is calculated as the generation-weighted average emissions per electricity unit (t CO<sub>2</sub>e/MWh) of all generating sources serving in the system, excluding low-operating cost and must-run power plants:

$$EF_{OM, simple, y} = \frac{\sum_{i,j} F_{i,j,y} \cdot COEF_{i,j,y}}{\sum_j GEN_{j,y}}$$

Where:

- $F_{i,j,y}$  the amount of fuel  $i$  consumed by relevant power sources  $j$  in year(s)  $y$ . The index  $j$  runs over all power sources including imports, but excludes low operating costs and must-run power plants.
- $COEF_{i,j,y}$  the CO<sub>2</sub> emission coefficient of fuel  $i$ , taking into account the carbon content of fuels used by relevant power sources  $j$  and the percentage oxidation of the fuel in year(s)  $y$ ;
- $GEN_{j,y}$  the electricity delivered to the grid by source  $j$  in year  $y$ .

The CO<sub>2</sub> emission coefficient is equal to the net calorific value of fuel  $i$ , multiplied by the oxidation factor of the fuel and the CO<sub>2</sub> emission factor per unit of energy of the fuel  $i$ .

$$COEF_i = NCV_i \cdot EF_{CO_2,i} \cdot OXID_i$$

$NCV_i$  is the net calorific value (TJ per mass or volume unit) of fuel  $i$ ;

$OXID_i$  is the oxidation factor of the fuel. IPCC default values are used.

$EF_{CO_2,i}$  is the CO<sub>2</sub> emission factor per unit of energy of the fuel  $i$  (tCO<sub>2</sub>e/TJ).  $EF_{CO_2,i}$  of fossil fuels is from IPCC defaults.

$EF_{OM,y}$  is calculated as the generation-weighted average emissions of the total generation of the latest three years.

### STEP 2. Calculate the Build Margin emission factor ( $EF_{BM,y}$ )

The Build Margin Emission Factor is calculated as the generation weighted average emission factor (measured in tCO<sub>2</sub>e/MWh) of a sample of  $m$  power plants:

$$EF_{BM, y} = \frac{\sum_{i,m} F_{i,m,y} \times COEF_{i,m,y}}{\sum_m GEN_{m,y}}$$

Where

- $F_{i,m,y}$  the amount of fuel  $i$  consumed by relevant power sources  $m$  in year(s)  $y$ . The index  $m$  runs over all power sources including imports.



- $COEF_{i,m,y}$  the CO<sub>2</sub> emission coefficient of fuel  $i$ , taking into account the carbon content of fuels used by relevant power sources  $m$  and the percentage oxidation of the fuel in year(s)  $y$ ;
- $GEN_{m,y}$  the electricity delivered to the grid by source  $m$  in year  $y$ .

ACM0002 provides two options for calculating  $EF_{BM,y}$  :

Both options have the same requirement on sample group  $m$ : either the five power plants built most recently, or the power plants capacity additions in the electricity system that comprising 20% of the system generation (in MWh) and that have been built most recently. The project chooses ex-ante  $EF_{BM,y}$ .

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 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.

Deviated Calculation of Build Margin (BM):

Sub-step 1. Calculation of weights of CO<sub>2</sub> emissions of solid, liquid and gas fuel in total emissions for power generation

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

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

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

Where:

$F_{i,j,y}$ : the consumption of fuel  $i$  for province  $j$  in year  $y$  (tce);

$COEF_{i,j,y}$ : the emission factor (tCO<sub>2</sub>/tce) of fuel  $i$ , taking into account the carbon content of fuel  $i$  and the percentage of oxidation of the fuel in year  $y$ ;

*COAL, OIL and GAS* respectively refers to the group of solid, liquid, and gas fuels.

Sub-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.

Sub-step 3: Calculation of BM of the Grid

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

Where:

$CAP_{Total}$  is the total of new capacity additions;

$CAP_{Thermal}$  is the new capacity addition of thermal power.

### STEP 3. Calculate the baseline emission factor $EF_y$

The Baseline Emission Factor is calculated as a Combined Margin, using a weighted average of the Operating Margin and Build Margin.

The default values of weighted factor are:

$$w_{OM} = 0.75 \quad w_{BM} = 0.25$$

$$EF_y = EF_{OM} * w_{OM} + EF_{BM} * w_{BM}$$

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

$$BE_y = EG_y * EF_y$$

With:

$BE_y$  the baseline emission of Northwest China Power Grid in year y;

$EG_y$  the amount of net power generated by the project and supplied to the grid each year;

$EF_y$  the ex-ante emission factor in year y.

$$EG_y = EG_{output,y} - EG_{import,y}$$

With:

$EG_y$  the net Electricity supplied to the grid by the project in year y;

$EG_{output,y}$  the Electricity supplied to the grid by the project in year y;

$EG_{import,y}$  the Electricity purchased from the grid by the project in year y;

### Emissions from project activity

The Xinjiang Xiaocaohu Wind Power Project is a zero-emission electricity generating activity; therefore no emissions from the project activity were identified.

### Leakage



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

### Emission Reductions

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 zero-emission activity the final GHG emission reductions are calculated as follows:

$$ER_y (tCO_2e/yr) = BE_y - PE_y = (EG_y * EF_y) - 0$$

Where:

$PE_y (tCO_2e)$  the project emissions in year y;

$EG_y (MWh/yr)$  the amount of net power generated by the project and supplied to the grid each year;

$EF_y (tCO_2e/MWh)$  the ex-ante emission factor in year y.

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

<b>Data / Parameter:</b>	<b>EF<sub>OM</sub></b>
Data unit:	tCO <sub>2</sub> / MWh
Description:	Operating Margin Emission Factor
Source of data used:	Baseline Emission Factors for Power Grids in China, sourced from China Energy Statistical Yearbook, China Electric Power Yearbook and 1996 IPCC Guidelines for National Greenhouse Gas Inventories
Value applied:	1.03289
Justification of the choice of data or description of measurement methods and procedures actually applied :	Calculated according to the updated Baseline Emission Factors for Power Grids in China based on ACM0002 and EB guidance
Any comment:	

<b>Data / Parameter:</b>	<b>EF<sub>BM</sub></b>
Data unit:	tCO <sub>2</sub> / MWh
Description:	Build Margin Emission Factor
Source of data used:	Baseline Emission Factors for Power Grids in China, sourced from China Energy Statistical Yearbook, China Electric Power Yearbook and 1996 IPCC Guidelines for National Greenhouse Gas Inventories
Value applied:	0.6491
Justification of the choice of data or description of measurement methods and procedures actually applied :	Calculated according to the updated Baseline Emission Factors for Power Grids in China based on ACM0002 and EB guidance



applied :	
Any comment:	

<b>Data / Parameter:</b>	<b>EF<sub>v</sub></b>
Data unit:	tCO <sub>2</sub> / MWh
Description:	Combined Emission Factor
Source of data used:	Baseline Emission Factors for Power Grids in China, sourced from China Energy Statistical Yearbook, China Electric Power Yearbook and 1996 IPCC Guidelines for National Greenhouse Gas Inventories
Value applied:	0.93695
Justification of the choice of data or description of measurement methods and procedures actually applied :	Calculated according to the updated Baseline Emission Factors for Power Grids in China based on ACM0002 and EB guidance
Any comment:	

Data / Parameter:	<b>F<sub>i,j,y</sub></b>
Data unit:	tonne, m <sup>3</sup>
Description:	the amount of fuel <i>i</i> (in a mass or volume unit) consumed by relevant power sources <i>j</i> in year(s) <i>y</i>
Source of data used:	China Energy Statistical Yearbook (2000~2005)
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:	

<b>Data / Parameter:</b>	<b>NCV<sub>i</sub></b>
Data unit:	MJ / tonne or kilo m <sup>3</sup>
Description:	Net Calorific Value of fossil fuel type <i>I</i> consumed by the power plants in the Northwest China Power Grid
Source of data used:	China Energy Statistical Yearbook (2005)
Value applied:	See Annex 3 for details
Justification of the choice of data or description of measurement methods and procedures actually applied :	Local values
Any comment:	



<b>Data / Parameter:</b>	<b>EF<sub>CO<sub>2</sub>i</sub></b>
Data unit:	tc/TJ
Description:	CO <sub>2</sub> emission factor of fossil fuel type <i>I</i> consumed by the power plants in the Northwest China Power Grid
Source of data used:	1996 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:	

<b>Data / Parameter:</b>	<b>Carbon Oxidation Factor</b>
Data unit:	%
Description:	Carbon Oxidation Factor of fossil fuel type <i>I</i> consumed by the power plants in the Northwest China Power Grid
Source of data used:	1996 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:	

<b>Data / Parameter:</b>	<b>Installed Capacity</b>
Data unit:	MW
Description:	The Installed Capacity of the power plants in the Northwest China Power Grid in the year <i>y</i>
Source of data used:	China Electric Power Yearbook(2002-2005)
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:	

<b>Data / Parameter:</b>	<b>Electricity Generation</b>
Data unit:	MWh
Description:	The electricity generation of the power plants in the Northwest China Power



	Grid in the year y
Source of data used:	China Electric Power Yearbook(2003-2005)
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:	

<b>Data / Parameter:</b>	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(2003-2005)
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:	

<b>Data / Parameter:</b>	<b>Electricity Import</b>
Data unit:	MWh
Description:	The electricity consumed by the power plants which is imported from the other grid in the year y
Source of data used:	China Electric Power Yearbook(2003-2005)
Value applied:	0
Justification of the choice of data or description of measurement methods and procedures actually applied :	IPCC default value
Any comment:	The Northwest China Power Grid does not import electricity from other Grids. Please refer to footnote 2.

<b>Data / Parameter:</b>	<b>COEF<sub>I,i,y imports</sub></b>
Data unit:	tCO <sub>2</sub> /mass or volume unit e fuel
Description:	CO <sub>2</sub> emission coefficient of fossil fuel type I, consumed by the power plants in the grids of China, taking into account the carbon content of the fuels used by relevant power sources j and the percent oxidation of the fuel in year(s)y
Source of data used:	1996 IPCC Guidelines for National Greenhouse Gas Inventories



Value applied:	The parameter is neglected since the Northwest China Power Grid does not import electricity from other Grids. Please refer to footnote 2.
Justification of the choice of data or description of measurement methods and procedures actually applied :	IPCC default value
Any comment:	

<b>B.6.3 Ex-ante calculation of emission reductions:</b>
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&gt;&gt;

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

**Baseline emissions**

Annual generation (net of auxiliary power i.e. the on-site electricity usage for the operation of the wind farm) is estimated as 116,255 MWh.

The project uses the calculation of emission reductions publicized by China's DNA. The calculation result is as follows:

$$EF_{OM} = 1.03289 \text{ tCO}_2/\text{MWh}$$

$$EF_{BM} = 0.6491 \text{ tCO}_2/\text{MWh}$$

According to the calculation result above, the ex-ante baseline emission factor of the project is 0.93695 tCO<sub>2</sub>/MWh. The calculation equation is as follows:

$$EF_y = 1.03289 * 0.75 + 0.6491 * 0.25 = 0.93695 \text{ tCO}_2/\text{MWh}$$

Annual baseline emissions: 108,924 tCO<sub>2</sub>. The calculation equation is as follows:

$$BE_y = 116255 * 0.93695 = 108,924 \text{ tCO}_2$$

**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,

$$PL_y = 0$$

**Project Emission Reductions**

Net emission reductions of the proposed project = Total baseline emissions – Total project emissions

$$ER_y \text{ (tCO}_2\text{e/yr)} = BE_y - PE_y$$

The total annual baseline emissions are **108,924 tCO<sub>2</sub>**

The total annual project emissions are **0 tCO<sub>2</sub>**.

The annual emission reductions are estimated to be: **108,924 tCO<sub>2</sub>**. The proposed project activity is expected to achieve **762,468 tCO<sub>2</sub>e** of net emission reductions during the first 7-year crediting period.

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

&gt;&gt;

Year	Estimation of project activity emissions (tonnes of CO <sub>2</sub> e)	Estimation of baseline emissions (tonnes of CO <sub>2</sub> e)	Estimation of leakage (tonnes of CO <sub>2</sub> e)	Estimation of overall emission reductions (tonnes of CO <sub>2</sub> e)
Year 1 15/03/2008-14/03/2009	0	108,924	0	108,924
Year 2 15/03/2009-14/03/2010	0	108,924	0	108,924
Year 3 15/03/2010-14/03/2011	0	108,924	0	108,924
Year 4 15/03/2011-14/03/2012	0	108,924	0	108,924
Year 5 15/03/2012-14/03/2013	0	108,924	0	108,924
Year 6 15/03/2013-14/03/2014	0	108,924	0	108,924
Year 7 15/03/2014-14/03/2015	0	108,924	0	108,924
Total (tonnes of CO <sub>2</sub> e)	0	762,468	0	762,468

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

(Copy this table for each data and parameter)

Data / Parameter:	EG <sub>output,y</sub>
Data unit:	MWh
Description:	electricity supplied to the Grid by the proposed project during year y
Source of data to be used:	Electricity meter reading at the connection point between the proposed project and the Grid
Value of data applied for the purpose of	172,067



calculating expected emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	The readings of the electricity meter will be hourly measured and monthly recorded. Data will be archived for 2 years following the end of the crediting period by means of electronic and paper backup. The accuracy of electricity meter is 0.2s. The national Calibration standard (dl/t 448-2000) will be applied in the project. The calibration frequency is one time/year.
QA/QC procedures to be applied:	The electricity generation from the plant will be monitored and recorded by the electricity meter at the on-site control centre. The project operator is responsible for recording this set of data. Receipts from electricity sales will also be obtained for double check.
Any comment:	

<b>Data / Parameter:</b>	$EG_{import,y}$
Data unit:	MWh
Description:	Electricity purchased from the Grid by the proposed project during year y
Source of data to be used:	Electricity meter reading at the connection point between the proposed project and the Grid
Value of data applied for the purpose of calculating expected emission reductions in section B.5	5,812
Description of measurement methods and procedures to be applied:	The readings of the electricity meter will be hourly measured and monthly recorded. Data will be archived for 2 years following the end of the crediting period by means of electronic and paper backup. The accuracy of electricity meter is 0.2s. The national Calibration standard (dl/t 448-2000) will be applied in the project. The calibration frequency is one time/year.
QA/QC procedures to be applied:	The electricity generation from the plant will be monitored and recorded by the electricity meter at the on-site control centre. The project operator is responsible for recording this set of data. Receipts from electricity purchase will also be obtained for double check.
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 that all aspects of projected greenhouse gas (GHG) emission reductions for the proposed project are controlled and reported. This requires an on going monitoring of the project to ensure performance according to its design and that claimed Certified Emission Reductions (CERs) are actually achieved.

The monitoring plan provides the requirements and instructions for:

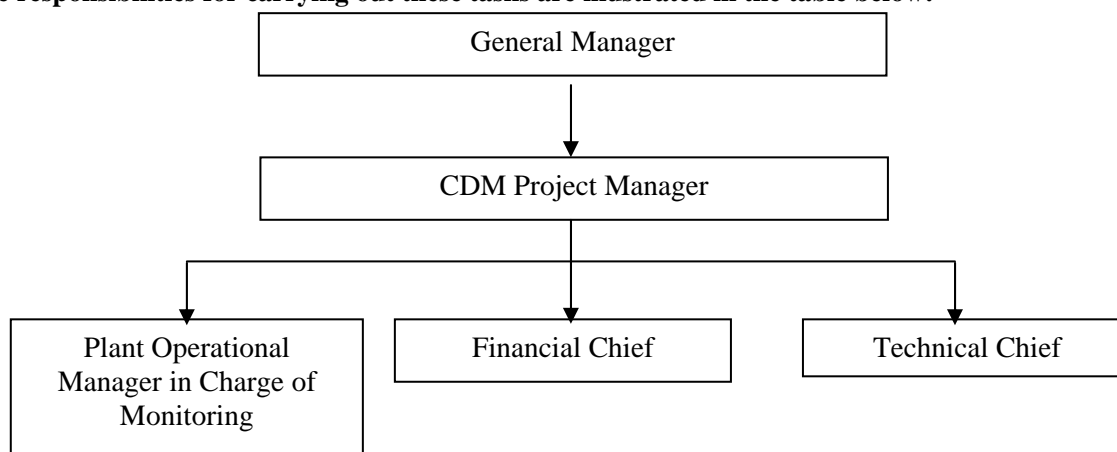


- ③ Establishing and maintaining the appropriate monitoring systems for electricity generated by the project;
- ③ Quality control of the measurements;
- ③ Procedures for the periodic calculation of GHG emission reductions;
- ③ Assigning monitoring responsibilities to personnel;
- ③ Data storage and filing system;
- ③ Preparing for the requirements of an independent, third party auditor or verifier.

### 1. User of the Monitoring Plan

The Xinjiang Huadian Xiaocaohu Wind Power Co., Ltd., the proposed project owner, will use this document as guideline in monitoring of the project emission reduction performance and will adhere to the guidelines set out in this monitoring plan. This plan should be modified according to actual conditions and requirements of DOE in order to ensure that the monitoring is credible, transparent, and conservative.

The responsibilities for carrying out these tasks are illustrated in the table below:



Operational manager of wind farm will collect the information and data required by the Monitoring Plan. The collected information will be documented and sent to the CDM manager and responsible staffs of the Xinjiang Huadian Xiaocaohu Wind Power Co., Ltd. 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.

### 2. Calibration of Meters & Metering

The accuracy of electricity meter is 0.2s that meets the national requirement and the calibration frequency is one time/year. The national Calibration standard (dl/t 448-2000) will be applied in the proposed project. An agreement should be signed between the proposed project owner and the Grid that defines the metering arrangements and the required quality control procedures to ensure accuracy. 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. In case of any errors happens, the grid-connected electricity generated by the proposed project shall be determined by the project owner and the Grid jointly according to the error handling procedures.

Calibration is carried out by the Grid with the records being provided to the proposed project owner, and these records will be maintained by the proposed project owner and the third party designated.





The verification of the monitoring results of the project is a mandatory process required for all CDM projects. The main objective of the verification is to independently verify that the project has achieved the emission reductions as reported and projected in the PDD. It is expected that the verification will be done annually.

**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)**

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Date of completion of Baseline Study: 28/12/2006

Name of person/entity determining the baseline:

Ms. Lin, Wei

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Email: tonilin@easy-carbon.com

Mr. Guan, Yisong

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Phone/fax: +86 1058697045-603/59000064

Email: gyisong@easy-carbon.com

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:**

>>

06/03/2007(starting date of construction)

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

>>

21 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:**

>>  
15/03/2008

**C.2.1.2. Length of the first crediting period:**

>>  
7 years

**C.2.2. Fixed crediting period:**

**C.2.2.1. Starting date:**

>>  
Not applicable

**C.2.2.2. Length:**

>>  
Not applicable

**SECTION D. Environmental impacts**

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

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The environmental Impact Assessment for this project was carried out by Xinjiang New Energy Power Engineering Consultancy Co., Ltd. in May 2006 and was approved by Xinjiang Autonomous Region Environmental Protection Bureau in June 2006.

A summary of the report is illustrated as below:

**Impact on air**

The air pollution from dust existed mainly in the period of construction. Protective measures to be adopted include improving the management of transportation and storage of all kinds of building materials such as cement and sand and stopping work on windy days. As the period of construction is short, the impacts on air will be insignificant after conducting these mitigation measures.

**Impact from noise**

The operation of the wind turbines and construction machines will generate continuous noise. The project has chosen the turbines with low noise. In addition, the wind farm lies in a piece of desert. Therefore, the noise from the proposed project will not affect the local residents.

**Electromagnetic impact**

The operation of the wind farm will generate electromagnetic energy; however, it will be very little. According to the survey to the local residents near the Project, no impact to local residents and electronic equipments was detected. Furthermore, the site of the Project is far from the resident area. Therefore, there is no significant electromagnetic impact to be generated.

**Impacts from solid waste**

The solid waste from the proposed project mainly includes waste earth and household waste. Most of the waste earth produced in the construction and the household waste will be collected and transported to Tuokexun municipal landfill plant, which can reduce the damage to the original landscape and prevent soil erosion.

**Impacts from wastewater**

The wastewater from the project will be collected and transported to the local wastewater treatment point and will not cause any pollution to the underground water resource.

**Biological impact**

Given the environment of the project location, there are very few animals at the site, and no protected animal has been detected. Therefore, there is no significant impact by the Project to the local biology.



**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 Xiaocaohu Wind Power Project are not considered significant.

**SECTION E. Stakeholders' comments**

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

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The workshop on the Xinjiang Xiaocaohu Wind Power Project was held in the first-floor meeting room on 5th March, 2007 by the government of Turfan City with the 63 representatives of local stakeholders, consisting of local government officers from Turfan Municipal Environmental Bureau, Bureau of Land Resources of Turfan City, Turfan Municipal Development and Reform Committee, Turfan Municipal Electric Power Company, Turfan Municipal Economic and Trade Commission and Turfan Municipal General Union, the representatives of the project owner and the villagers from Yaer County and Daheyuan Town around the project site. The objective of the on-site meeting is to know the villagers' comments on the proposed project further and explain to the local stakeholders about their concerns.

The project developer, Xinjiang Huadian Xiaocaohu Wind Power Co., Ltd., introduced the general situation of the Xinjiang Xiaocaohu Wind Power Project and the importance of the CDM project to guarantee the successful implementation of the Project with the interests of stakeholders being taken into account. The project developer and local environmental protection department have distributed questionnaires to the representatives for comments on the construction of the project and they also have carried out the informal discussions and answered the representatives' questions on the project. 51 questionnaires were distributed and 51 replies were received.

Among the interviewees, there were 4 farmers, 13 workers, 17 government officials, 5 students, 10 teachers and 2 others. 7 of them have middle school education, 11 high school, 28 college, 1 master and 4 others. The questions investigated were mainly as follows:

1. Whether current surrounding area is quiet?
2. Whether there is electromagnetic wave disturbance in receiving TV signal?
3. Whether the proposed project has any adverse impact on life?
4. Whether the proposed project can help improve living environment?
5. What is your major environment concern in the construction and operation of the proposed project?
6. Do you support the proposed project?
7. Is there any other issues needed attention?

**E.2. Summary of the comments received:**

&gt;&gt;

The summary of survey is listed as the following:

Among the respondents, 45 of them are satisfied with the sound environment and 6 of them are not. And 44 of them think that there is no disturbance of the TV signal receiving, 3 of them don't think so and 4 persons are not sure. 29 of them believe that there is no negative impact on their life from the wind farm, 3 of them believe that there are some impacts on their life and 19 of them are not sure. As to the environmental problems aroused during the construction and operational period of the proposed project, 26 of them concede noise may be the most important disturbance, 23 of them are concerned about the disturbance of the TV signal receiving, while 2 of them worry about the waste water discharge. 41 respondents support the project construction, 10 of all the respondents are uncertain of that and no one objects the construction of the project.



According to the questionnaires, the interviewees were concerned about the impacts from noise and waste water during the construction and operation phase and electromagnetic disturbance of the TV signal receiving in the operation phase of the project. Therefore, at the meeting, the project owner introduced the current project situation in the construction phase and the project development as CDM project and explained to the stakeholders that measures had been considered and taken to protect the environment during the construction and operation phases.

The main concerned issued of wind farm is the close-distance noise, and the noise impact on the proposed project are assessed using national standard. With the requirement of National Standard, “Standard of Noise at Boundary of Industrial Enterprise (GB12348-90) – Class III” namely, noise value is no more than 65dB(A) in the daytime and no more than 55 dB(A) at night. The project has chosen wind turbines with low noise. In addition, the wind farm lies in a piece of gobi desert and there are no residents nearby. Therefore, the noise from the proposed project will not affect the local residents.

There was almost no production wastewater from the project and the sanitary wastewater from the project was collected and transported to the local wastewater treatment point, so the impact was little.

When the frequency is 0.5MHz, the electromagnetic interference level is 45.4dB or less, lower than the threshold value as defined by national standard, which is 53dB. In addition, the wind farm lies in a piece of gobi desert which is far away from residential area and there are no power equipment or communication equipment near the project site. Therefore, the TV signal receiving would not be disturbed electromagnetically.

Through the on-site meeting, the representatives from Yaer County and Daheyan Town represented that the project had little negative impact on their life and surrounding environment and they welcomed and supported the project.

It can be learned from the survey summary that villagers investigated support the construction of the project.

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

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Most comments received on the project are positive. Moreover, the issues that local residents were concerned about, such as noise, electromagnetic interference and wastewater in the construction phase and during the operation phase, are well dealt with and specific measures were given to mitigate the potential impacts of these issues as discussed in the EIA report. The environmental impacts can be avoided, controlled or mitigated via thorough implementation of the mitigation measures. And the proposed project will be benefit to the local economy and infrastructure. Therefore, the proposed project can be carried out as planned.

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

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**Annex 2**

**INFORMATION REGARDING PUBLIC FUNDING**

There is no public funding for the Xinjiang Xiaocaohu Wind Power Project.

Annex 3

## BASELINE INFORMATION

All the tables related to the calculation of baseline emission reduction are presented below:

Calculation of Operational Margin (OM):

**Table A1. Simple OM Emission Factor of Northwest China Power Grid in 2002**

Fuel types	Unit	Shanxi	Gansu	Qinghai	Ningxia	Xinjiang	Subtotal	Emission Factor (tc/TJ)	Oxidation rate (%)	Average low Caloric value (KJ/kg, m <sup>3</sup> )	CO <sub>2</sub> emission (tCO <sub>2</sub> e) J=G*H*I*F*44/12/10000 (unit of mass)
		A	B	C	D	E	F=A+B+C+D+E	G	H	I	J=G*H*I*F*44/12/1000 (unit of volume)
Raw coal	10000 ton	1607.5	1156.02	278.66		981.75	<b>4023.93</b>	25.8	98	20908	77997399.05
Cleaned coal	10000 ton		0.91				<b>0.91</b>	25.8	98	26344	22224.92592
Other washed coal	10000 ton						<b>0</b>	25.8	98	8363	0
Coke	10000 ton						<b>0</b>	29.5	98	28435	0
Coke oven gas	10 <sup>8</sup> m <sup>3</sup>		0.04				<b>0.04</b>	13	99.5	16726	3173.145213
Other coal gas	10 <sup>8</sup> m <sup>3</sup>		0.08				<b>0.08</b>	13	99.5	5227	1983.263187
Crude oil	10000						<b>0</b>	20	99	41816	0



	ton										
Diesel	10000 ton	1.96			1.12	<b>3.08</b>	20.2	99	42652	96327.017	
Fuel oil	10000 ton		1.7		1.27	<b>2.97</b>	21.1	99	41816	95123.54277	
LPG	10000 ton					<b>0</b>	17.2	99.5	50179	0	
Refinery gas	10000 ton					<b>0</b>	18.2	99.5	46055	0	
Natural gas	10 <sup>8</sup> m <sup>3</sup>		0.53		2.33	<b>2.86</b>	15.3	99.5	38931	621509.161	
Other oil product	10000 ton					<b>0</b>	20	99	38369	0	
Other coking product	10000 ton					<b>0</b>	25.8	98	28435	0	
Other fuel	10000tce		5.07		1.74	<b>6.81</b>	0	0	0	0	
									Subtotal	78837740.11	

China Energy Statistical Yearbook 2000-2002

**Table A2. Thermal Power Generation of Northwest China Power Grid in 2002**

Province	Power Generation (MWh)	Ratio of Self Power Consumption of Plant (%)	Power Supply (MWh)
Shanxi	31941000	7.87	29427243
Gansu	23504000	6.83	21898677
Qinghai	4980000	8.4	4561680



Ningxia	15505000	6.54	14490973
Xinjiang	17498000	10.24	15706205
<b>Total</b>			86084778

China Electric Power Yearbook 2003

**Table A3. Emission Factor of Northwest China Power Grid in 2003**

	Parameter	Unit	Value	Source
A	Total Power Supply of Northwest China Power Grid	MWh	86084778	A=Total Power Generation of Northwest China Power Grid
B	Total Emissions of Northwest China Power Grid	tCO <sub>2</sub> e	78837740	
C	Emission Factor of Northwest China Power Grid	tCO <sub>2</sub> e/MWh	0.9158151	C=B/A

**Table A4. Simple OM Emission Factor of Northwest China Power Grid in 2003**

Fuel types	Unit	Shanxi	Gansu	Qinghai	Ningxia	Xinjiang	Subtotal	Emission Factor (tc/TJ)	Oxidation rate (%)	Average low Caloric value (KJ/kg, m <sup>3</sup> )	CO <sub>2</sub> emission (tCO <sub>2</sub> e) $J=G*H*I*F*44/12/10000$ (unit of mass)
		A	B	C	D	E	$F=A+B+C+D+E$	G	H	I	$J=G*H*I*F*44/12/1000$ (unit of volume)
Raw coal	10000ton	2002.26	1479.62	330.67	682	1065.75	<b>5560.3</b>	25.8	98	20908	107777455.9
Cleaned coal	10000ton						<b>0</b>	25.8	98	26344	0
Other washed coal	10000ton				27	3.64	<b>30.64</b>	25.8	98	8363	237557.13



Coke	10000ton					<b>0</b>	29.5	98	28435	0	
Coke oven gas	10 <sup>8</sup> m <sup>3</sup>		1.54			<b>1.54</b>	13	99.5	16726	122166.0907	
Other coal gas	10 <sup>8</sup> m <sup>3</sup>		0.12			<b>0.12</b>	13	99.5	5227	2974.89478	
Crude oil	10000ton					<b>0</b>	20	99	41816	0	
Diesel	10000ton	3.12			0.04	0.4	<b>3.56</b>	20.2	99	42652	111339.0197
Fuel oil	10000ton		1.19			1.02	<b>2.21</b>	21.1	99	41816	70782.16482
LPG	10000ton						<b>0</b>	17.2	99.5	50179	0
Refinery gas	10000ton					3.48	<b>3.48</b>	18.2	99.5	46055	106419.6754
Natural gas	10 <sup>8</sup> m <sup>3</sup>	0.1	0.54			5.95	<b>6.59</b>	15.3	99.5	38931	1432078.801
Other oil product	10000ton						<b>0</b>	20	99	38369	0
Other coking product	10000ton						<b>0</b>	25.8	98	28435	0
Other fuel	10000tce		5.86			2.3	<b>8.16</b>	0	0	0	0
										Subtotal	109860773.6

China Energy Statistical Yearbook 2004

Province	Power Generation (MWh)	Ratio of Self Power Consumption of Plant (%)	Power Supply (MWh)
Shanxi	38144000	6.94	35496806
Gansu	29494000	6.35	27621131
Qinghai	6446000	4.5	6155930
Ningxia	19175000	5.25	18168313
Xinjiang	19834000	8.19	18209595



<b>Total</b>		105651775
China Electric Power Yearbook 2004		

**Table A6. Emission Factor of Northwest China Power Grid in 2003**

	<b>Parameter</b>	<b>Unit</b>	<b>Value</b>	<b>Source</b>
A	Total Power Supply of Northwest China Power Grid	MWh	105651775	A=Total Power Generation of Northwest China Power Grid
B	Total Emissions of Northwest China Power Grid	tCO <sub>2</sub> e	109860774	
C	Emission Factor of Northwest China Power Grid	tCO <sub>2</sub> e/MWh	1.0398384	C=B/A

**Table A7. Simple OM Emission Factor of Northwest China Power Grid in 2004**

<b>Fuel types</b>	<b>Unit</b>	<b>Shanxi</b>	<b>Gansu</b>	<b>Qinghai</b>	<b>Ningxia</b>	<b>Xinjiang</b>	<b>Subtotal</b>	<b>Emission Factor (tc/TJ)</b>	<b>Oxidation rate (%)</b>	<b>Average low Caloric value (KJ/kg, m<sup>3</sup>)</b>	<b>CO<sub>2</sub> emission (tCO<sub>2</sub>e) J=G*H*I*F*44/12/10000 (unit of mass)</b>
		<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>E</b>	<b>F=A+B+C +D+E</b>	<b>G</b>	<b>H</b>	<b>I</b>	<b>J=G*H*I*F*44/12/1000 (unit of volume)</b>
Raw coal	10000ton	2428.7	1595.9	322.8	1270.1	1240.9	<b>6858.4</b>	25.8	98	20908	132939032.6
Cleaned coal	10000ton						<b>0</b>	25.8	98	26344	0
Other washed coal	10000ton				102.64	10.5	<b>113.14</b>	25.8	98	8363	877193.6583
Coke	10000ton	0.78					<b>0.78</b>	29.5	98	28435	23510.79731
Coke oven gas	10 <sup>8</sup> m <sup>3</sup>		0.3				<b>0.3</b>	13	99.5	16726	23798.5891
Other coal gas	10 <sup>8</sup> m <sup>3</sup>	0.74	1.26				<b>2</b>	13	99.5	5227	49581.57967



Crude oil	10000 ton	0.01				0.06	<b>0.07</b>	20	99	41816	2125.08912
Gasoline	10000 ton	0.02					<b>0.02</b>	18.9	99	43070	590.980698
Diesel	10000 ton	2.16	0.36		0.05	0.41	<b>2.98</b>	20.2	99	42652	93199.51645
Fuel oil	10000 ton	0.01	0.69			0.3	<b>1</b>	21.1	99	41816	32028.12888
LPG	10000 ton						<b>0</b>	17.2	99.5	50179	0
Refinery gas	10000 ton					3.26	<b>3.26</b>	18.2	99.5	46055	99691.99474
Natural gas	10 <sup>8</sup> m <sup>3</sup>	1.61	0.59			6.27	<b>8.47</b>	15.3	99.5	38931	1840623.284
Other oil product	10000 ton						<b>0</b>	20	99	38369	0
Other coking product	10000 ton						<b>0</b>	25.8	98	28435	0
Other fuel	10000 tce		6.17			3.46	<b>9.63</b>	0	0	0	0
										Subtotal	135981376.3

China Energy Statistical Yearbook 2005

Province	Power Generation (MWh)	Ratio of Self Power Consumption of Plant (%)	Power Supply (MWh)
Shanxi	44439000	7.5	41106075
Gansu	33242000	6.21	31177672
Qinghai	6208000	7.96	5713843.2
Ningxia	25298000	5.45	23919259
Xinjiang	22752000	9.07	20688394
<b>Total</b>			122605243

China Electric Power Yearbook 2005

**Table A9. Emission Factor of Northwest China Power Grid in 2004**

	Parameter	Unit	Value	Source
A	Total Power Supply of Northwest China Power Grid	MWh	122605243	A=Total Power Generation of Northwest China Power Grid
B	Total Emissions of Northwest China Power Grid	tCO <sub>2</sub> e	135981376	
C	Emission Factor of Northwest China Power Grid	tCO <sub>2</sub> e/MWh	1.1090992	C=B/A

**Table A10. Operating Margin Emission Factor of Northwest China Power Grid**

		Year 2002	Year 2003	Year 2004	Total
A	Emissions (tCO <sub>2</sub> /year)	78837740	109860774	135981376.3	324679890
B	Coal Power Generation (GWh)	86084778	105651775	122605242.6	314341795.8
C	CO <sub>2</sub> Emission Factor (tCO <sub>2</sub> /MWh)	C = A/B			<b>1.0329</b>

Calculation of Build Margin (BM):

**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 (tc/TJ)	Oxidation Rate	Emissions (tCO <sub>2</sub> /MWh)
		<b>A</b>	<b>B</b>	<b>C</b>	<b>D=3.6/A/1000*B*C*44/12</b>
Coal-fired Power Plant	<i>EF<sub>Coal,Adv</sub></i>	36.53%	25.8	0.98	0.9136
Gas-fired Power Plant	<i>EF<sub>Gas,Adv</sub></i>	45.87%	15.3	0.995	0.4381
Oil-fired Power Plant	<i>EF<sub>Oil,Adv</sub></i>	45.87%	21.1	0.99	0.6011

**Table A12. Installed Capacity of Northwest China Power Grid in 2004**

Installed Capacity	Unit	Shanxi	Gansu	Qinghai	Ningxia	Xinjiang	Total
Thermal Power	MW	7640.4	4975.6	889.8	3782	4959.7	22247.5
Hydro Power	MW	1876.5	3566.1	4053.4	366.2	973	10835.2
Nuclear Power	MW	0	0	0	0	0	0
Wind Power and Others	MW	0	138.2	0	42.5	95.3	276
Total	MW	9516.9	8679.9	4943.2	4190.7	6028	33358.7

Source: China Electric Power Yearbook 2005

**Table A13. Installed Capacity of Northwest China Power Grid in 2002**

Installed Capacity	Unit	Shanxi	Gansu	Qinghai	Ningxia	Xinjiang	Total
Thermal Power	MW	6735.4	3881.8	803.8	2386	3949.9	17756.9
Hydro Power	MW	1462.3	3238.6	3206.3	307.9	984.8	9199.9
Nuclear Power	MW	0	0	0	0	0	0
Wind Power and Others	MW	0	8.4	0	0	96.7	0
Total	MW	8197.7	7128.8	4010	2693.9	5031.4	27061.8

Source: China Electric Power Yearbook 2003

**Table A14. Installed Capacity of Northwest China Power Grid in 2001**

Installed Capacity	Unit	Shanxi	Gansu	Qinghai	Ningxia	Xinjiang	Total
Thermal Power	MW	6302.4	3874.8	766.8	2046	3804.9	16794.9
Hydro Power	MW	1450.7	3118.3	3127.4	307.9	868.1	8872.4
Nuclear Power	MW	0	0	0	0	0	0
Wind Power and Others	MW	0	8.4	0	0	70.6	79
Total	MW	7753.1	7001.5	3894.1	2353.9	4743.6	25746.2

Source: China Electric Power Yearbook 2002

**Table A15. Calculation of BM of Northwest China Power Grid**

	Installation in year 2001	Installation in year 2002	Installation in year 2004	New Additions from 2001 to 2004	Ratio in New Additions
	A	B	C	D=C-A	
Thermal Power (MW)	16794.9	17756.9	22247.5	5452.6	71.63%
Hydro Power (MW)	8872.4	9199.9	10835.2	1962.8	25.78%
Nuclear Power (MW)	0	0	0	0	0.00%
Wind Power (MW)	79	105.1	276	197	2.59%
<b>Total (MW)</b>	<b>25746.3</b>	<b>27061.9</b>	<b>33358.7</b>	<b>7612.4</b>	<b>100.00%</b>
Percentage compared with installation of 2004	77.18%	81.12%	100%		

$$EF_{BM,y} = 0.9095 \times 71.63\% = 0.6491 \text{ tCO}_2/\text{MWh}.$$

**Table A16. Baseline Emission Factor of Northwest China Power Grid**

	Parameter	Unit	Amount
A	Operating Margin Emission Factor	tCO <sub>2</sub> /MWh	1.0329
B	Build Margin Emission Factor	tCO <sub>2</sub> /MWh	0.6491
C	Combined Emission Factor (C=0.75*A+0.25*B)	tCO <sub>2</sub> /MWh	0.9369425

**Table A17. Electricity Generation Baseline Emissions**

	Parameter	Unit	Amount	Source or Equation
A	Project installed capacity	MW	49.5	Feasibility Study
B	Annual electricity supplied	MWh	116,255	Feasibility Study
C	Baseline Emissions Factor	tCO <sub>2</sub> /MWh	0.9369425	TableA16



D	Electricity generation baseline emissions	tCO <sub>2</sub> /year	<b>108,924</b>	D= B * C
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**Annex 4**

**MONITORING PLAN**

Please refer to B 7.2 in the PDD.