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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Title: Gansu Guazhou Ganhekou No.8 Wind Farm Project
PDD Version: 3.0
Date: 29/11/2012
Version history:

Version Number	Date	Description
1.0	10/03/2010	Prepared for and submitted to China's DNA to apply LoA and Version submitted to the DOE for GSP
2.0	05/08/2010	Revised based on validation protocol
3.0	29/11/2012	Updated with correction

A.2. Description of the project activity:

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Gansu Guazhou Ganhekou No.8 Wind Farm Project (hereinafter referred as the proposed project) is developed by Gansu Guazhou Xiehe Wind Power Co., Ltd.. It is located in Guazhou County, Jiuquan City, Gansu Province, P. R. of China.

Purpose of the Proposed Project:

(a) The scenario existing prior to the start of the implementation of the proposed project is: The same electricity output by the proposed project activity would have otherwise been generated by the operation of Northwest China Power Grid (NWCPG)-connected power plants and by the addition of new generation sources. That is the same as the baseline scenario.

(b) The proposed project will utilize the local wind resources to generate electricity. It involves the installation of 134 turbines, each of which has a rated output of 1500 kW, providing a total capacity of 201 MW. The annual output of the proposed project is estimated to be 443,278 MWh and the electricity will be sold to the NWCPG.

(c) The proposed project will be connected with NWCPG, so the baseline scenario of the proposed project is the same as the scenario existing prior to the start of implementation of the proposed project.

How the Proposed Project reduces GHG emissions:

The proposed project is a newly-built wind farm project with the total capacity of 201 MW. 134 sets of wind turbines with unit capacity of 1500 kW will be installed by the proposed project to generate clean renewable and zero emission electricity. The annual output of the proposed project is estimated to be 443,278 MWh and the electricity will be sold to the NWCPG which is predominated by fossil fuel-fired power plants. And thus GHG generated by coal-fired power plants could be reduced. The estimated annual GHG emission reductions are 411,927 tCO_2e.

Contributions of the project activity to sustainable development:

As a renewable energy project, the proposed project will not only supply renewable electricity to grid, but also contribute to sustainable development of the local community, the host country and the world by means of:

- Increasing the power supply of the local area and promoting economic development;
- Supplying zero-emissions electricity to the grid and reducing GHG emissions compared to a business-as-usual scenario;

- Creating local employment opportunity during the assembly and installation of wind turbines, and for operation of the wind farm;
- Reducing other pollutants resulting from the power generation industry, compared to a business-as-usual approach;
- Helping to stimulate the growth of the wind power industry in China.

A.3. Project participants:

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Name of Party involved (*) ((host) indicates a host Party)	Private and/or public entity(ies) project participants (*) (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
People's Republic of China (host)	Gansu Guazhou Xiehe Wind Power Co., Ltd. (Project Owner)	No
The United Kingdom of Great Britain and Northern Ireland	United Carbon Credits Limited (Purchase Party)	No
(*) In accordance with the CDM modalities and procedures, at the time of making the CDM-PDD public at the stage of validation, a Party involved may or may not have provided its approval. At the time of requesting registration, the approval by the Party (ies) involved is required.		

For detailed information, please refer to Annex I.

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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Gansu Province

A.4.1.3. City/Town/Community etc:

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Guazhou County, Jiuquan 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 project is located in Guazhou County, Jiuquan City, Gansu Province, P.R.of China. The geographical coordinates of the proposed project is between the east longitude 95°17′00"~95°20′30"E and the north latitude 40°36′16"~40°40′29"N. The center geographical coordinates of the project are east longitude 95°18′45"and north latitude 40°38′23". Figure 1 on the next page shows the location of the proposed project.

Figure 1. The location of the proposed project

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

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This category would fall to:

Category: Renewable electricity in grid connected applications.

Sectoral scope 1: energy industries (renewable sources).

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

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Prior scenario and baseline scenario:

The scenario existing prior to the start of the implementation of the proposed project: the same electricity output by the proposed project would have otherwise been generated by the operation of NWCPG-connected power plants and by the addition of new generation sources. That is the same as the baseline scenario.

Project scenario:

The project site is located in Guazhou County, Jiuquan City, Gansu Province, where the wind resource is plentiful. And the proposed project will utilize the local wind resources to generate electricity.

The proposed project will install 134 wind turbines with each capacity of 1500 kW, and total up an installation capacity of 201 MW. All the 134 wind turbines of 1500 kW will be supplied by Sinovel Wind Group Co., Ltd. The main technical parameters are shown in the following table 1.

Table 1. The main technical parameters

Parameters	Unit	Value
Turbine type		SL1500/82
Quantity of turbines		134
Rated Power	kW	1500
Cut-in Wind Speed	m/s	3.0
Cut-out Wind Speed	m/s	20.0
Impeller Diameter	m	82.9
Rated Wind Speed	m/s	10.5
Rated Voltage	V	690
Expected life	Year	20

Data source: Purchase Agreement of the wind turbines and wind-power towers

Each turbine will have a 35 kV transformer. The electricity output will be transmitted by 35 kV transmission lines to Ganhekou West transformer station, and then to NWCPG through Anxi Substation. On average, the project activity is expected to operate 2205hours per years, which corresponds to output power of 443,278 MWh to NWCPG annually. The plant load factor (PLF) is 25.17% which is consistent with the officially approved Feasibility Study Report (FSR) compiled by an independent engineering company. The simplified flow diagram is shown in the following figure:

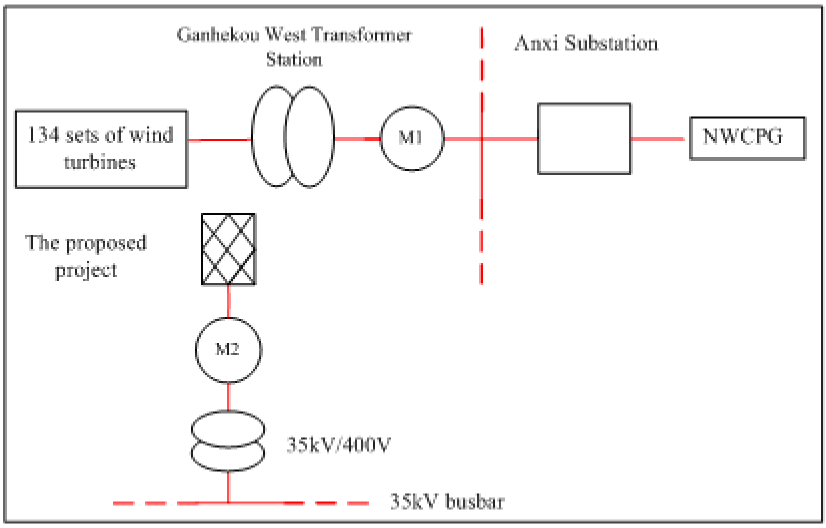

Figure 2. The flow diagram of the proposed project

According to the FSR and the Environmental Impact Assessment Report (EIA) of the proposed project, the technology employed by the proposed project is environmentally safe.

There is no technology transferred from other countries involved in this project activity. The wind turbines are made in domestic and the project design engineering reflects current good practices in China.

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

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The proposed project adopts renewable crediting period. Annual emission reductions of the proposed project are estimated to be 411,927 tCO_2e. For detailed calculation, please refer to section B. The total emission reductions of the project will be 2,883,489 tCO_2e during the first crediting period (10/03/2011 – 09/03/2018).

Years	**Annual estimation of emission reductions in tonnes of CO_2e**
10/03/2011 to 09/03/2012	411,927
10/03/2012 to 09/03/2013	411,927
10/03/2013 to 09/03/2014	411,927
10/03/2014 to 09/03/2015	411,927
10/03/2015 to 09/03/2016	411,927
10/03/2016 to 09/03/2017	411,927
10/03/2017 to 09/03/2018	411,927
Total estimated reductions (tonnes of CO_2e)	2,883,489
Total number of crediting years	7
Annual average over the crediting period of estimated reductions (tonnes of CO_2e)	411,927

A.4.5. Public funding of the project activity:

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No public funds from Annex I countries is involved in the proposed 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 proposed project will use the approved consolidated baseline and monitoring methodology ACM0002 "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" (Version 11).

The methodology also refers to the latest approved versions of the following tools:

- Tool to calculate the emission factor for an electricity system (Version 02);
- Tool for the demonstration and assessment of additionality (Version 05.2).

For more information regarding the methodology and the tools as well as their consideration by the Executive Board, please refers to the web site:
http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html

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

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The methodology ACM0002 (Version 11) is applicable to the proposed project, because the proposed project meets all the applicability criteria stated in the methodology with relevance to wind power project.

- The proposed project is a grid-connected zero-emission renewable power generation activity that install a new wind power plant at a site where no renewable power plant was operated prior to the implementation of the project activity (Greenfield plant);
- The proposed project does not involve switching from fossil fuels to renewable energy sources at the site of the project activity;
- The geographic and system boundaries for Northwest China Power Grid can be clearly identified and information on the characteristics of the grid is available.

Therefore, the proposed project activity is in accordance with the applicability of methodology ACM0002 (Version 11).

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

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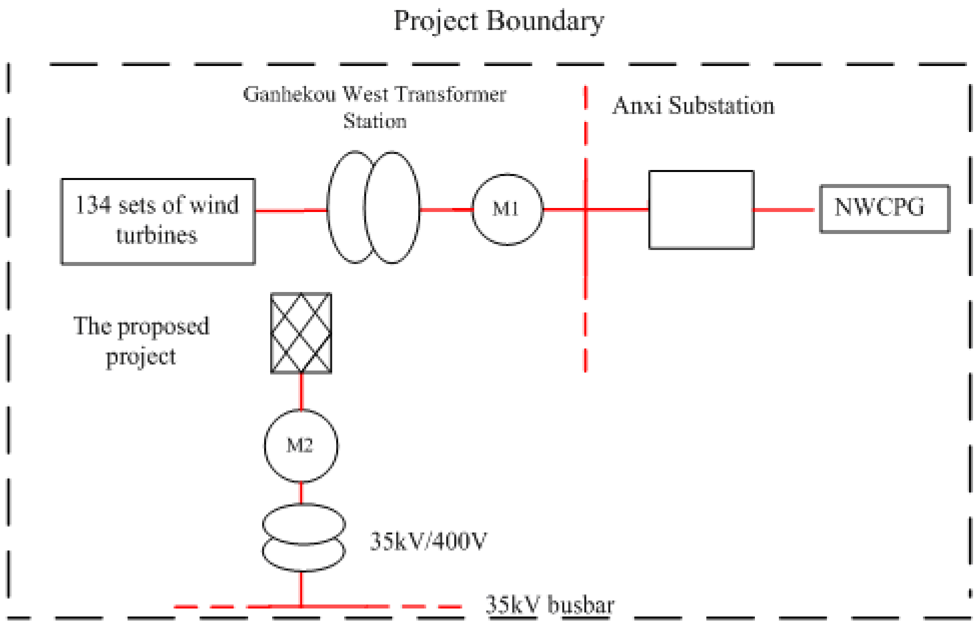
The electricity generated by the proposed project will be transferred to the NWCPG. According to China DNA's guidance, NWCPG is composed of Shanxi Grid, Gansu Grid, Qinghai Grid, Ningxia Grid and Xinjiang Grid.

According to the methodology ACM0002 (Version 11) and China DNA's guidance[1], the spatial extent of the proposed project boundary includes the proposed project site and all the power plants connected physically to NWCPG which the proposed project will be connected to. The project boundary is showed in the figure as follow:

[1] http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File2333.pdf



For the purpose of calculating project emissions and baseline emissions, the emission sources and gases which are included in the project boundary are listed in the following table.

	Source	Gas	Included?	Justification/Explanation
Baseline	The emission from the fossil-fired power station of NWCPG	CO_2	Yes	Main emission source and the only gas identified in the baseline methodology
		CH_4	No	Excluded for simplification. This is deemed a conservative measure.
		N_2O	No	Excluded for simplification. This is deemed a conservative measure.
Project Activity	Emissions caused by the proposed project activity	CO_2	No	According to ACM0002 (Version 11), project emission is excluded as a wind power project.
		CH_4	No	According to ACM0002 (Version 11), project emission is excluded as a wind power project.
		N_2O	No	According to ACM0002 (Version 11), project emission is excluded as a wind power project.

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

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According to the description in the approved baseline methodology ACM0002, if the project activity is the installation of a new grid-connected renewable power plant/unit, the baseline scenario is the following:

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

According to the Tool to calculate the emission factor for an electricity system (EB 50/Annex 14), if the DNA of the host country has published a delineation of the project electricity system and connected electricity systems, these delineations should be used.

The electricity generated by the proposed project will be sold to NWCPG according to the delineation which is published by the Chinese DNA, NWCPG is considered as the "project electricity system", which is defined as the "project boundary" of the proposed project. Therefore according to the ACM0002 "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" (Version 11), the baseline scenario is the following:

> Electricity delivered to the grid (NWCPG) by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the section B.6.

In addition, the proposed project meets the applicability conditions included in the "Tool to calculate the emission factor for an electricity system" referred above:

- This tool may be referred to estimate the OM, BM and/or CM for the purpose of calculating baseline emissions for a project activity which substitutes electricity from the grid, i.e. where a project activity supplies electricity to a grid.

The proposed project will supply electricity to NWCPG, and therefore can use this tool to estimate the OM, BM and CM for calculating baseline emissions.

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 incentive from the CDM had been taken into account prior to the starting date of the project activity, aiming to obtain the additional funding to secure the project financially.

The Feasibility Study Report (FSR) of the proposed project considering the CDM revenue was completed by Northwest Hydro Consulting Engineers, CHECC in December 2008. In the FSR, it states that the project IRR is less than the benchmark IRR (8%) and the institute advised the project owner to develop the proposed project as a CDM project to increase the financial indicator. After considering the income from selling CERs, the project IRR is higher than the benchmark IRR (8%). Therefore, on 20th February 2009, the developer held a board meeting and decided to develop the proposed project as a CDM project. The CDM development of the project has been forward from then. The FSR of the proposed project considering the CDM revenue was approved by National Development and Reform Commission of the People's Republic of China (NDRC of P.R.C.) on 21st April, 2009. In June 2009, the project owner signed the Emission Reductions Purchase Agreement (ERPA) with United Carbon Credits Limited. Table 2 lists the key events in the development of the proposed project.

Table 2. Overview of key events in the development of the project

Time	Events
06/08/2008	Environmental Impact Assessment Report was Approved.
12/2008	Feasibility Study Report (FSR) of the proposed project with considering the CDM revenue was developed by Northwest Hydro Consulting Engineers, CHECC. In the FSR, the institute advised the project owner to develop the proposed project as a CDM project to increase the financial indicator.
20/02/2009	The developer held a board meeting and decided to develop the proposed project as a CDM project.
21/04/2009	The FSR of the proposed project with considering the CDM revenue was Approved by NDRC of P.R.C.
08/06/2009	The project owner signed the ERPA.
13/12/2009	The project owner signed the Purchase Agreement of Main Transformer

12/2009	Collected the comments of stakeholders by issuing the questionnaires
22/12/2009	Early CDM Notification Form was sent to EB[2]
11/01/2010	The early CDM Notification Form was issued by China DNA
11/04/2010	The Starting Construction Order was issued
12/05/2010	Attended the DNA's Auditing Council[3]
31/05/2010	The project owner signed the Purchase Agreement of Wind turbine and Tower tube

From what discussed above, we can clearly drawn the conclusion that the incentive by the CDM was seriously considered in the decision to proceed with the proposed project activity.

The additionality will be demonstrated by the "Tool for the demonstration and assessment of additionality" (Version 05.2).

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

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

Alternative 1. The proposed project not undertaken as a CDM project activity.

Alternative 2. Construction of a coal-fired power plant with the same annual electricity generation as the proposed project.

Alternative 3. A renewable power plant using other resources (such as PV, biomass, hydro and so on) with equivalent amount of annual electricity generation as the proposed project.

Alternative 4. Electricity delivered to the NWCPG 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.

Besides wind energy, other kinds of renewable energy technologies, such as solar PV, geothermal, biomass and hydro are possible grid-connected sources that could be applied in China. Due to technology development status and the high cost of geothermal[4] and biomass technologies[5] on a scale that would achieve a similar output to the proposed project, these renewable power technologies are not considered plausible alternatives to the proposed project.

Because of different grid connected situation, high operating cost and less of national policies[6] for solar PV power project, there is no chance for grid connected solar PV development with a similar amount of annual electricity generation as the proposed project.

Furthermore, Guazhou county is located in the extreme drought desert area in the west of Hexi Corridor in Gansu Province where the biomass materials are very poor[7], so there is no opportunity for biomass development at the proposed project's location.

Similarly, the proposed project is located in the extreme drought desert area, so the development of

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[2] http://cdm.unfccc.int/Projects/PriorCDM/notifications/index_html?s=2400

[3] http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File2440.doc

[4] http://www.crein.org.cn/view/viewnews.aspx?id=20080131103909265

[5] http://biology.aweb.com.cn/news/2007/7/9/9293227.shtml;

http://www.86ne.com/Biomass/200712/Biomass_103227.html

[6] http://www.wefweb.com/news/200916/1413073809_0.shtml; http://www.ck365.cn/hyxx/4615.html

[7] http://amuseum.cdstm.cn/AMuseum/diqiuziyuan/wr0_4.html;
http://www.guazhoudj.gov.cn/diaochayanjiu/ShowArticle.asp?ArticleID=6497

hydro power plant with equivalent amount of annual electricity generation as the proposed project is not feasible.

Therefore, this *Alternative* 3 will not become the baseline scenario.

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

Alternative 1, developing the proposed project not as a CDM project, meets China current regulations and laws.

Alternative 2 should be eliminated from the following consideration because it does not comply with the national regulation for controlling small scale thermal power plant. In 2007, the average generation hours for fossil fuel fired power plants are 6231 hours[8]in Gansu Province. To provide the same output as the proposed project, the alternative baseline scenario should be a grid-connected fossil fuel fired power plant with installed capacity of about 71.14 MW. However, according to Chinese regulations[9], thermal power plants with capacity below 135 MW are prohibited for construction within the grid connected area. Consequently, the *Alternative* 2 is not a feasible alternative scenario.

Alternative 4 is in compliance with all mandatory laws and regulations in China and faces with no economical barriers. Furthermore, the annual electricity output of the NWCPG has been increasing for many years (refer to China Electric Power Yearbook 2006-2008). Hence, the *Alternative 4* is a credible and realistic alternative. As a result, providing the same electricity output by NWCPG is selected as the baseline scenario for the proposed project.

In conclusion, the credible and realistic alternative scenarios for power generation are *Alternative 1* and *Alternative 4*.

Step 2. Investment analysis.

Sub-step 2a. Determine appropriate analysis method.

According to "Tool for the demonstration and assessment of additionality (Version 05.2)", three options can be applied for the investment analysis: the simple cost analysis, the investment comparison analysis and the benchmark analysis.

The simple cost analysis (Option I) is not applicable for the proposed project because the project activity will generate economic benefits from electricity sale other than CERs income.

And the investment comparison analysis (Option II) is only applicable to projects where alternatives should be similar investment projects. The investment comparison analysis is also not applicable for the proposed project because the baseline scenario, providing the same capacity or electricity output by the NWCPG, is not a new investment project.

To conclude, the benchmark analysis (Option III) will be used to identify whether the financial indicator (such as IRR or NPV) of the proposed project is better than relevant benchmark value.

Sub-step 2b. Apply benchmark analysis.

According to the *Interim Rules on Economic Assessment of Electrical Engineering Retrofit Projects*[10] issued by State Power Corporation of China, the benchmark IRR of power industry is 8% of the

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[8] <China Electric Power Yearbook 2008>,P734

[9] Notice on Strictly Prohibiting the Installation of Fuel-fired Generators with the Capacity of 135 MW or below issued by the General Office of the State Council, decree no. 2002-6.

[10] Issued by the Operation Department of Power Generation and Transmission, State Power Corporation, 10/09/2002

project IRR and it is widely used in wind power projects. The project is considered to be financially feasible when the project IRR is higher or equal than the benchmark.

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

The basic parameters for calculation of financial indicators are shown in the following table:

Table 3. Main parameters for calculation of financial indicators

Items	Unit	Value	Source
Installation capacity	MW	201	FSR
Annually electricity output	MWh	443,278	FSR
Static total investment	Million RMB	1,955.95	FSR
Electricity tariff (Inc. VAT)	RMB/kWh	0.5206	FSR
Value added tax rate (VAT)		17.0%[11]	
Education supplementary tax		3%	FSR
Maintaining and building cities tax		5%	FSR
Income tax rate		25%	FSR
Depreciation rate		8.0%	FSR
Recovery of residue value of the fixed assets	Million RMB	100.47	FSR
Project life time	Year	20	FSR
CERs crediting time	Year	7×3	
Expected CERs Price to calculate project IRR	EUR/tCO_2e	11	ERPA

The financial indicators (Project IRR) with and without income from selling CERs are listed in the following table. Without income from selling CERs, the IRR of the proposed project is 5.86%, lower than the benchmark IRR 8% and the proposed project is financially unacceptable because of its low profitability. While considering such income, the IRR of the proposed project is 9.01%, higher than the benchmark, and then the proposed project is financially acceptable.

Table 4. Comparison of financial indicators of different scenarios with benchmark

Items	Without CDM	Benchmark	With CDM
The Project IRR	5.86%	8%	9.01%

Sub-step 2d. Sensitivity analysis

The objective of this sub step is to show the conclusion regarding the financial attractiveness is robust to reasonable variations of the critical assumptions.

Four factors are considered in following sensitivity analysis:

1) Static total investment;

2) Annual O&M cost;

3) Grid-in tariff;

[11] Value Added Tax: The rate of VAT is 17%, and the rate of VAT drawback is 50%, applicable to the wind power industry in accordance with *National VAT Law (State Council [2008]538)* issued by State Administration of Taxation and *VAT policy on Comprehensive Utilization of Resource* (Source: http://www.js-n-tax.gov.cn/Page1/StatuteDetail.aspx?StatuteID=8862） *and Other Products (Cai Shui[2008]156)* released by Ministry of Finance and State Administration of Taxation(Source: http://www.js-n-tax.gov.cn/Page1/StatuteDetail.aspx?StatuteID=8931). Also applicable is the *"Notice about implementation of VAT reform in the whole country" (Cai Shui [2008]170)* (Source: http://202.108.90.130/n8136506/n8136563/n8193451/n8193466/n8193602/8884823.html), which allows the VAT incurred by the purchase of equipments can be recouped over the operation period against the VAT for electricity sales until the VAT from the equipment is fully recovered. Both VAT reduction policies are taken into account in the PDD. So, this is conservative.

4) Annual electricity output.

In China, the range from -10% to 10% is widely used in sensitivity analysis in practice and it is proper for the proposed project according to "Tool for the demonstration and assessment of additionality (Version 05.2)".Assuming the above four factors vary in the range of -10% to 10%, the project IRR of the proposed project (without income from selling CERs) varies to different extent, as shown in table 5 and figure 3.

Table 5. Sensitivity analysis of the project

	-225.00%	-13.50%	-10.00%	-5.00%	0.00%	5.00%	10.00%	15.65%
Static total investment		8.00%	7.41%	6.60%	5.86%	5.19%	4.57%	
Annual O&M Cost	8.00%		5.96%	5.91%	5.86%	5.81%	5.76%	
Grid-in Tariff			4.45%	5.16%	5.86%	6.56%	7.25%	8.00%
Annual electricity output			4.45%	5.16%	5.86%	6.56%	7.25%	8.00%

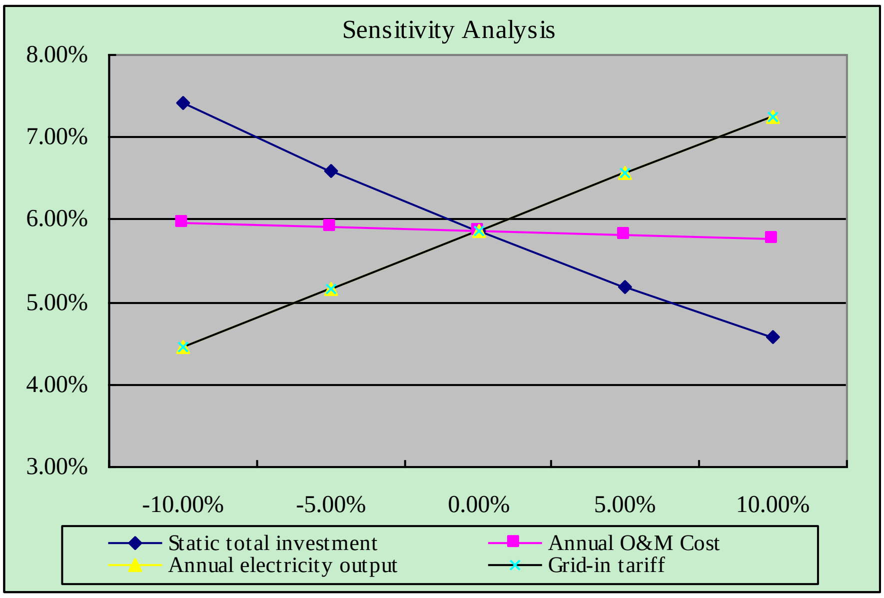

Figure 3. Sensitivity analysis of the proposed project

Table 5 and figure 3 show that the impact of the static total investment on the project IRR is the most significant. The next important factor for financial attractiveness is the annual electricity output and grid-in tariff and the impact of the annual O&M costs takes the third place. But the IRR of the proposed project keeps lower than the benchmark when the four parameters fluctuate within the range from -10% to 10%.

The project IRR will reach the benchmark (8%) at the following assumptions, but it very unlikely happen due to:

➢ Only when the static total investment has a drop of 13.50%, the project IRR can reach the benchmark rate. However, as the prices, including those of the requirement equipment and commodities, have been increasing in recent years[12], a significant reduction in the level of investment is unlikely, in particular a reduction greater than 13.50%. Furthermore, by reviewing

[12] http://finance.qq.com/a/20081117/003288.htm

the purchase agreements of wind turbines and wind-power towers and the construction contract, it can be concluded that the already signed contract values are higher than those estimated in the approved FSR. Therefore, it is impossible for the proposed project to reduce the static total investment to make the project IRR higher than the benchmark of 8%;

- Only when the annual O&M cost has a drop of 225.00%, the project IRR can reach the benchmark rate. The annual O&M costs mainly include maintenance costs, wage and welfare, material cost and other costs. Transparently, it is impossible for the operation & maintenance cost to zero. Therefore, the annual O&M cost will not be changed to make the project IRR equal to the benchmark;

- Only when the grid-in tariff increases by 15.65%, the project IRR can reach the benchmark rate. The electricity tariff 0.5206RMB/kWh (Inc. VAT) used in the PDD is sourced from the approved FSR. On 21st April, 2009, the FSR of the proposed project was approved by the NDRC[13]. According to Fagainengyuan [2009] No. 1005, the tariff of the wind farm project officially approved was two-phase tariff. The tariff before 30,000 hours will be fixed (i.e. 0.5206 RMB/kWh (Inc. VAT)), the tariff after 30,000 hours will be set at the average tariff of the local grid (0.24901 RMB/kWh (Inc.VAT) in 2008)[14] which is far lower than 0.5206 RMB/kWh (Inc.VAT, after 30,000 hours) used in IRR calculation. So, it is conservative and reasonable to use 0.5206RMB /kWh (Inc.VAT) as the tariff for whole life.

  Moreover, even if the highest tariff issued for similar projects in Gansu Province 0.585 RMB/kWh (Inc. VAT) was used in the IRR calculation for whole life, the project IRR would be still lower than the benchmark of 8%.

  To sum up, there is no chance for the tariff (0.5206 RMB/kWh (Inc.VAT)) of the project to be changed to make the project IRR higher than or equal to the benchmark;

- Only when the annual electricity output increase by 15.65%, the project IRR can reach the benchmark rate. In the Approved FSR the expected annual electricity output of the proposed project were calculated based on 30 years of historical wind speeds measured by Local Meteorological Station[15], the institute calculated the operational hours according to the *Methodology of Wind Energy Resource Assessment for Wind Farm* (GB/T18710-2002). The calculations for the project were carried out using professional WASP software designed for wind energy, which is used by wind developers and turbines manufacturers worldwide. As the calculation were based on historical data, assuming a sustained 15.65% of increase in annual electricity output is not reasonable. Therefore, it is very unlikely for the project to become commercially attractive through an adjustment of the annual electricity output.

In a word, when financial indicators change within reasonable range, the proposed project is not financially feasible without CDM support. Therefore, *Alternative 1* is not feasible.

Step 3. Barrier analysis

The proposed project does not adopt barrier analysis.

Step 4. Common practice analysis

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

For the purpose of analyzing common practice, the proposed project is compared to other wind power

[13] Fagainengyuan [2009] No. 1005

[14] China Electricity Price Executive Report 2008, issued by State Electricity Regulatory Commission

[15] Feasibility Study Report of the proposed project

projects which built after 2002 with installed capacity larger than 50 MW in Gansu Province.

In April 2002, China implemented power sector reform to establish a more commercialized power market in China 2002[16]. Since market condition for wind power project development has changed significantly since 2002, the operation date of similar activities is identified from 2002. The project with the installed capacity not less than 50MW must be gotten the approval letter from National Development and Reform Commission[17]. Therefore, the projects with installed capacity larger than 50MW will be identified for analyzing common practice. The activities in the same province have the similar wind resource, grid structure, geological and transportation conditions, economic developing status. Those factors affected the annual electricity output and the total investment respectively. Therefore, only the projects in Gansu Province are chosen to compare.

According to these criteria, an analysis was done on wind power projects in Gansu Province. This analysis identified that there is only one similar project which is not applying CDM- Gansu Anxi (Jiuquan Phase I) Wind Farm Project (100.5 MW)[18].

Sub-step 4b. Discuss any similar options that accruing.

The Gansu Anxi (Jiuquan Phase I) Wind Farm Project (100.5 MW) has been registered as Gold Standard VER project[19]. The development of large scale wind farms in Gansu Province face considerable financial barriers, and without higher supporting tariffs or favorable financial support, projects will struggle to overcome these barriers. The Gansu Anxi (Jiuquan Phase I) Wind Farm Project faces the same challenges as the proposed project, so it is also seeking financial assistance from the Gold Standard VER.

Actually the rest wind farms in Inner Mongolia built after 2002 are applying or have already successfully been registered or are applying as CDM projects in EB[20]. Therefore, the wind power projects similar to the proposed project are not the common practice in Gansu Province.

As stated in *Sub-step 4a* and *Sub-step 4b*, the proposed project is not a common practice.

So, it can be concluded that the proposed project is additional.

Conclusion of the assessment and demonstration of additionality

It should be noted that the CDM revenue has been seriously considered at the early stage of the project, and it is an integral part of the financial package of the project.

If the proposed project can be registered as CDM project successfully, CDM revenue can not only cover the difference of IRR between the project and the benchmark and resolve the financial barrier coincidently, but also improve the confidence of investors to ensure the smooth operation of the project. And thus, the reduction of GHG will bring the corresponding social benefits, economic benefits and environment benefits as mentioned on A.2 part above.

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[16] "Notice of National Council Issued about the Power System of Organization Reform Programme" (National issued [2002] No. 5)

[17] Management regulations for electricity generation from renewable energy (Fagai Energy[2006]13)

[18] Statistics of domestic wind farm installation capacity in 2007, http://www.xnyfd.com/adho/editor/UploadFile/2008-8/13/2008813163917116.pdf.

[19] https://gs1.apx.com/mymodule/ProjectDoc/EditProjectDoc.asp?id1=554

[20] http://cdm.ccchina.gov.cn/; http://cdm.unfccc.int/Projects/registered.html; http://cdm.unfccc.int/Projects/Validation/index.html

Without CDM revenues, instead of the proposed clean energy, a continuous scenario as emitting CO_2 from electricity grid will be taken place. Moreover, the duration of IRR will be prolonged greatly and causes the risks of project cash flow which results the failure.

Therefore, the proposed project is additional. Without registration as CDM project, the reduction of GHG will not be realized.

B.6. Emission Reductions

B.6.1. Explanation of methodological choices

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Emission reductions of the proposed project can be calculated based on the methodology ACM0002 (Version 11). The “Tool to calculate the emission factor for an electricity system” (Version 02) determines the CO_2 emission factor for the displacement of electricity generated by power plants in an electricity system, by calculating the Operating Margin (OM) and Build Margin (BM) as well as the “Combined margin” emission factor ex-ante, and through weighted average of OM and BM, the Combined Margin baseline emission factor of the NWCPG can be obtained and then the emission reductions from CDM project activity can be estimated. The details are shown below:

1. Project emissions (*PE_y*)

According to the ACM0002 (Version 11), the emissions of wind power project activity is zero, PE_y=0

2. Baseline emissions (*BE_y*)

Baseline emissions include only CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity, calculated as follows:

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

Where:

BE_y	Baseline emissions in year *y*(tCO_2/y);
$EG_{PJ,y}$	Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y (MWh/yr);
$EF_{grid,CM,y}$	Combined Margin CO_2 emission factor for NWCPG in year *y* calculated using the latest version of the “Tool to calculate the emission factor for an electricity system” (Version 02) (tCO_2/ MWh);

Since the project activity is the installation of a new grid-connected renewable power plant where no renewable power plant was operated prior to the implementation of the project activity, the $EG_{PJ,y}$ are calculated according to the following equation:

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

Where:

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

The “Tool to calculate the emission factor for an electricity system” (Version 02) determines the CO_2 emission factor for the displacement of electricity generated by power plants in NWCPG, by calculating the “operating margin” (OM) and “build margin” (BM) as well as the “combined margin” (CM). The operating margin refers to a cohort of power plants that reflect the existing power plants whose electricity generation would be affected by the proposed CDM project activity. The build

margin refers to a cohort of power units that reflect the type of power units whose construction would be affected by the proposed CDM project activity.

The following steps are applied to calculate the emission factor of NWCPG:

Step1: Identify the relevant electricity systems.

The NWCPG is selected as the project boundary, as:

- There is guidance available from the DNA on project boundaries identifying the applicable grid as the project boundary[21].
- The Grid is the regional grid in a country with layered dispatch system like China.

According to the guidance from China DNA, the NWCPG is therefore determined as the project boundary. It is composed by Shanxi, Gansu, Qinghai, Ningxia and Xinjiang power grids.

The baseline emissions factor (EF_y) is calculated as the weighted average of the operating margin emissions factor and the build margin emissions factor. The data used to calculate the grid emissions factor comes from reliable and publicly accessible statistics e.g. China Energy Statistic Yearbook and China Electric Power Yearbook, as well as Chinese DNA.

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.

Following the calculations of the DNA, and the statistical data available, Option I is chosen.

Step3: Select a method to determine the Operating Margin (OM) method

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

(a) Simple OM, or

(b) Simple adjusted OM, or

(c) Dispatch data analysis OM, or

(d) Average OM

Considering the low cost/must run resources[22] only constitute 18.8%, 19.9%, 25.4%, 24.7% and 23.2%[23] of total generation of NWCPG from the year 2003 to 2007, respectively (China Electric Power Yearbooks 2004-2008).

Based on these parameters, the simple OM method (option a) can be used for low-cost/must-run resources constitute less than 50% of total grid generation in the five most recent years.

[21] http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File2333.pdf

[22] Low-cost/must-run resources are defined as power plants with low marginal generation costs or power plants that are dispatched independently of the daily or seasonal load of the grid. They typically include hydro, geothermal, wind, low-cost biomass, nuclear and solar generation. If coal is obviously used as must-run, it should also be included in this list, i.e. excluded from set of plants.

[23] China Electric Power Yearbooks (2004:P709; 2005:P485; 2006: P572; 2007:P638; 2008:P748)

Therefore, method (a) is chosen to calculate OM emission factor for the proposed project. The ex-ante option of the data vintages is chosen to calculate the emission factor of the NWCPG that should be documented in the CDM-PDD and not be changed during the crediting periods.

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

The simple OM emission factor is calculated as the generation-weighted average CO_2 emissions per unit net electricity generation (tCO_2/MWh) of all generating power plants serving the system, not including low-cost / must-run power plants / units.

The simple OM may be calculated:

Option A: Based on the net electricity generation and a CO_2 emission factor of each power unit; or

Option B: Based on net electricity generation, the average efficiency of each power unit and the fuel type consumption of the project electricity system,

Option B can only be used if:

(a) The necessary data for Option A is not available; and

(b) Only nuclear and renewable power generation are considered as low-cost/must-run power sources and the quantity of electricity supplied to the grid by these sources is known; and

(c) Off-grid power plants are not included in the calculation (i.e., if Option I has been chosen in Step 2).

For the proposed project, the data on fuel consumption, net electricity generation and the average efficiency of each power unit are unavailable, thus option A cannot be used. Nevertheless, the 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 are available, and, nuclear and renewable power generation are considered as low-cost / must-run power sources and the quantity of electricity supplied to the grid by these sources is known, therefore, Option B can be used.

On Option B, the simple OM emission factor is calculated based on the net electricity supplied to the grid by all power plants serving the system, not including low-cost / must-run power plants / units, and based on the fuel type(s) and total fuel consumption of the project electricity system, as follows:

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

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);
NCV_i	Net calorific value (energy content) of fossil fuel type *i* in year *y* (GJ / mass or volume unit);
$EF_{CO2,\ I}$	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 (ex-ante option).

The simple operating margin CO_2 emission factor ($EF_{grid,OM\ simple,y}$) of the NWCPG is 1.0246 tCO_2/MWh. The detailed calculations and data are listed in the annex 3.

$EF_{grid,OMsimple,y}$ =1.0246 tCO_2/MWh

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

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.

The set of power units that comprises the larger annual generation should be used.

A power unit is considered to have been built at the date when it started to supply electricity to the grid.

Power plant registered as CDM project activities should be excluded from the sample group m. However, if the group of power units, not registered as CDM project activity, identified for estimating the build margin emission factor includes power unit(s) that is (are) built more than 10 years ago then:

(i) exclude power unit(s) that is (are) built more than 10 years ago from the group; and

(ii) include grid connected power projects registered as CDM project activities, which are dispatched by dispatching authority to the electricity system.

Capacity additions from retrofits of power plants should not be included in the calculation of the build margin emission factor.

In terms of vintage of data, one of the following two options can be chosen:

Option 1: For the first crediting period, calculate the build margin emission factor ex-ante based on the most recent information available on units already built for sample group m at the time of CDM-PDD submission to the DOE for validation. For the second crediting period, the build margin emission factor should be updated based on the most recent information available on units already built at the time of submission of the request for renewal of the crediting period to the DOE. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used. This option does not require monitoring the emission factor during the crediting period.

Option 2: For the first crediting period, the build margin emission factor shall be updated annually, ex-post, including those units built up to the year of registration of the project activity or, if information up to the year of registration is not yet available, including those units built up to the latest year for which information is available. For the second crediting period, the build margin emissions factor shall be calculated ex-ante, as described in option 1 above. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used.

For the proposed project, method (b) is chosen to make the sample group of power units, and option 1 is chosen to calculate Build Margin emission factor.

Step 6. Calculate the build margin emission factor

The build margin emissions 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);
$EF_{EL,m,y}$	CO_2 emission factor of power unit *m* in year y (tCO_2/MWh).
m	Power units included in the build margin
y	Most recent historical year for which power generation data is available

However, even for those built most recently power plants that comprise 20% of the system generation, it is also difficult to obtain the specific data regarding to fuel consumption and electricity generation additions by each power sources as confidential reason, the BM calculation in this PDD adopts the modifications methods agreed by the CDM EB. First, calculate the newly added installed capacity and the various component technologies, then calculation of the weight of newly added installed capacity of each power generation technology. Finally the commercial and efficient level of each power generation technology is adopted to calculate BM emission factor.

Because the generating capacity of the coal-fired, oil-fired and gas-fired technology can not be separated from the existing statistical data, the BM calculation in this PDD adopts the following method: First, use the available data in the energy balance tables on the most recent year, then calculate the proportion of CO_2 emissions from solid, liquid and gaseous fuels corresponding to the total emissions of CO_2 emissions. Second, the proportion used as the weight, based on the emission factors of the optimal efficient and commercial technologies, calculate the emission factor of the thermal power in each grid. Finally, this thermal emission factor is multiplied by the proportion of thermal power added capacity in the additional 20% capacity. The result is BM emission factor[24].

According to “Tool to calculate the emission factor for an electricity system” and clarifications by EB, the main steps for BM calculation are as following:

Sub-step 6-1: Calculation of weights of CO_2 emissions by coal-fired, oil-fired and gas-fired plants in total CO_2 emissions of NWCPG.

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

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

[24] http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/2008/200887164119674.pdf

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

Where:

$F_{i,j,y}$	The total amount of fuel i (in a mass or volume unit) consumed by province j in NWCPG for power generation in year y;
$NCV_{i,y}$	is the net calorific value of fuel i (GJ/t or GJ/m^3)in year y;
$EF_{CO2,i,j,y}$	The total amount the CO_2 emission coefficient of fuel i (tCO_2/mass or volume unit of the fuel), taking into account the carbon content of the fuels used by relevant power sources j in year(s) y

COAL, OIL, and GAS is the aggregation of various kinds of coal, oil, and gas as fossil fuels

Sub-step 6-2: Calculation of emission factor of thermal power ($EF_{thermal\ power}$) of NWCPG

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

Where: $EF_{Coal,Adv,y}$, $EF_{Oil,Adv,y}$ and $EF_{Gas,Adv,y}$ are the emission factors for the best commercially available technology of coal fired power generation, oil fired power generation, and gas fired power generation respectively.

Based on the above calculation principle for BM, basic data and parameter, the calculation process for BM is shown in annex 3

Sub-step 6-3: Calculation of Build Margin (BM) emission factor of NWCPG

$$EF_{grid,BM,y} = \frac{CAP_{thermal,y}}{CAP_{Total,y}} * EF_{thermal,y} \qquad (9)$$

Where:

$CAP_{Total,y}$ The total capacity addition;

$CAP_{Thermal,y}$ The fossil fuel fired capacity addition.

$EF_{thermal,y}$ Is the emissions factor of thermal power generation capacity of the applicable electricity system with the efficiency level of the best commercially available technology in China in the previous three years.

Base on the formulas above, the result is:

$EF_{grid,BM,y}$=0.6433 tCO_2/MWh

For the detailed information, please see the Annex 3.

For the detailed information, please see to <Notification on Determining Baseline Emission Factor of China's Grid >[25].

Step 7: Calculate the combined margin emissions factor (EF_y)

The combined margin emissions factor is calculated as follows:

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[25] http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File2333.pdf

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

Where:

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

ω_{OM} Operation Margin weight ;

$EF_{grid,OM,y}$ Operational Margin emission factor (tCO_2e / MWh);

ω_{BM} Build Margin weight;

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

y A given year.

The baseline emission factor EF_y should be calculated as the weighted average of the Operating Margin emission factor ($EF_{grid,OM,y}$) and the Build Margin emission factor($EF_{grid,BM,y}$), where the weight of Operating Margin, ω_{OM} is 0.75 and Build Margin, ω_{BM} is 0.25 by default.

Applying the default weights for the proposed project, we calculate a Baseline Emission Factor as follows:

$EF_{grid,CM,y}$=1.0246*0.75+0.6433*0.25=0.92928 tCO_2/MWh

3. Leakage (*LE_y*)

According to ACM0002 (Version 11), for wind power project activities, $LE_y = 0$

4. Emission reductions (*ER_y*)

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

Where:

ER_y are the total emissions reductions in year y (tCO_2e/yr)

PE_y are the emissions from the project activity in year y (tCO_2e/yr)

BE_y are the baseline emissions for the project activity in year y (tCO_2e/yr)

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

Data / Parameter:	$FC_{i,m,y}$
Data unit:	Mass or volume unit
Description:	The amount of fuel i (in a mass or volume unit) consumed by relevant power sources m in year(s) y
Source of data used:	China Energy Statistical Yearbook (2006-2008)
Value applied:	See Annex 3 for details
Justification of the choice of data or description of measurement methods and procedures actually applied :	Official statistical data
Any comment:	-

Data / Parameter:	$NCV_{i,y}$
Data unit:	GJ/mass or volume unit of a fuel

Description:	The net calorific value (energy content) per mass or volume unit of a fuel i
Source of data used:	China Energy Statistical Yearbook 2006-2008
Value applied:	See Annex3 for details
Justification of the choice of data or description of measurement methods and procedures actually applied :	Official statistical data
Any comment:	-

Data / Parameter:	$EF_{i,m,y}$
Data unit:	tCO_2/GJ
Description:	The CO_2 emission factor per unit of energy of the fuel i.
Source of data used:	2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value applied:	See Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	2006 IPCC Guidelines for National Greenhouse Gas Inventories
Any comment:	-

Data / Parameter:	$EG_{grid,j,y}$
Data unit:	MWh
Description:	Net electricity generated and delivered to the grid by province *j* in year y
Source of data used:	China Power Yearbook 2006-2008
Value applied:	See Annex 3 for details
Justification of the choice of data or description of measurement methods and procedures actually applied :	Official statistical data
Any comment:	-

Data / Parameter:	$GENE_{best,coal}$
Data unit:	
Description:	Best electricity supply efficiency for coal fired plant
Source of data used:	Notification on Determining Baseline Emission Factor of China's Grid[26]
Value applied:	38.10%
Justification of the choice of data or description of measurement methods and procedures actually applied :	Official statistical data
Any comment:	-

Data / Parameter:	$GENE_{best,oil,gas}$
Data unit:	

[26] http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File2332.doc

Description:	Efficiency level of the best technology commercially available in China for gas-fired and oil-fired power generators
Source of data used:	Notification on Determining Baseline Emission Factor of China's Grid[27]
Value applied:	49.99%
Justification of the choice of data or description of measurement methods and procedures actually applied :	Official statistical data
Any comment:	-

Data / Parameter:	$CAP_{i,y}$
Data unit:	MW
Description:	Installed capacity in each province of NWCPG
Source of data used:	China Electric Power Yearbook 2005-2008
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:	$EF_{grid,CM,y}$
Data unit:	tCO_2/MWh
Description:	The baseline emission factor $EF_{grid,CM,y}$ of NWCPG is calculated as the weighted average of the Operating Margin emission factor ($EF_{grid,OM,y}$) and the Build Margin emission factor($EF_{grid,BM,y}$), where the weight of Operating Margin, ω_{OM} is 0.75 and Build Margin, ω_{BM} is 0.25 by default. For the detailed information, please see the Annex 3.
Source of data used:	"Notification on Determining Baseline Emission Factor of China's Grid" published by China's DNA on 02/07/2009[28].
Value applied:	0.92928
Justification of the choice of data or description of measurement methods and procedures actually applied :	Official statistical data
Any comment:	-

Data / Parameter:	$EF_{grid,OM,y}$
Data unit:	tCO_2/MWh
Description:	The Operating Margin emission factor ($EF_{grid,OM,y}$) of NWCPG. For the detailed information, please see the Annex 3.
Source of data used:	"Notification on Determining Baseline Emission Factor of China's Grid" published by China's DNA on 02/07/2009.
Value applied:	1.0246

[27] http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File2332.doc

[28] http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File2333.pdf

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

Data / Parameter:	$EF_{grid,BM,y}$
Data unit:	tCO_2/MWh
Description:	The Build Margin emission factor ($EF_{grid,BM,y}$) of NWCPG. For the detailed information, please see the Annex 3.
Source of data used:	"Notification on Determining Baseline Emission Factor of China's Grid" published by China's DNA on 02/07/2009.
Value applied:	0.6433
Justification of the choice of data or description of measurement methods and procedures actually applied :	Official statistical data
Any comment:	-

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

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According to the analysis in section B.6.1, the project emission and leakage of the proposed project is 0, then LE_y=0 tCO_2e and PE_y=0 tCO_2e. And the combined baseline emission factor of the NWCPG is:

$EF_{grid,CM,y}$=0.92928 tCO_2e/MWh.

According to the Feasibility Study Report of the proposed project, the estimated annual electricity generation delivered to the power grid will be:

$EG_{facility,\ y}$ =443,278 MWh.

The annual emissions of baseline scenario are:

$BE_y = EG_{facility,\ y} \times EF_{grid,CM,y}$ = 443,278×0.92928= 411,927 tCO_2e/year

The annual emission reductions of the proposed project will be:

ER_y= 411,927－0= 411,927 tCO_2e/year

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

Year	Estimation of Project activity Emission (tonnes of CO_2e)	Estimation of baseline emission (tonnes of CO_2e)	Estimation of leakage (tonnes of CO_2e)	Estimation of Emission reductions (tonnes of CO_2e)
10/03/2011-09/03/2012	0	411,927	0	411,927
10/03/2012-09/03/2013	0	411,927	0	411,927
10/03/2013-09/03/2014	0	411,927	0	411,927
10/03/2014-09/03/2015	0	411,927	0	411,927
10/03/2015-09/03/2016	0	411,927	0	411,927
10/03/2016-09/03/2017	0	411,927	0	411,927
10/03/2017-09/03/2018	0	411,927	0	411,927
Total (tonnes of CO_2e)	0	2,883,489	0	2,883,489

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

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B.7.1 Data and parameters monitored:

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Data / Parameter:	$EG_{export,y}$
Data unit:	MWh
Description:	Electricity exported to grid by the proposed project through the main line in year y.
Source of data to be used:	Measured by meter.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	443,278 MWh
Description of measurement methods and procedures to be applied:	Continuous measurement and monthly recording.
QA/QC procedures to be applied:	The measurement will be in compliance with the national guidelines and requirements of the grid company for accuracy and reliability. The calibration will be carried out according to relevant national standards and regulations by authorized organization.
Any comment:	As the construction of project is not completed, the value indicated here is estimated.

Data / Parameter:	$EG_{import,y}$
Data unit:	MWh
Description:	Electricity imported from the grid to the project through the main line in year *y*.
Source of data to be used:	Measured by meter.
Value of data applied for the purpose of calculating expected emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	Continuous measurement and monthly recording.
QA/QC procedures to be applied:	The measurement will be in compliance with the national guidelines and requirements of the grid company for accuracy and reliability. The calibration will be carried out according to relevant national standards and regulations by authorized organization.
Any comment:	As the construction of project is not completed, the value indicated here is estimated.

Data / Parameter:	$EG_{auxiliary\ line,y}$
Data unit:	MWh
Description:	Electricity delivered to the project through the auxiliary line in year y.
Source of data to be used:	Measured by meter.
Value of data applied for the purpose of calculating	

expected emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	Continuous measurement and monthly recording.
QA/QC procedures to be applied:	The measurement will be in compliance with the national guidelines and requirements of the grid company for accuracy and reliability. The calibration will be carried out according to relevant national standards and regulations by authorized organization.
Any comment:	As the construction of project is not completed, the value indicated here is estimated.

Data / Parameter:	$EG_{facility,y}$
Data unit:	MWh/yr
Description:	Quantity of net electricity generation supplied to the Grid by the project activity in year y.
Source of data to be used:	Calculated using the formula: $EG_{facility,y} = EG_{export,y} - EG_{import,y} - EG_{auxiliary\ line,y}$
Value of data applied for the purpose of calculating expected emission reductions in section B.5	443,278
Description of measurement methods and procedures to be applied:	Calculated using the formula: $EG_{facility,y} = EG_{export,y} - EG_{import,y} - EG_{auxiliary\ line,y}$ Continuous measurement and monthly recording.
QA/QC procedures to be applied:	The metering equipments at the project site will be calibrated by a qualified Meter Calibration Organization according to the management standard. Power imported from the grid will be double checked according to electricity sales receipts. The accuracy of the metering equipments is not lower than 0.5s.
Any comment:	As the construction of project is not completed, the value indicated here is estimated.

B.7.2. Description of the monitoring plan:

>>

The project owner, Gansu Guazhou Xiehe Wind Power Co., Ltd., is the user of this monitoring plan and will be responsible for this monitoring plan. The project owner must maintain credible, transparent, and adequate data estimation, measurement, collection, and tracking systems to maintain the information required for an audit of an emission reduction project.

Emission reductions will be achieved through displacing part of the electricity from the NWCPG due to the power generated by the proposed project. Therefore, the net grid-connected output is therefore defined as the key data to monitor.

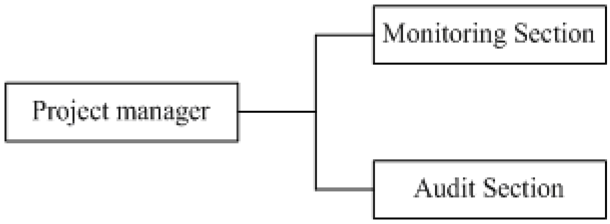
The monitoring plan is established according to the request of approved baseline and monitoring methodology ACM0002 (Version 11).

1. Monitoring subject

The main data to be monitored are $EG_{export,y}$, $EG_{import,y}$ and $EG_{auxiliary\ line,\ y}$. $EG_{facility,y}$ used to calculate the emission reduction is calculated as $EG_{export,\ y}$- $EG_{import,\ y}$ -$EG_{auxiliary\ line,\ y}$. To assume the annual emission reduction in the PDD, 443,278MWh is used as $EG_{facility,y}$ in accordance with the FSR.

2. Project Integrate Management

The project owner will take the responsibility for the monitoring plan implementation. A CDM working team is established which consists of project manager, monitoring section, audit section. The project manager is responsible for the implementation and monitoring of the monitoring activity. There are 2 departments organized for monitoring section and audit section. Monitoring section is to monitor, collect and archive the data according to the Monitoring and Management Manual, while the audit section is to audit the work of the monitoring section and execute the QC/QA procedures according to the Monitoring and Management Manual. The monitoring system flowchart of this project is shown in following figure.



The relevant training will be implemented by the project owner and the equipment manufacturer before operation of the proposed project.

3. Metering System

The electricity generated by the project will be transmitted to Ganhekou West transformer station where the voltage was increased to 330 kV, and then the electricity will be delivered to NWCPG by 330 kV transmission line via Anxi Substation. The simplified electrical grid connection diagram is shown in the following figure 4:

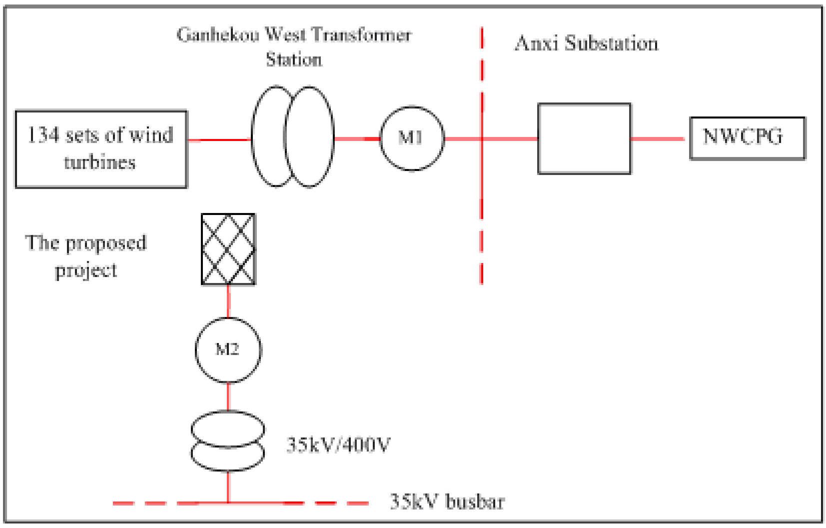


Figure 4. Simplified electrical grid connection diagram

According to figure 4, the metering system indicated by the meter instruments at M1 in Figure 4 is the main meter while there is a backup meter at the same site. The backup meter is the same with the main meter. The main line supplying electric power to the grid can also deliver power from the grid to the wind farm. The metering equipment runs in two directions and will record two readings i.e. electricity exported to the grid ($EG_{export,\ y}$) and electricity imported from the grid ($EG_{import,y}$).

Auxiliary power will be supplied by an auxiliary line from 35kV bus-bar. And the electricity ($EG_{auxiliary\ line,\ y}$) is metered by instruments at M2 in Figure 4.

The project owner will receive electricity transaction notes which serve as a cross-check of the

accuracy of the record of the readings of meter M1 and M2.

Net electricity supplied to the grid by the proposed project is calculated on a monthly basis as:

$EG_{facility,\ y} = EG_{export,\ y} - EG_{import,\ y} - EG_{auxiliary\ line,\ y}$

Where:

$EG_{facility,\ y}$ is the calculated power generation from the proposed project;

$EG_{export,\ y}$ is the electricity exported to the grid through the main line metered by M1 in year y;

$EG_{import,\ y}$ is the electricity imported from the grid through the main line metered by M1in year y;

$EG_{auxiliary\ line,\ y}$ is the electricity delivered to the project through the auxiliary line metered by M2 in year y.

4. Calibration

The metering equipments will be properly calibrated and checked annually by an independent third part according to relevantnational standard, e.g. the DL/T448－2000 or other national standard, to ensure its accuracy. The accuracy of the metering equipment M1 and the backup meter of M1 shall be 0.2s, while the accuracy of the metering equipment M2 shall be 0.5s.

The relative recording files will be supplied to the project owner. These recording files will be preserved by the project owner and provide to DOE in Verification.

5. Quality Assurance and Quality Control

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

6. Data collection and management

It is the responsibility for the project owner to provide necessary information and data for validation and verification. The measurement of the whole production data is controlled and stored by the project owner.

On-duty staff will watch the operation status of metering equipments everyday on site. Furthermore, the designated staff will collect the measured electricity data and complete the corresponding records. The data from these records will be digested and analyzed and the results will be reported to project manager.

All physical documents including the readings in electronic and/or manual form of the meters, electricity transaction notes will be stored by the project owner and kept one copy in order to facilitate the verification of DOE. The monthly records of power supplied to the grid and received from the grid, relevant accounting documents and electricity transaction notes and the results of calibration shall be collected in a central place by the project owner.

All data collected as part of monitoring will be kept at least for 2 years after the end of the last crediting period by the project owner.

7. Procedure in case of damaged metering equipment

If any errors are detected the party owning the meters shall repair, recalibrate or replace the meter giving the other party sufficient notice to allow a representative to attend during any corrective activity. If the readings of M1 are beyond allowable error, the backup meter will be used; if the readings of both M1 and the backup meter are beyond allowable error, the project owner and the grid company shall jointly prepare a reasonable and conservative estimate of the correct reading. In any case there is any problem for the meters, the relevant third party is responsible to correct the meters

and write the corrective action records.

After handling of the emergency, the project owner must prepare a report regarding the emergency to explain to DOE that the handling method is reasonable.

8. Monitoring Report

The Project owner will annually prepare a monitoring report which will include among others metering values of power supplied to and received from the grid, copies of sales/billing receipts, a report on calibration and a calculation of emission reductions.

All the data shall be kept at least for 2 years after the end of the last crediting period.

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

>>

The baseline study and monitoring methodology was completed on March 10th, 2010 by:

Ms Qingrong Zhu, United Carbon Credits Limited

Address: Room 1703, Tower 2, Prosper Center, No.5 Guanghua Road, Chaoyang District, Beijing, P.R. of China

Phone: +86 10 85875799; E-Mail: cdm@unitedcdm.com

The entity is a project participant listed in Annex 1.

SECTION C. Duration of the project activity / crediting period

C.1 Duration of the project activity:

C.1.1. Starting date of the project activity:

>>

13/12/2009 (Signing date of Purchase Agreement of the Main Transformer)

The signing date of Purchase Agreement of the Main Transformer is 13/12/2009; The date of the Starting Construction Order is 11/04/2010; The signing date of the Purchase Agreements of the Wind turbines and Wind-power towers is 31/05/2010; The earliest date among these three is chosen as the starting date of the proposed project activity.

Therefore, the signing date of Purchase Agreement of the Main Transformer (13/12/2009) is the starting date of the project activity.

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

>>

20 years 0 month.

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:

>>

10/03/2011 or the date of registration in EB, whichever is later

C.2.1.2. Length of the first crediting period:

>>

7 years 0 month

C.2.2. Fixed crediting period:

>>

Not applicable

C.2.2.1. Starting date:

>>

Not applicable

C.2.2.2. Length:

>>

Not applicable

SECTION D. Environmental impacts

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

>>

The Environmental Impact Assessment of the proposed project which was compiled by Northwest Research Institute of Mining And Metallurgy was approved by the Gansu Environment Protection Bureau on 6th August, 2008. Main contents of the Environmental Impact Assessment are summarized as follows:

Noise

The noises will be produced by the constructing equipments and transporting vehicle during construction period. The construction will be arranged by daylight mostly, and there is no residential area and industrial and mining enterprises a few kilometres around the project site, so the constructing noise will not interrupt the residents and the noise will disappear when the project finishes construction. The measurements as arranging the transport time reasonably, limited the speed and no tooting of the vehicles in some environmental sensitive area will be carried out to reduce the noise impact of the transporting vehicle. The low-noise wind turbines will be employed to reduce the noise impact during operation period.

Air Pollution

The Powder and dust produced in the constructing process are the main factor for the air pollution during construction period. Sprinkling, covering the raw material and so on will be carried out to reduce the impact to lowest. The tail gas of transporting vehicles and constructing equipments will impact on part environment, but the impact will be over when the project finishes construction.

Wastewater

The wastewater during construction period involves equipment washing wastewater and domestic sewage. The evaporation tank will be built to treat the wastewater. When the project finishes construction, the evaporation tank will be buried. In the operation period, the domestic sewage will be drained into the water storage pit after treatment. Then it will be used for factory virescence. Therefore, there is no impact on the water environment.

Solid waste

The solid wastes include living garbage and construction garbage during construction period. The solid waste will be transported to the local landfill. The smeary solid wastes will be set on fire or collected to treat. When the project finishes construction, the solid waste will be cleaned in time. The oilskin will be collected and sent to the hazardous waste treatment and disposal company during the operation period, so it will not impact on the environment.

Ecological environment

The impact on the ecological environment is mainly happened during construction period. The excavation, transport and the storage of equipments and materials will lead to the destruction of vegetation and changes of earth’s surface structure. The construction area will be strictly arranged and will carry out the environment protecting and recovery measurements.

The project site is in the Gobi desert which is not the birds migrating channel, so there is no harm for the birds.

Conclusion

After the above measurements performed, the negative impacts on environment will be minimized

below the requirements of laws and regulations during the construction and operation periods.

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 approved EIA report for the proposed project indicated that the proposed project would not bring significant impacts on environment.

SECTION E. Stakeholders' comments

>>

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

>>

The project owner has carried out a stakeholder investigation around the project site in December 2009 in order to solicit the comments from local stakeholders. The stakeholder investigating summary is shown as below:

1. Issuing Questionnaires

To consider the local stakeholder's comments, a survey has been made by the project owner in December 2009 around Guazhou County. 59 stakeholders mostly include local residents, local governors and other related persons. The surveys were arranged through a one-page questionnaire, which was designed to be easily filled in. The opinions expressed by the stakeholders were recorded and are available on request. The surveys include the following sections:

1) Project introduction

2) Respondent's basic information and education level

3) Questions on:

What level do you know about the proposed project?	A. Know very well B. Know little C. Do not know
Do you know about the Clean Development Mechanism?	A. Know B. Know little C. Do not know
Impacts of the project to local environment?	A. Positive effect B. No effect C. Negative impact
Do you think which impact on the environment may be caused by the project?	A. Noise of the Construction and Operation
	B. Construction Waste Water
	C. Impact of Dust on Air Quality
	D. Ecological Environment
	E. Construction Waste
	F. No Effect
Impact of the project to local economic development?	A. Beneficial B. No Effect C. Adverse
Whether to support the construction of the project?	A. Support B. Do not Care C. Non support

4) Space for the respondents' signature and date.

Questionnaires have been distributed according to the principle of both representation and randomness in order to reflect the public opinions and comments in a fair and real manner.

The investigation has fully considered the public advice of different education background occupations. The investigated stakeholders include the villager, the representative of the corporation, the reporter and so on.

2. Notification

Furthermore, the project owner has collected the public comments by publishing the notification through Lanzhou Morning Post on 23rd December 2009. The notification contained the introduction of the project and CDM, and comments can be accessed through e-mail or telephone.

E.2. Summary of the comments received:

>>

1. Comments from the Questionnaires

59 valid responses from 59 questionnaires were collected and the following is a summary of the key findings:

Education level of the respondents: Specialist qualifications (52.54%), Undergraduate course (30.51 %), Senior high school (6.78%), Others (10.17%);

Comments from the questionnaires show that 100% of the investigated stakeholders agree with the project construction, and none of them objects.

Almost 100% of the investigated stakeholders know something about the project. 98.31% of them know about the proposed project, while 1.69% of them do not know about the proposed project; 76.27% of the investigated stakeholders know about the CDM, while the other23.73% of them don not know about the CDM. 32.2% of them don't think it impact their livelihoods environment while 67.8% of them think it will take positive effect on the local environment. The fields of environmental protection the public concerned mainly include Noise of the Construction and Operation (22.03%),Impact of Dust on Air Quality (8.47%), Ecological Environment (5.08%）,Construction Waste (6.78%); Almost 100% of them think it will promote the local economy. And the stakeholders are all supportive of this project.

2. Comments Received through Notification

No comments of the stakeholders have been received from 23rd December 2009 by e-mail or by telephone.

In a word, the public and local government support the proposed project generally.

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

>>

The survey shows that the project has strong local support amongst the public. All the interviewees support the construction of the project.

The fields of environmental protection the public concerned mainly include noise, impact of dust on air quality as mentioned above. The EIA approved by the Environment Protection Bureau of Gansu shows that the noise levels would be within China national standards and no interference is expected. The developer will take some measures to reduce the dust during the construction such as watering and covering. The soil and water conservation will be carried out according to the regulation. Construction waste and waste water will be disposed of properly according to the EIA. The project owner will put the measures listed in the EIA into effect during construction and operation, so as to achieve environmental benefits, social benefits and economic benefits.

All of the investigated stakeholders agree with the project construction. Therefore there has been not necessary to modify the plans due to comments received.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

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Annex 2
INFORMATION REGARDING PUBLIC FUNDING

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There is no public funding from Annex I Parties involved in the project activity.

ANNEX 3
BASELINE INFORMATION

Database used for combined margin emissions factor calculation.

Baseline Information: Northwest China Power Grid (including Shanxi, Gansu, Qinghai, Ningxia and Xinjiang.).

The table list used for calculation the emissions reduce and combined margin ($EF_{grid,CM,y}$) (including data, data resources and course of calculation)is as follow:

Table 3-1: Low calorific values, CO_2 emission factors
Table 3-2: Operating Margin Emission Factor ($EF_{grid,OM,y}$) of Northwest China Power Grid in 2005
Table 3-3: Thermal Power to Northwest China Power Grid in 2005
Table 3-4: Operating Margin Emission Factor ($EF_{grid,OM,y}$) of Northwest China Power Grid in 2006
Table 3-5: Thermal Power to Northwest China Power Grid in 2006
Table 3-6: Operating Margin Emission Factor ($EF_{grid,OM,y}$) of Northwest China Power Grid in 2007
Table 3-7: Thermal Power to Northwest China Power Grid in 2007
Table 3-8: Operating Margin Emission Factor ($EF_{grid,OM,y}$) of Northwest China Power Grid
Table 3-9: Calculating of the CO_2 emissions factor of fuel i (tCO_2e/MWh)
Table 3-10: Calculating the percentage of CO_2 emission caused by of fuel i
Table 3-11: Installed Capacities of NWCPG in 2007
Table 3-12: Installed Capacities of NWCPG in 2006
Table 3-13: Installed Capacities of NWCPG in 2005
Table 3-14: Installed Capacities of NWCPG in 2004
Table 3-15: Installed Capacity of NWCPG from 2004 to 2007
Table 3-16: Baseline Emissions Factor of Northwest China Power Grid (tCO_2e/MWh)

Table 3-1: Low calorific values, CO_2 emission factors

Fuel	Low Calorific Value	Emission Factor ($kgCO_2/TJ$)
Raw Coal	20,908 kJ/kg	87,300
Cleaned Coal	26,344 kJ/kg	87,300
Mould coal	20,908 kJ/kg	87,300
Other Washed Coal	8,363 kJ/kg	87,300
Coke	28,435 kJ/kg	95,700
Crude Oil	41,816 kJ/kg	71,100
Gasoline	43,070 kJ/kg	67,500
Diesel Oil	42,652 kJ/kg	72,600
Fuel Oil	41,816 kJ/kg	75,500
Other Oil Products	41,816 kJ/kg	75,500
Natural Gas	38,931 kJ/m^3	54,300
Coke Oven Gas	16,726 kJ/m^3	37,300
Other Gas	5,227 kJ/m^3	37,300
LPG	50,179 kJ/kg	61,600
Refinery Gas	46,055 kJ/kg	48,200
Other Coking Products	28,435 kJ/kg	95,700

Data Source:

The net calorific values are quoted from <China Energy Statistical Yearbook 2008>, Page 283.The emission factors and oxidation factors are quoted from <2006 IPCC Guidelines for National Greenhouse Gas Inventories>, Volume 2 Energy.

Step 1: Calculation of the Operating Margin Factor of the Northwest China Power Grid

Fuel	Unit	Shanxi	Gansu	Qinghai	Ningxia	Xinjiang	Total	Emission Factor	Average Low Calorific Value	CO_2 Emission (tCO_2e)
								($kgCO_2$/TJ)	(MJ/t,km^3)	K=F×I×J/100000(mass unit)
		A	B	C	D	E	F=A+B+C+D+E	I	J	K=F×I×J/10000 (volume unit)
Raw Coal	10^4 t	2,461.28	1,597	345.1	1,467.70	1358.09	7229.17	87,300	20,908	131,951,756
Cleaned Coal	10^4 t	16.22					16.22	87,300	26,344	373,033
Other Washed Coal	10^4 t	35.56			101.95	10.2	147.71	87,300	8,363	1,078,416
Coke	10^4 t	3.23					3.23	95,700	28,435	87,896
Coke Oven Gas	10^8 m^3						0	37,300	16,726	0
Other Gas	10^8 m^3						0	37,300	5,227	0
Crude Oil	10^4 t					0.18	0.18	71,100	41,816	5,352
Gasoline	10^4 t	0.02				0.01	0.03	67,500	43,070	872
Diesel Oil	10^4 t	2.24	0.46	0.06		0.5	3.26	72,600	42,652	100,947
Fuel Oil	10^4 t	0.01	0.57			0.25	0.83	75,500	41,816	26,204
LPG	10^4 t						0	61,600	50,179	0
Refinery Gas	10^4 t					7.71	7.71	48,200	46,055	171,151
Natural Gas	10^8 m^3	1.46	0.52	1.33		7.81	11.12	54,300	38,931	2,350,716
Other Oil Products	10^4 t						0	75,500	41,816	0
Other Coking Products	10^4 t						0	95,700	28,435	0
Other Energy	10^4 tce	8.24	1.30				9.54	0	0	0
Total									Total	136,146,341

Data Source: <China Energy Statistical Yearbook 2006>

Table 3-3: Thermal Power to Northwest China Power Grid in 2005

Province	Electricity Generation	Electricity Generation	Used by the Power Plant	Electricity to the Grid
	(10^8kWh)	(MWh)	(%)	(MWh)
Shanxi	411	41,100,000	7.16	38,157,240
Gansu	331.06	33,106,000	4.23	31,705,616
Qinghai	55	5,500,000	2.69	5,352,050
Ningxia Autonomous Region	276.43	27,643,000	5.73	26,059,056
Xinjiang Autonomous Region	265.6	26,560,000	8.8	24,222,720
Total				125,496,682

Data Source: <China Electric Power Yearbook 2006>

Table 3-4: Operating Margin Emission Factor ($EF_{grid,OM,y}$) of Northwest China Power Grid in 2006

Fuel	Unit	Shanxi	Gansu	Qinghai	Ningxia	Xinjiang	Total	Emission Factor	Average Low Calorific Value	CO_2 Emission (tCO_2e)
								($kgCO_2$/TJ)	(MJ/t,km^3)	K=F×I×J/100000(mass unit)
		A	B	C	D	E	F=A+B+C+D+E	I	J	K=F×I×J/10000 (volume unit)
Raw Coal	10^4 t	2834.44	1660.92	421.86	1833.72	1,547.69	8,299	87,300	20,908	151,472,271
Cleaned Coal	10^4 t						0.00	87,300	26,344	0
Other Washed Coal	10^4 t				112.70	8.45	121.15	87,300	8,363	884,504
Coke	10^4 t				0.01		0.01	95,700	28,435	272
Coke Oven Gas	10^8 m^3	0.20				0.08	0.28	37,300	16,726	17,469
Other Gas	10^8 m^3	0.10					0.10	37,300	5,227	1,950
Crude Oil	10^4 t					0.02	0.02	71,100	41,816	595

Gasoline	10^4 t	0.01					0.01	67,500	43,070	291
Diesel Oil	10^4 t	1.14	0.24	0.61		1.25	3.24	72,600	42,652	100,328
Fuel Oil	10^4 t		0.60			0.11	0.71	75,500	41,816	22,415
LPG	10^4 t						0.0	61,600	50,179	0
Refinery Gas	10^4 t						0.0	48,200	46,055	0
Natural Gas	10^8 m^3	1.59	0.56	1.06		7.49	10.7	54,300	38,931	2,261,930
Other Oil Products	10^4 t						0.0	75,500	41,816	0
Other Coking Products	10^4 t	1.86					1.86	95,700	28,435	50,615
Other Energy	10^4 tce	33.57	8.81			2.2	44.58	0	0	0
Total									Tatol	154,812,639

Table 3-5: Thermal Power to Northwest China Power Grid in 2006

Province	Electricity Generation	Electricity Generation	Used by the Power Plant	Electricity to the Grid
	(10^8kWh)	(MWh)	(%)	(MWh)
Shanxi	544.82	54,482,000	6.97	50,684,605
Gansu	357.38	35,738,000	4.29	34,204,840
Qinghai	72.04	7,204,000	2.57	7,018,857
Ningxia Autonomous Region	367.31	36,731,000		36,731,000
Xinjiang Autonomous Region	299.01	29,901,000	8.02	27,502,940
Total				156,142,241

Data Source: China Energy Statistical Yearbook 2007

Table 3-6: Operating Margin Emission Factor ($EF_{grid,OM,y}$) of Northwest China Power Grid in 2007

Fuel	Unit	Shanxi	Gansu	Qinghai	Ningxia	Xinjiang	Total	Emission Factor	Average Low Calorific Value	CO_2 Emission (tCO_2e)
								($kgCO_2$/TJ)	(MJ/t,km^3)	K=F×I×J/100000(mass unit)
		A	B	C	D	E	F=A+B+C+D+E	I	J	K=F×I×J/10000 (volume unit)
Raw Coal	10^4 t	3303.44	1969.03	470.85	2165.80	1762.11	9671.23	87,300	20,908	176,525,905
Cleaned Coal	10^4 t						0.00	87,300	26,344	0
Other Washed Coal	10^4 t	3.73			124.31	7.73	135.77	87,300	8,363	991,243
Mould coal	10^4 t	3.53					3.53	87,300	20,908	64,432
Coke	10^4 t						0.00	95,700	28,435	0
Coke Oven Gas	10^8 m^3	0.52	0.65			0.26	1.43	37,300	16,726	89,215
Other Gas	10^8 m^3	14.14	0.71				14.85	37,300	5,227	289,526
Crude Oil	10^4 t					0.09	0.09	71,100	41,816	2,676
Gasoline	10^4 t	0.02					0.02	67,500	43,070	581
Diesel Oil	10^4 t	1.12	0.26	0.42		1.77	3.57	72,600	42,652	110,546
Fuel Oil	10^4 t	0.01	1.05	0.04		0.05	1.15	75,500	41,816	36,307
LPG	10^4 t						0.00	61,600	50,179	0
Refinery Gas	10^4 t					5.99	5.99	48,200	46,055	132,969
Natural Gas	10^8 m^3	1.68	0.49	1.93		8.66	12.76	54,300	38,931	2,697,404
Other Oil Products	10^4 t						0.00	75,500	41,816	0
Other	10^4 t						0.00	95,700	28,435	0

Coking Products										
Other Energy	10^4 tce	94	9.73				104.09	0	0	0
									Total	180,940,805

Table 3-7: Thermal Power to Northwest China Power Grid in 2007

Province	Electricity Generation	Electricity Generation	Used by the Power Plant	Electricity to the Grid
	(10^8kWh)	(MWh)	(%)	(MWh)
Shanxi	591	59,100,000	6.77	55,098,930
Gansu	424	42,400,000	5.89	39,902,640
Qinghai	97	9,700,000	7.19	9,002,570
Ningxia Autonomous Region	435	43,500,000		43,500,000
Xinjiang Autonomous Region	346	34,600,000	9.20	31,416,800
Total				178,920,940

Data Source: <China Electric Power Yearbook 2008>

Table 3-8: Operating Margin Emission Factor ($EF_{grid,OM,y}$) of Northwest China Power Grid

	2007year	2006year	2005year	Average $EF_{grid,OM,y}$ (tCO_2e/ MWh)
Total supplied electricity	178,920,940	156,142,241	125,496,682	1.0246
Total CO_2 emissions	180,940,805	154,812,639	136,146,341	

Step2: Calculation of the Build Margin Factor of the Northwest China Power Grid

Table 3-9: Calculating of the CO_2 emissions factor of fuel i (tCO_2e /MWh)

	Parameter	Efficiency of Power Suppy	Emission Factor of Fuel ($kgCO_2$/TJ)	Emission Factor (tCO_2e/MWh)
		A	B	D=3.6/A/1,000,000×B
Coal-fired Power	$EF_{Coal,Adv,y}$	38.1	87,300	0.8249

Plant				
Oil-fired Power Plant	$EF_{Oil,Adv,y}$	49.99	75,500	0.5437
Gas-fired Power Plant	$EF_{Gas,Adv,y}$	49.99	54,300	0.3910

Data source: http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File2333.pdf

Table 3-10: Calculating the percentage of CO_2 emission caused by of fuel i

		Shanxi	Gansu	Qinghai	Ningxia	Xinjiang	Total	Average Low Calorific Value	Emission Factor	AverageLow Calorific Value	CO_2 Emission
Fuel	Unit	A	B	C	D	E	G=A+ …+F	H	I	J	K=G×H×I×J/10 0,000
Raw Coal	10^4 t	3303.44	1969.03	470.85	2165.8	1762.11	9671.23	20,908	87,300	1	176,525,905
Cleaned Coal	10^4 t	0	0	0	0	0	0	26,344	87,300	1	0
Other Washed Coal	10^4 t	3.73	0	0	124.31	7.73	135.77	8,363	87,300	1	991,243
Mould coal	10^4 t	3.53	0	0	0	0	3.53	20,908	87,300	1	64,432
Coke	10^4 t	0	0	0	0	0	0	28,435	95,700	1	0
Other Coking Products	10^4 t	0	0	0	0	0	0	28,435	95,700	1	0
Subtotal								0	0	0	177,581,580
Crude Oil	10^4 t	0	0	0	0	0.09	0.09	41,816	71,100	1	2,676
Gasoline	10^4 t	0.02	0	0	0	0	0.02	43,070	67,500	1	581
Diesel Oil	10^4 t	1.12	0.26	0.42	0	1.77	3.57	42,652	72,600	1	110,546
Fuel Oil	10^4 t	0.01	1.05	0.04	0	0.05	1.15	41,816	75,500	1	36,307
Other Oil Products	10^4 t	0	0	0	0	0	0	41,816	75,500	1	0
Subtotal								0	0	0	150,110

Natural Gas	10^7 m^3	16.8	4.9	19.3	0	86.6	127.6	38,931	54,300	1	2,697,404
Coke Oven Gas	10^7 m^3	5.2	6.5	0	0	2.6	14.3	16,726	37,300	1	89,215
Other Gas	10^7 m^3	141.4	7.1	0	0	0	148.5	5,227	37,300	1	289,526
LPG	10^4 t	0	0	0	0	0	0	50,179	61,600	1	0
Refinery Gas	10^4 t	0	0	0	0	5.99	5.99	46,055	48,200	1	132,969
Subtotal											3,209,114
Total											180,940,805

Data Source: <China Energy Statistical Yearbook 2008>

Data are available from the above,

λ_{Coal}= 98.14% λ_{Oil}= 0.08% λ_{Gas}= 1.77%

The final $EF_{Thermal}$ is calculated as follow:

$$EF_{Thermal}=EF_{Coal,Adv}\times\lambda_{Coal}+EF_{Oil,Adv}\times\lambda_{Oil}+EF_{Gas,Adv}\times\lambda_{Gas}=0.8170tCO_2e/MWh$$

Table 3-11: Installed Capacities of NWCPG in 2007

Installed Capacity	Unit	Shanxi	Gansu	Qinghai	Ningxia	Xinjiang	Total
Fuel-fired	MW	12,290	7,840	1,900	7,030	6,560	35,620
Hydro	MW	1,790	4,400	5,830	430	2,140	14,590
Nuclear	MW	0	0	0	0	0	0
Wind & Others	MW	72.5	346	0	50	330	798.5
Total	MW	14,152.50	12,586	7,730	7,510	9,030	51,008.50

Data Source: <China Electric Power Yearbook2008>

Table 3-12: Installed Capacities of NWCPG in 2006

Installed Capacity	Unit	Shanxi	Gansu	Qinghai	Ningxia	Xinjiang	Total
Fuel-fired	MW	9,723	6,448	1,517	6,002	5,937	29,627
Hydro	MW	2,165	4,291	5,423	429	1,766	14,074
Nuclear	MW	0	0	0	0	0	0
Wind & Others	MW	0	199	0	11	189	399
Total	MW	11,888	10,938	6,940	6,442	7,892	44,100

Data Source: <China Electric Power Yearbook2007>

Table 3-13: Installed Capacities of NWCPG in 2005

Installed Capacity	Unit	Shanxi	Gansu	Qinghai	Ningxia	Xinjiang	Total
Fuel-fired	MW	9,132.1	5,715	886.8	4,577	5,051.7	25,362.6
Hydro	MW	1,578	4,036.2	4,825	428.5	1,352.1	12,219.8
Nuclear	MW	0	0	0	0	0	0
Wind & Others	MW	46	109.1	0	112.2	132.2	399.5
Total	MW	10,756.1	9,860.3	5,711.8	5,117.7	6,536	37,981.9

Data Source: <China Electric Power Yearbook2006>

Table 3-14: Installed Capacity of NWCPG from 2005to 2007

	2005	2006	2007	New Capacity Additions from Year 2005-2007	
	A	B	C	D=C-A	
Fuel-fired	25,362.6	29,627	35,620	10,257.4	78.74%
Hydro	12,219.8	14,074	14,590	2,370.2	18.20%
Nuclear	0	0	0	0.0	0.00%
Wind & Others	399.5	399	798.5	399	3.06%
Total	37,981.9	44,100	51,008.5	13,026.6	100.00%
Percentage of the Total capacity in 2007	74.46%	86.46%	100%		

The Build Margin Emission Factor in Northwest China Power Grid is:

$EF_{grid,BM,y}$ =0.8170×78.74%=0.6433 tCO_2e/MWh.

Step3: Calculation of the Combined Margin Factor of the Northwest China Power Grid

Table 3-15: Baseline Emissions Factor of Northwest China Power Grid (tCO_2e/MWh)

$E_{Fgrid,OM,y}$	1.0246
$EF_{grid,BM,y}$	0.6433
$EF_{grid,CM,y}$	0.92928

Annex 4
MONITORING PLAN

This plan will be carried out to monitor the electricity supply and the balance document between the grid company and the project owner. Please refer to B7.2 for the detailed description of monitoring plan.

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