



GANSU GUAZHOU BEIDAQIAO WIND POWER PROJECT

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Co.,Ltd.

Project Title	Gansu Guazhou Beidaqiao Wind Power Project
Version	2.0
Date of Issue	09/09/2010
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**CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-PDD)
Version 03 - in effect as of: 28 July 2006**

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SECTION A. General description of project activity.

A.1 Title of the project activity:

Gansu Guazhou Beidaqiao Wind Power Project
Version: 2.0
Date: 09/09/2010

A.2. Description of the project activity:

Gansu Guazhou Beidaqiao Wind Power Project (hereafter referred as the proposed project) is located in Guazhou County, Jiuquan city, Gansu Province. Totally 134 sets of 1500kW wind turbines will be installed, providing a total capacity of 201MW and an average annual generation of 480,708MWh connected into Northwest China Power Grid. The proposed project will achieve CO₂ emission reduction by replacing electricity generated by fossil fuel fired power plant connected into Northwest China Power Grid. The proposed project is estimated to deliver 446,721 tonnes CO₂ emission reduction annually.

The purpose of the proposed project is to generate zero-emission wind power and supply it to Northwest China Power Grid. For the proposed project,

- (a) The scenario existing prior to the start of the implementation of the project activity is Northwest China Power Grid providing the same electricity supply as the proposed project;
- (b) The project scenario is the implementation of the proposed project, i.e., the installation and operation of 134 wind turbines with a total capacity of 201MW which will supply an average annual generation of 480,708MWh to Northwest China Power Grid and replace the same amount of electricity generated by fossil fuel fired power plants connected into Northwest China Power Grid;
- (c) The baseline scenario is the same as the scenario existing prior to the start of implementation of the project activity.

The implementation of the proposed project will achieve CO₂ emission reductions by replacing electricity generated by fossil fuel fired power plants. The purpose of the proposed project is to generate zero-emission wind power and deliver it to Northwest China Power Grid. For the proposed project, the scenario existing prior to the start of the implementation of the project activity is Northwest China Power Grid provides the same electricity service as the proposed project. The baseline scenario is the same as the scenario existing prior to the start of implementation of the project activity.

As an environmentally sound energy supply technology, wind power is a priority development project in China. The contributions of the proposed project to sustainable development are summarized as follows:

- ◆ Located in a power grid dominated by coal-fired power plants, development of the proposed project will not only reduce GHG emissions but also mitigate local environmental pollution caused by pollutant emissions from coal-fired power plants.

- ◆ The implementation of the proposed project would provide 30 employment opportunities.
- ◆ The operation of the proposed project will increase local revenues and promote local economy.

A.3. Project participants:

Name of Party involved (*) ((host indicates a host Party)	Private and/or public entity(ies) project participants (*) (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
P.R.China (host)	Longyuan (Jiuquan) Wind Power Co., Ltd.	No
the Netherlands	Electrabel NV/SA	No

A.4. Technical description of the project activity:
A.4.1. Location of the project activity:
A.4.1.1. Host Party(ies):

People's Republic of China

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

Gansu Province

A.4.1.3. City/Town/Community etc:

Guazhou County, Jiuquan City

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

The proposed project is located in Guazhou County, Jiuquan City, Gansu province of China. Four inflexions of geographical scopes are A (E96.257 °; N40.674), B (96.304 °; N40.674), C (E96.304 °; N40.744 °) and D (E96.257 °; N40.744 °)¹. Its average altitude is 1380-1470 m. The detailed location of the proposed project is shown in Figure 1.

¹ FSR, page 1-1



Figure 1. Location of the proposed project

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

The project activity falls under the following scope and category.

Sectoral scope: 1. Energy industries

Category: Grid-connected electricity generation from renewable energy sources

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

Totally 134 wind turbines produced by Sinovel Wind Group Co., Ltd. with a nominal capacity of 1500 KW will be installed, providing a total capacity of 201MW. The main technical specifications are as follows¹:

Table : Technical Characteristics of Wind Turbines for the Proposed Project²

Preliminary Design Data	
Number	134
Manufacturer	Sinovel Wind Group Co., Ltd.
Nominal Capacity	1500KW
Rotor	
Number of Blades	3
Cut-in Wind Speed	3m/s
Rated Wind Speed	10.5m/s
Cut-out Wind Speed	20m/s
Extreme Wind Speed	59.5m/s
Generator	
Rated Power	1500kw
Rated Voltage	690V
Lifetime	20y
PLF	27.31%

Data sources : FSR

Each turbine will have a 690V-to-35kV transformer, from which a 35kV line will link into the 330kV step-up substation, which has been constructed by other previous project. By the 330 kV overhead transmission line, the electricity generated by the proposed project are delivered to s to the power grid.

The inspect system of wind turbines consists of on-site controlling system, central computer system and communication network. The step-up substation has been constructed by other previous project proposed project so that the inspect system of transmission facility has not been

¹ The Feasible Study Report of proposed project P1-9

² Feasibility Study Report pp.37

considered in this proposed project. The electricity supplied to the power grid will be measured by the electronic meters installed at the substation.

The wind turbine used by the proposed project is the production of Sinovel Wind Group Co., Ltd, which is one of the biggest manufactures³. The main characteristics of domestic turbines are their robustness, adaptability, reliability and maximum performance on the types of low temperature and high latitude region. Due to its advantage on fully utilizing wind resources and improving efficiency, this type of domestic turbines has been widely adopted in China.

The project scenario is the implementation of the proposed project, the installation and operation of 134 sets of wind turbines with a total capacity of 201MW. The baseline scenario of the proposed project is the additional power generated by Northwest China Power Grid and it is the same as the scenario existing prior to the start of implementation of the project activity. The supplied power is expected to be 480,708MWh annually, with an average load factor of about 27.31%. As the Northwest China Power Grid is dominated by the thermal power generation, the proposed project activity will achieve greenhouse gas(GHG) emission reductions by displacing the electricity from Northwest China Power Grid.

No technology from abroad is transferred for the proposed CDM project

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

It is estimated that 446,721 tCO₂e emission reductions will be generated during the first crediting period (from 1st July. 2011 to 30th June. 2018) of the proposed project, as shown in the following table.

Years	Annual estimation of emission reductions in tonnes of CO ₂ e
01/07/2011-31/12/2011	223,360
01/01/2012-31/12/2012	446,721
01/01/2013-31/12/2013	446,721
01/01/2014-31/12/2014	446,721
01/01/2015-31/12/2015	446,721
01/01/2016-31/12/2016	446,721
01/01/2017-31/12/2017	446,721
01/01/2018-30/06/2018	223,361
Total estimated reductions (tonnes of CO₂e)	3,127,047
Total number of crediting years	7
Annual average over the crediting period of estimated reductions (tonnes of CO₂e)	446,721

³ <http://www.sinovel.com/>

A.4.5. Public funding of the project activity:

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:

Approved consolidated baseline and monitoring methodology ACM0002 “Consolidated baseline methodology for grid-connected electricity generation from renewable sources”- ACM 0002 (Version 12.1.0)

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

- + Tool to calculate the emission factor for an electricity system (Version 0 2);
- + 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 refer to <http://cdm.unfccc.int/goto/MPappmeth>.

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

The proposed project can meet the applicability criteria of the baseline methodology (ACM0002 version 12.1.0):

- ◆ The proposed project is the installation of a new grid-connected zero-emission renewable power generation activity from wind source;
- ◆ The proposed project is not an activity that involves switching from fossil fuels to renewable energy sources at the site of the project activity;
- ◆ The proposed project is not a biomass fired power plant.

Therefore, the methodology is applicable to the proposed project.

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

The proposed project is the installation of a new grid-connected renewable power plant, and the baseline scenario is the following:

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

The spatial extent of the project boundary includes the proposed project and all power plants connected physically to the Northwest Power Grid that the CDM project power plant is connected to. Northwest Power Grid is defined as the project electricity system. In accordance with the boundary definitions of the Chinese DNA⁴, Northwest Power Grid consists of

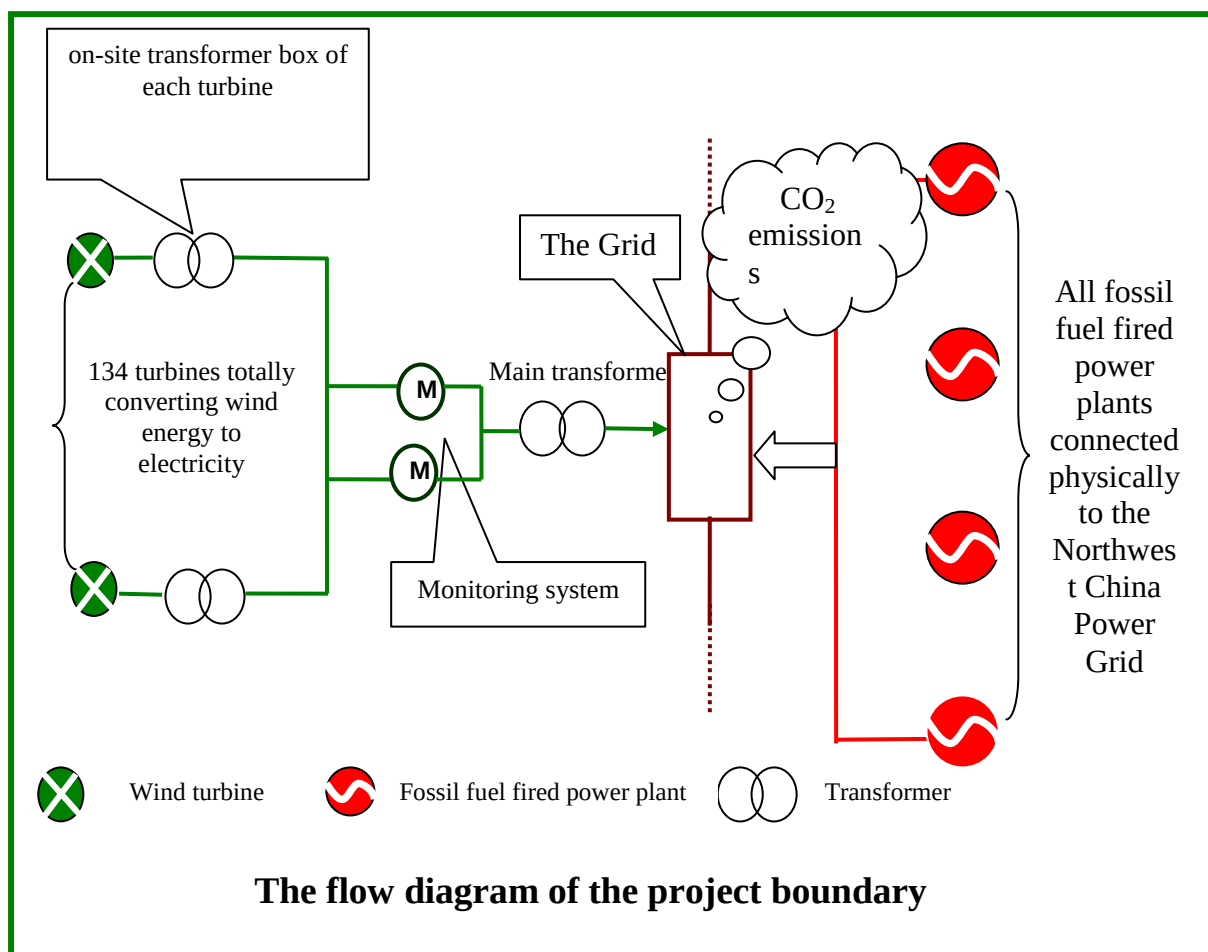
⁴ http://qhs.ndrc.gov.cn/qjzjz/t20090703_289357.htm

independent province-level electricity systems including the Qingghai, Gansu, Shaanxi, Ningxia Hui Autonomous and Xinjiang Uigur Autonomous Region Grid that can be dispatched without significant transmission constraints. The proposed project located in Gansu province is connected into Northwest China Power Grid by Gansu province Grid. The Northwest China Power Grid is net electricity export grid.

The greenhouse gases and emission sources included in or excluded from the project boundary are shown in the following table:

	Source	Gas	Included?	Justification/explanation
Baseline	Fossil fuel-fired power plants	CO ₂	Yes	Major emission sources
		CH ₄	No	Minor emission sources
		N ₂ O	No	Minor emission sources
Project activity	The proposed project is a zero-emission renewable power source	CO ₂	No	Minor emission sources
		CH ₄	No	Minor emission sources
		N ₂ O	No	Minor emission sources

Below is a flow diagram of the project boundary.



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

The proposed project is the installation of a new grid-connected renewable power plant and the baseline scenario is the following as per ACM0002 (Version 12.1.0):

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

The proposed project is connected to Gansu Province Grid, which is an integrated part of Northwest China Power Grid (NWPG). Therefore, the baseline scenario of the proposed project is provision of equivalent amount of annual power output by the NWPG where the proposed project is connected, which is the continued operation of the existing power plants and the addition of new generation sources on the NWPG to meet the electricity demand.

According to ACM0002, baseline emissions are equal to net electricity generation that is produced and fed into the NWPG, multiplied by the baseline emission factor. The baseline

emission factor (EF_y) is calculated as a Combined Margin (CM). The analysis and description in B.5 and B.6 will support the baseline scenario selected above.

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

The project activity is not the baseline scenario and possesses additionality, which is demonstrated below in a step-wise manner using the latest version (05.2) of “Tool for demonstration and assessment of additionality”.

The CDM had been taken into serious consideration by the project owner during the investment decision of the proposed project, as can be clearly shown in the following Timeline of the Proposed Project.

Timeline of the Proposed Project

No.	Time	Item
1	04/2008	EIA of the proposed project was completed.
2	06/08/2008	EIA of the proposed project was approved by the Environmental Protection Administration of Gansu Province.
3	12/2008	Feasibility Study Report of the proposed project was completed in which the CDM was seriously considered.
4	13/05/2009	The Feasibility Study Report was approved by National Development and Reform Commission.
5	12/06/2009	Decision made at investment decision meeting to proceed with the project
6	09/2009	The project owner signed a consultancy contract to start CDM development.
7	20/09/2009	Stakeholders’ meeting was held by the project owner
8	24/09/2009	Notification to DNA regarding CDM consideration
9	06/11/2009	Construction contract signed (starting date)
10	28/11/2009	Construction permission letter
11	28/12/2009	Wind turbine contract signed
12	21/04/2010	Prior consideration-Gansu Guazhou Beidaqiao wind power project
13	06/2010	Validation contract

Step 1. Identification of alternatives to the project activity consistent with mandatory laws and Regulations

Realistic and credible alternatives to the project activity that can be part of the baseline scenario are defined through the following sub-steps:

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

The demonstration about the alternative that provides outputs or services comparable with the proposed CDM project activity is as follows:

- a) The proposed project not undertaken as a CDM project activity
- b) The thermal power plant with the same annual electricity output as the proposed project.
- c) Other renewable energy project with the same annual electricity output as the proposed project.
- d) To provide the same electricity output by Northwest China Power Grid.

For the alternative c), besides wind energy, other kinds of energy like solar PV, geothermal, biomass and hydro are the possible grid-connected renewable energy technologies that could be applied in China. Guazhou County is located in the northwest of Gansu Province where the water resource is very poor⁵, so the development of hydro power is not feasible. Due to different grid connected situation, high operating cost and less of national policies^{6 7} for solar PV power project; economic unattractive⁸ and the danger of causing earthquake⁹ for geothermal power project; high cost, low payoff¹⁰ for biomass power project, the possible grid-connected renewable energy technologies such as solar PV, geothermal, biomass with the same annual electricity output as the proposed project are alternatives far from being attractive investment in the grid in China. Therefore, the alternative c) is not a realistic alternative.

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

The mandatory laws and regulations for the proposed project include laws, central government regulations, local regulations, departmental rules and disciplines related to electricity and environment protection.

According to Notice on Strictly Prohibiting the Installation of Fuel-fired Generation with the Capacity of 135MW or below issued by the General Office of the State Council, decree no. 2002-6¹¹, and thermal power plants with the Capacity of 135MW or below are strictly prohibited for construction. The alternative b) 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 operation time of thermal power plant in Gansu Province is 6231hr¹², and the effective operation time of proposed project is 2392hr¹³. To provide the same output as the proposed project, the alternative thermal power plant will has the capacity of 77.16 MW. However, according to the regulations, thermal power plants with the Capacity of 135MW or below are prohibited for construction¹⁴. Consequently, the alternative b) is not a feasible alternative;

⁵ <http://www.guazhoudj.gov.cn/diaochayanjiu/ShowArticle.asp?ArticleID=6497>

⁶ http://www.wefweb.com/news/200916/1413073809_0.shtml

⁷ <http://finance.people.com.cn/GB/1038/59942/59949/6294546.html>

⁸ <http://www.study1w.com/dianli/dire/139.html>

⁹ http://www.study1w.com/dianli/dire/618_2.html

¹⁰ http://www.ce.cn/cysc/ny/xny/200901/12/t20090112_17928711.shtml

¹¹ http://nyj.ndrc.gov.cn/nyfjb/nyfjb4/nyfjb43/nyfjb432/t20070112_110563.htm

¹² China Electric Power Yearbook 2008

¹³ The Feasible Study Report of proposed project

¹⁴ Notice on Strictly Prohibiting the Installation of Fuel-fired Generation with the Capacity of 135MW or below issued by the General Office of the State Council, decree no. 2002-6

The other alternatives described in sub-step 1a are all in compliance with mandatory laws and regulations as required by the methodology used.

To summarize, the potential realistic and creditable alternatives that can provide the same output or services as the proposed project are a) and d). The investment analysis in Step 2 will show the proposed project not undertaken as a CDM project and without CERs income (alternative a)) is lack of the attraction for the potential investors.

Step2. Investment analysis.

Sub-step 2a. Determine appropriate analysis method.

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 is not applicable for the proposed project because the project activity will produce economic benefit (from electricity sale) other than CDM related income. The investment comparison analysis is also not applicable for the proposed project because the baseline scenario, as identified in step1, providing the same electricity output by the Northwest Power Grid, is not a new investment project.

To conclude, the benchmark analysis will be used to identify whether the financial indicators of the proposed project is better than relevant benchmark value.

Sub-step 2b Apply benchmark analysis.

In according with *Interim Rules on Economic Assessment of Electrical Engineering Retrofit Projects* issued by former State Power Corporation of China, the benchmark Project IRR in China's power generation industry is 8%. When the Project IRR is above the corresponding benchmark, the project is financially feasible and economically reasonable.¹⁵

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

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

(1) Basic parameters for calculation of financial indicators

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

Table 1 Main parameters for calculation of financial indicators¹⁶

¹⁵ Interim Rules on Economic Assessment of Electric Engineering Retrofit Projects

¹⁶ The Feasible Study Report of proposed project

Items	Unit	Amount	Note
Capacity	MW	201	Feasibility Study Report(FSR) page14-1
Static total investment	Million Yuan	1913.1476	FSR page14-1
Annually output	MWh/year	480708	FSR page14-1
Electricity Tariff (Including VAT)	Yuan/kWh	0.5206	FSR page14-2
Depreciable life of fixed assets	Year	15	FSR page 14-2
Rate of residual value of fixed assets	%	5	FSR page 14-2
Income tax	%	25	FSR page 14-3
Project period(including 2 years of construction)	Year	22	FSR page14-1

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

The financial indicators (IRR) with and without income from selling CERs are listed in the following table. Without income from selling CERs, the IRR on total investment of the proposed project is lower than the benchmark IRR and the proposed project is financially unattractive because of its low profitability.

Table 2 Comparison of financial indicators with and without income from CERs

Items	Unit	Without income from CERs	Benchmark	With income from CERs
IRR	%	6.28	8	9.39

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) Tariff .
- 3) Annual generation output(PLF).
- 4) Annual operation & maintenance costs.

The parameters used in sensitivity analysis (Investment, Tariff, Electricity Generation and O&M costs) constitute more than 20% of either total project costs or total project revenues, and there are no other parameters having significant impact on the sensitivity analysis that are not included in the sensitivity analysis.

The four financial parameters were identified as the main variable factors for sensitive analysis of financial attractiveness. Their impacts on IRR of total investment were analyzed in the below tables

Assuming the above four factors fluctuate within the range to the proper extent, the IRR of the proposed project (without income from selling CERs) varies to different extent, as shown in below.

The impact of the static total investment on IRR

Fluctuation	-15.55%	-10%	-7.5%	-5%	-2.5%	0	+2.5%	+5%	+7.5%	+10%
IRR	8.00%	7.35%	7.07%	6.80%	6.54%	6.28%	6.04%	5.80%	5.57%	5.34%

The impact of tariff on IRR

Fluctuation	-10%	-7.5%	-5%	-2.5%	0	+2.5%	+5%	+7.5%	+10%	+12.6%
IRR	4.80%	5.19%	5.56%	5.93%	6.28%	6.64%	6.98%	7.32%	7.66%	8.00%

The impact of the annual generation output on IRR

Fluctuation	-10%	-7.5%	-5%	-2.5%	0	+2.5%	+5%	+7.5%	+10%	+12.6%
IRR	4.80%	5.19%	5.56%	5.93%	6.28%	6.64%	6.98%	7.32%	7.66%	8.00%

The impact of the annual O & M costs on IRR

Fluctuation	-53.6%	-10%	-7.5%	-5%	-2.5%	0	+2.5%	+5%	+7.5%	+10%
IRR	8.00%	6.62%	6.53%	6.45%	6.37%	6.28%	6.20%	6.12%	6.03%	5.95%

The total investment is an important factor affecting the financial attractiveness of the proposed project. In the case that the total investment decreases more than 15.55%, the IRR of the proposed project begins to exceed the benchmark. Considering the majority of total investment is used to buy wind turbines, whose price tends to be increasing for its advanced technology and demand booming¹⁷. The rest of the static total investment is for installation of the wind turbines and the construction of the wind turbine foundation and some other buildings, due to the increasing trend of construction material costs¹⁸, is also unrealistic to be lowered down. Hence,

¹⁷ <http://news.hexun.com/2008-07-01/107093401.html>

¹⁸ <http://finance1.jrj.com.cn/news/2008-03-28/000003465715.html>,
http://www.ic37.com/htm_news/2008-1/15834_66520.htm

within the reasonable range of total investment, the proposed project is always lack of financial attractiveness.

The tariff is also an important factor affecting the financial attractiveness of the proposed project. When the tariff increases by 12.6%, the project exceeds 8% benchmark. The tariff of 0.5206 Yuan/kWh in PDD is taken from the FSR, and the latest available tariff information by NDRC is 0.54 Yuan/kWh (incl.VAT)¹⁹. Although the tariff of 0.54 Yuan/kWh (incl.VAT) issued by NDRC in Gansu, the IRR of the proposed project rechecked by the guidance tariff of 0.54 Yuan/kWh is still lower than the benchmark. Moreover, the guiding tariff issued by NDRC in 2009²⁰ shows that the tariff level was 0.54 Yuan /kWh (incl.VAT) in Gansu. Given the reasons above, it is not likely that the tariff for the proposed project will increase by 12.6%. Therefore, within the reasonable range of tariff; the proposed project is always lack of financial attractiveness.

The annual generation output is also an important factor affecting the financial attractiveness of the proposed project. In the case that the annual generation output increases by 12.6%, the IRR of the proposed project begins to exceed the benchmark. According to the feasibility study report of the proposed project, the annual generation output is estimated basing on the long term weather statistic data provided by local meteorological station and wind resources measurement which showed in FSR. As shown in the 30-year wind statistic data in the FSR, the average wind speed of 30-year is 2.62m/s, the average wind speed of 20-year is 2.36m/s, the average wind speed of 10-year is 2.13m/s. Compared with the 30-year wind statistic data, the wind speed is decreasing and trending to be stable²¹. So the probability that the annual generation output is 12.60% higher than the estimated value is very small. Therefore, within the reasonable range of the annual generation output, the proposed project is always lack of financial attractiveness.

The impact of the annual O&M cost is the slightest, the IRR of the proposed project begins to exceed the benchmark until the annual O&M cost decreases about 53.6%. Moreover, the price of material and salaries of the employees are gradually increasing in China, which leads annual O&M cost gradually increasing²². So the proposed project is always lack of financial attractiveness within the reasonable range of annual O&M cost.

To conclude, under the reasonable variations in the critical assumptions, the conclusion regarding the financial additionality is robust and supported by sensitivity analysis. There are no other factors which constitute more than 20% of either total project costs or total project revenues needed to be analyzed.

¹⁹ http://www.ndrc.gov.cn/zcfb/zcfbtz/2008tongzhi/t20080813_230718.htm

<http://www.ndrc.gov.cn/zcfb/zcfbtz/2008tongzhi/W020080813574224669079.pdf>

²⁰ http://www.hebwj.gov.cn/upfiles/xy_col32gjc_20070718164220007126.htm

²¹ The Feasible Study Report of proposed project

²² http://www.ic37.com/htm_news/2008-1/15834_66520.htm

http://www.chinadaily.com.cn/hqcj/2007-09/03/content_6075777.htm

Step 3. Barrier analysis

According to the latest version (05.2) of “Tool for demonstration and assessment of additionality”, the barrier analysis is not applicable to the proposed project.

Step 4. Common practice analysis

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

In China, provincial governments are authorized to regulate wind power projects in the province by the NDRC.²³ So the investment climate, tariff, land policy, regulations etc. are usually similar for wind power projects in the same province. The location of the proposed project belongs to Gansu Province. Therefore, Gansu Province is selected as the geographical scope for the common practice analysis of the project.

In April 2002, China implemented power sector reform to establish a more commercialized power market in China²⁴. Since market condition for wind power project development has changed significantly since 2002, the common practice analysis starts from 2002.

According to the description for the comparable size to the project activity, a similar scale to the proposed project is limited with the capacity of 100-300MW. Therefore, the similar projects²⁵ are defined as the projects with the capacity of 100-300MW operated after 2002 in Gansu Province where the proposed projects located.

Table Similar wind resource power generation projects in Gansu province

Project	Installed capacity (MW)	Status
CECIC HKC Gansu Changma Wind Power project	201	Applying for registration of CDM
Gansu Datang Changma Wind Power Project	201	Applying for registration of CDM
Gansu Guazhou 300 MW Wind Power Project	300	Applying for registration of CDM
Gansu Guazhou Ganhekou Fourth Wind Farm Power Generation Project	199.5	Applying for registration of CDM
Gansu Guazhou Ganhekou No.3 Wind Power Plant Project	201	Applying for registration of CDM
Gansu Guazhou Ganhekou No.8 Wind Farm Project	201	Applying for registration of CDM
Gansu Guazhou Ganhekou No 1 Wind Farm Project	199.5	Applying for registration of CDM
Gansu Guazhou Qiaowan Wind Farm Project	201	Applying for registration of CDM
Huadian Gansu Guazhou Ganhekou No. 7 Wind Farm Project	201	Registered as a CDM project on 24 May 2010
Huaneng Gansu Guazhou Ganhekou No.2 Wind Farm	199.5	Applying for registration of CDM

Reference: 1. <http://cdm.unfccc.int/Projects/Validation/index.html>

2. Shi Pengfei. Installed capacity Statistic of Chinese Wind Farm 2007, 2008²⁶

²³ http://www.sdpc.gov.cn/nyjt/nyzywx/t20050810_41378.htm

²⁴ http://www.ndrc.gov.cn/xwfb/t20050708_28096.htm

²⁵ <http://cdm.unfccc.int/Projects/Validation/index.html>

<http://www.cwea.org.cn/upload/20080324.pdf>

²⁶ <http://www.cwea.org.cn/upload/20080324.pdf>, [http://www.cnwpem.com/webdata/down_list/2009-](http://www.cnwpem.com/webdata/down_list/2009-03/20090305131421723.pdf)

[03/20090305131421723.pdf](http://www.cnwpem.com/webdata/down_list/2009-03/20090305131421723.pdf)

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

In 2007, wind power accounted for only 2.0 % of the total installed capacity of Gansu province, it is clear that wind power is not a common practice generally.²⁷

As shown in Table above, the wind power generation project is not a business as usual (BAU) project in Gansu province and all of the similar projects are applying for registration of CDM to support the construction and operation.

According to the above sub-step 4a, no other similar projects other than those CDM projects registered or published on UNFCCC website for comments are observed. Therefore, the result of financial unattractiveness for the project is consistent with scenarios of other similar projects observed.

In conclusion, the proposed project activity passed all criteria of “Tool for the demonstration and assessment of additionality”. The proposed project is additional.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

The proposed project is the installation of a new grid-connected renewable power plant, and 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”.

Baseline emissions

Baseline emissions include only CO₂ emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity. The methodology assumes that all project electricity generation above baseline levels would have been generated by existing grid-connected power plants and the addition of new grid-connected power plants. The baseline emissions are to be calculated as follows:

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

(1)

Where:

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

$EG_{PJ,y}$ = Quantity of net electricity generation that is produced and fed into the grid as a result

²⁷ China Power Year Book 2008

of the implementation of the CDM project activity in year y (MWh/yr).

$EF_{grid,CM,y}$ = Combined margin CO₂ emission factor for grid connected power generation in year y calculated using the latest version of the “Tool to calculate the emission factor for an electricity system” (tCO₂/ MWh).

Since the proposed project is the installation of a new grid-connected renewable power plant, then $EG_{PJ,y}$ is calculated using the following formula:

$$EG_{PJ,y} = EG_{facility,y}$$

(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 methodological tool “Tool to calculate the emission factor for an electricity system” (version 02) determines the CO₂ 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” (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 methodological tool “Tool to calculate the emission factor for an electricity system” (version 02) provides procedures to determine the following parameters:

Parameter	SI Unit	Description
$EF_{grid,CM,y}$	tCO ₂ /MWh	Combined margin CO ₂ emission factor for grid connected power generation in year y
$EF_{grid,BM,y}$	tCO ₂ /MWh	Build margin CO ₂ emission factor for grid connected power generation in year y
$EF_{grid,OM,y}$	tCO ₂ /MWh	Operating margin CO ₂ emission factor for grid connected power generation in year y

The following six steps are applied to calculate the emission factor for an electricity system:

STEP 1: Identify the relevant electricity systems.

STEP 2: Choose whether to include off-grid power plants in the project electricity system (optional)

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

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

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

STEP 6: Calculate the build margin emission factor.

STEP 7: Calculate the combined margin (CM) emissions factor.

Step1: Identify the relevant electric power system.

Using the boundary definitions of the Chinese DNA²⁸, the spatial extent of the project boundary includes Proposed Project and all power plants connected physically to the Northwest Power Grid that the CDM project power plant is connected to Northwest Power Grid is defined as the **project electricity system**, which consists of independent province-level electricity systems including Shaanxi, Gansu, Qinghai, Ningxia and Xinjiang province that can be dispatched without significant transmission constraints. The **connected electricity system** is Central China Power Grid, which is connected by transmission lines to the project electricity system. Power plants within the connected electricity system can be dispatched without significant transmission constraints but transmission to the project electricity system has significant transmission constraint.

Electricity transfers from connected electricity systems to the project electricity system are defined as **electricity imports** and electricity transfers to connected electricity systems are defined as **electricity exports**.

Since the Northwest Power Grid has the electricity exports to the Central China Power Grid, the spatial extent is limited to the project electricity system (Northwest China Power Grid).

Step2: 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 and off-grid power plants are included in the calculation.

The calculation of the proposed project only includes grid power plants. Therefore, **Option I** is chosen.

Step3: Select an 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

²⁸ <http://cdm.ccchina.gov.cn/web/index.asp>

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

The simple OM method (option a) can only be used if low-cost/must-run resources ²⁹ constitute less than 50% of total grid generation in: 1) average of the five most recent years, or 2) based on long-term averages for hydroelectricity production.

For the simple OM, the simple adjusted OM and the average OM, the emissions factor can be calculated using either of the two following data vintages:

- ✦ Ex ante option: A 3-year generation-weighted average, based on the most recent data available at the time of submission of the CDM-PDD to the DOE for validation, without requirement to monitor and recalculate the emissions factor during the crediting period, or
- ✦ Ex post option: the year in which the project activity displaces grid electricity, requiring the emissions factor to be updated annually during monitoring. If the data required calculating the emission factor for year y is usually only available later than six months after the end of year y , alternatively the emission factor of the previous year ($y-1$) may be used. If the data is usually only available 18 months after the end of year y , the emission factor of the year proceeding the previous year ($y-2$) may be used. The same data vintage (y , $y-1$ or $y-2$) should be used throughout all crediting periods.

For the dispatch data analysis OM, use the year in which the project activity displaces grid electricity and update the emission factor annually during monitoring.

The data vintage chosen should be documented in the CDM-PDD and not be changed during the crediting periods.

Power plants registered as CDM project activities should be included in the sample group that is used to calculate the operating margin if the criteria for including the power source in the sample group apply.

The justifications of the choice of method to calculate OM emission factor are as follows.

Method (c): The dispatch data analysis OM emission factor is determined based on the power units that are actually dispatched at the margin during each hour h where the project is displacing electricity. This method requires the dispatch order of each power plant and the dispatched electricity generation of all the power plants in the power grid during each hour. Since the dispatch data, power plants operation data are considered as confidential materials and only for internal usage and are not available publicly. Thus, method (c) is not applicable for the proposed project.

²⁹ 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 the set of plants.

Method (b): Method (b) requires the annual load duration curve of the power grid and the load data of every hour data during the whole year on the basis of the time order. As mentioned above, the dispatch data and detailed load curve data are not available publicly. Therefore, method (b) is not applicable for the proposed project as well.

In terms of Method (d) and Method (a): The average OM emission factor (option d) is calculated as the average emission rate of all power plants serving the grid, using the methodological guidance as described under (a) above for the simple OM, but including in all equations also low-cost/must-run power plants. The simple OM method (option a) can only be used if low-cost/must-run resources constitute less than 50% of total grid generation in: 1) average of the five most recent years, or 2) based on long-term averages for hydroelectricity production. Low operating cost and must run resources 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 the set of plants. Considering the low-cost/ must run resources only constitute 18.8%, 19.92%, 25.36%, 24.71% and 23.15%³⁰ of total generation of Northwest China Power Grid, respectively. (China Electric Power Yearbooks 2004-2008). Therefore, method (a) is chosen to calculate OM emission factor for the proposed project.

In conclusion, the Ex ante option of the data vintages is chosen to calculate the emission factor of the Northwest Power Grid by using the simple OM method (option a) for the proposed project.

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

The simple OM emission factor is calculated as the generation-weighted average CO₂ emissions per unit net electricity generation (tCO₂/MWh) of all generating power plants serving the system, not including low-cost / must-run power plants / units. It may be calculated:

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

Option A should be preferred and must be used if fuel consumption data is available for each power plant / unit. In other cases, option B or option C can be used. For the purpose of calculating the simple OM, Option C should only be used if the necessary data for option A and option B is not available and can only be used if only nuclear and renewable power generation are considered as low-cost / must-run power sources and if the quantity of electricity supplied to the grid by these sources is known.

³⁰ China Electric Power Yearbooks 2004-2008

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 and option B 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 C can be used.

On Option C, 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:

$$EF_{grid,OMsimple,y} = \frac{\sum_i FC_{i,y} \times NCV_{i,y} \times EF_{CO_2,i,y}}{EG_y}$$

(3)

Where:

$EF_{grid,OMsimple,y}$ = Simple operating margin CO₂ emission factor in year y (tCO₂/MWh)

$FC_{i,y}$ = Amount of fossil fuel type i consumed in the project electricity system in year y (mass or volume unit)

$NCV_{i,y}$ = Net calorific value (energy content) of fossil fuel type i in year y (GJ / mass or volume unit)

$EF_{CO_2,i,y}$ = CO₂ emission factor of fossil fuel type i in year y (tCO₂/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)

For this approach (simple OM) to calculate the operating margin, 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 including electricity imports to the grid³¹. Electricity imports should be treated as one power plant source.

Regarding parameter selection, local values of $NCV_{i,y}$ and $EF_{CO_2,i,y}$ should be used where available. If no such values are available, IPCC world-wide default values are preferable. The Net Calorific Value ($NCV_{i,y}$) of each type of fossil fuel used in the calculation comes from

³¹ An import from a connected electricity system should be considered as one power source.

China Energy Statistic Yearbook 2008. Emission factors ($EF_{CO_2,i,y}$) of each type of fossil fuel come from IPCC 2006 default values.

As chosen in step 2, the simple OM emission factor is calculated by using Ex-ante option of data vintages, i.e. a 3-year generation-weighted average, based on the most recent data available at the time of submission of the CDM-PDD to the DOE for validation, without requirement to monitor and recalculate the emissions factor during the crediting period.

The data of installed capacity, electricity generation and fuel consumptions are all from China Energy Statistical Yearbooks 2006-2008 and China Electric Power Yearbooks 2006-2008.

Given the above, the simple operating margin CO₂ emission factor ($EF_{grid,OMsimple,y}$) of Northwest Power Grid is **1.0246 tCO₂/MWh**. The detailed calculations and data are listed in the annex 3 (The baseline emission factor OM is same as that provided by Chinese DNA, the website is <http://cdm.ccchina.gov.cn/web/index.asp>).

Step 5: Identify the cohort 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 recently³².

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 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.

³² If 20% falls on part capacity of a unit, that unit is fully included in the calculation

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, 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 (tCO₂/MWh) of all power units m during the most recent year y for which power generation data is available, calculated as follows:

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

(4)

Where:

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

$EG_{m,y}$ = Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh)

$EF_{EL,m,y}$ = CO₂ emission factor of power unit m in year y (tCO₂/MWh)

m = Power units included in the build margin

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

No matter which options for calculating BM factor mentioned in step 4 was adopted for the proposed project; the same issue on data availability must be addressed. Currently, it is very difficult to get the capacity margin data of power plants in China, since these data as well as net quantity of electricity generated and delivered to the grid and fuel consumption data in power

unit m are regarded as commercial secrets or only for internal usage. Then the following deviation was adopted to calculate the Build Margin emission factor.

1. The breakdown data by power plants are not while the aggregate data by different types of fuels are available. Considering this situation, the m sample group will consist of capacity addition by power sources with same fuel instead of by power plants. For the proposed project the m sample group will consist of fossil fuel fired capacity addition, hydropower capacity addition and other capacity addition;
2. Assuming that all the power plants with same fuel type have equal annual operation hours, and identify the starting year t_0 which the power capacity additions from t_0 to t_0 (i.e. the recent year of which the latest data is available) in the electricity system that comprise 20% of the system generation (in MWh).

The capacity addition belonging to m sample group thus could be identified. For the proposed project, the most recent year of which data is available is 2007, while $t_0=2005$, the total capacity addition during 2005 to 2007 consisting of 10257.4MW of fossil fuel fired capacity, 2370.2MW of hydropower capacity and 0MW of nuclear power capacity, and 399MW of other capacity³³, the total capacity addition during 2005 to 2007 comprises 21.26% of the system generation in 2007.

3. To be conservative, zero emission factors were selected for hydropower capacity and other capacity. Moreover, since specific data on coal fired capacity, oil fired capacity, and gas fired capacity could not be separated from current statistical data on fossil fuel fired capacity, the following approach was adopted for calculating the emission factor of fossil fuel fired capacity addition:

(1) With the energy balance sheet in China Energy Statistical Yearbook for the most recent year, calculating the respective percentages of CO₂ emissions from coal fired power generation, oil fired power generation, and gas fired power generation against total CO₂ emissions from fossil fuel fired power generation:

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

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

³³ China Electric Power Yearbook 2006-2008

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

Where:

$FC_{i,j,y}$ = The amount of fuel i (in a mass or volume unit) consumed by province j ;

$NCV_{i,y}$ = Net calorific value (energy content) of fossil fuel type i (GJ/ mass or volume unit);

$EF_{CO_2,i,j,y}$ = CO₂ emission factor of fossil fuel type i in year y (tCO₂/GJ)

$COAL$, OIL & GAS = The aggregation of various kinds of coal, oil, and gas as fossil fuels.

2) Calculating the corresponding emission factor for fossil fuel fired power generation:

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

Where:

$EF_{Coal,Adv,y}$, $EF_{Oil,Adv,y}$ & $EF_{Gas,Adv,y}$ 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 (See Annex 3 for detailed calculation).

4. Using the share of different type of capacity in total capacity addition as weight, the weighted average of emission factors of different type capacity is calculated as the Build Margin emission factor $EF_{grid,BM,y}$ of Northwest China Power Grid (See Annex 3 for detailed calculation):

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

Where:

CAP_{Total} = The total capacity addition

$CAP_{Thermal}$ = The fossil fuel fired capacity addition

Following the four steps above, the build margin emission factor $EF_{grid,BM,y}$ of the Northwest China Power Grid is calculated to be **0.6433tCO₂/MWh**. The detailed calculations and data are listed in the annex 3 (The build margin emission factor BM is same as that provided by Chinese DNA, the website is <http://cdm.ccchina.gov.cn/web/index.asp>).

Step 7: Calculate the combined margin emissions factor

The combined margin emissions factor is calculated as follows:

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

Where:

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

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

w_{OM} = Weighting of operating margin emissions factor (%)

w_{BM} = Weighting of build margin emissions factor (%)

Wind project activities: $w_{OM} = 0.75$ and $w_{BM} = 0.25$ (owing to their intermittent and non dispatchable nature) for the first crediting period and for subsequent crediting periods.

The default weights are adopted for the proposed project, the baseline emission factor is:

$$EF_{grid,CM,y} = EF_{grid,OM,y} \times w_{OM} + EF_{grid,BM,y} \times w_{BM} = \mathbf{0.9293 \text{ tCO}_2/\text{MWh}}$$

Project emissions

For the proposed wind power project activities, there are no emissions from fossil fuel consumption, operation of geothermal power plants or water reservoirs of hydro power plants.

$$PE_y = PE_{EF,y} + PE_{GP,y} + PE_{HP,y} = 0 \quad (11)$$

Where:

PE_y = Project emissions in year y (t CO₂e/yr).

$PE_{EF,y}$ = Project emissions from fossil fuel consumption in year y (t CO₂e/yr).

$PE_{GP,y}$ = Project emissions from the operation of geothermal power plants due to the release of non-condensable gases in year y (t CO₂e/yr).

$PE_{HP,y}$ = Project emissions from water reservoirs of hydro power plants in year y (t CO₂e/yr).

Leakage

No leakage emissions are considered. The main missions potentially giving rise to leakage in the context of electric sector projects are emissions arising due to activities such as power plant construction and upstream emissions from fossil fuel use (e.g. extraction, processing, transport). These emissions sources are neglected.

Emission reductions

Emission reductions are calculated as follows:

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

Where:

ER_y = Emission reductions in year y (t CO₂e/yr).

BE_y = Baseline emissions in year y (t CO₂e/yr).

PE_y = Project emissions in year y (t CO₂/yr).

BE_y is calculated using the following formula:

$$BE_y = EG_{PJ,y} \times EF_{grid,CM,y} \quad (13)$$

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).

$EF_{grid,CM,y}$ = The baseline emission factor.

$EG_{PJ,y}$ is calculated using the following formula:

$$EG_{PJ,y} = EG_{facility,y} \quad (14)$$

Where:

$EG_{facility,y}$ = Quantity of net electricity generation supplied by the project plant/unit to the grid in year y , according to the Feasibility Study Report of the proposed project, which will be 480,708MWh.

Then, the annual emission reduction of the proposed project is:

$$ER_y = BE_y - PE_y = BE_y = EG_{PJ,y} \times EF_{grid,CM,y} = EG_{facility,y} \times EF_{grid,CM,y}$$

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

Data / Parameter:	$FC_{i,y}$ $FC_{i,j,y}$
Data unit:	Mass or volume unit
Description:	Amount of fossil fuel type i (in a mass or volume unit) consumed by power plant/unit (or in the project electricity system in case of $FC_{i,y}$) in year y , or the amount of fuel type i (in a mass or volume unit) consumed by province j

Source of data used:	China Energy Statistical Yearbook 2006-2008
Value applied:	See Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Official statistical data
Any comment:	Applied for calculating OM and BM

Data / Parameter:	$NCV_{i,y}$
Data unit:	kJ/kg or kJ/m ³
Description:	Net calorific value (energy content) of fossil fuel type i in year y
Source of data used:	China Energy Statistical Yearbook 2008
Value applied:	See Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Official statistical data
Any comment:	Applied for calculating OM and BM

Data / Parameter:	$EF_{CO_2,i,y}$ $EF_{CO_2,i,j,y}$
Data unit:	tCO ₂ /TJ
Description:	CO ₂ emission factor of fossil fuel type i in year y (consumed by province j)
Source of data used:	2006 IPCC default values
Value applied:	See Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	IPCC default value
Any comment:	Applied for calculating OM and BM

Data / Parameter:	$CAP_{j,y}$
Data unit:	MW
Description:	Installed capacity of relevant power source j connected to the grid in year y
Source of data used:	China Electric Power Yearbook 2005-2008

Value applied:	See Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Official statistical data
Any comment:	Applied for calculating BM

Data / Parameter:	$\eta_{coal,adv}$
Data unit:	%
Description:	Best electricity supply efficiency for coal fired plant
Source of data used:	http://cdm.ccchina.gov.cn/web/index.asp
Value applied:	38.10
Justification of the choice of data or description of measurement methods and procedures actually applied :	Official statistical data
Any comment:	Applied for calculating BM

Data / Parameter:	$\eta_{oil,adv}$
Data unit:	%
Description:	Best electricity supply efficiency for oil fired plant
Source of data used:	http://cdm.ccchina.gov.cn/web/index.asp
Value applied:	49.99
Justification of the choice of data or description of measurement methods and procedures actually applied :	Official statistical data
Any comment:	Applied for calculating BM

Data / Parameter:	$\eta_{gas,adv}$
Data unit:	%
Description:	Best electricity supply efficiency for gas fired plant
Source of data used:	http://cdm.ccchina.gov.cn/web/index.asp
Value applied:	49.99
Justification of the choice of data or	Official statistical data

description of measurement methods and procedures actually applied :	
Any comment:	Applied for calculating BM

Data / Parameter:	$EF_{grid,CM,y}$
Data unit:	tCO ₂ /MWh
Description:	Combined margin CO ₂ emission factor for grid connected power generation in year y calculated using the latest version of the “Tool to calculate the emission factor for an electricity system” (version02)
Source of data used:	http://cdm.ccchina.gov.cn/web/index.asp
Value applied:	0.9293(Chinese DNA)
Justification of the choice of data or description of measurement methods and procedures actually applied :	As per the “Tool to calculate the emission factor for an electricity system” (version02)
Any comment:	Applied for calculating emission reduction

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

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

According to the baseline methodology ACM0002, the leakage of the proposed project can be neglected.

Therefore, the proposed project activity emissions are zero, i.e. $PE_y=0$.

According to the descriptions and calculation in section B. 6.1, the combined baseline emission factor of the Northwest Power Grid is:

$$EF_{grid,CM,y}=0.9293 \text{ tCO}_2/\text{MWh}.$$

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

$$EG_{PJ,y}=EG_{facility,y}=480,708\text{MWh}.$$

The annual emissions of the baseline scenario will be:

$$BE_y = EG_{PJ,y} \times EF_{grid,CM,y} = EG_{facility,y} \times EF_{grid,CM,y} = 446,721 \text{ tCO}_2$$

The annual emission reductions of the proposed project will be:

$$ER_y = BE_y - PE_y = BE_y = EG_{PJ,y} \times EF_{grid,CM,y} = EG_{facility,y} \times EF_{grid,CM,y} = 446,721 \text{ tCO}_2$$

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

Year	Estimation of Project activity Emission (tonnes of CO2e)	Estimation of baseline emission (tonnes of CO2e)	Estimation of leakage (tonnes of CO2e)	Estimation of Emission reductions (tonnes of CO2e)
01/07/2011-31/12/2011	0	223,360	0	223,360
01/01/2012-31/12/2012	0	446,721	0	446,721
01/01/2013-31/12/2013	0	446,721	0	446,721
01/01/2014-31/12/2014	0	446,721	0	446,721
01/01/2015-31/12/2015	0	446,721	0	446,721
01/01/2016-31/12/2016	0	446,721	0	446,721
01/01/2017-31/12/2017	0	446,721	0	446,721
01/01/2018-30/06/2018	0	223,361	0	223,361
Total (t CO2e)	0	3,127,047	0	3,127,047

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

B.7.1. Data and parameters monitored:

Data / Parameter:	$EG_{facility,y}$
Data unit:	MWh/yr
Description:	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y
Source of data to be used:	Measured electricity meters installed in the substation
Value of data applied for the purpose of calculating expected emission reductions in section B.5	480,708
Description of measurement methods	The readings of electricity meter will be continuously measured and monthly recorded. Data will be kept at least for 2 years after the end of

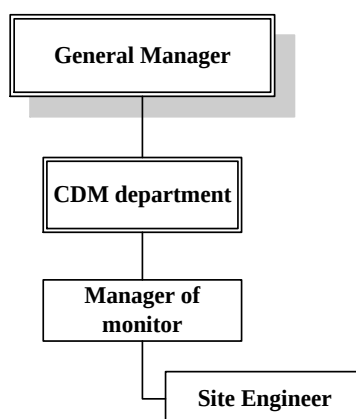
and procedures to be applied:	last crediting period. Meters are the multifunctional electricity meters (accuracy degree is no less than 0.5S, bidirectional)
QA/QC procedures to be applied:	The Meters used for reading will be calibrated as per industry standards of host country. The metering equipments are calibrated annually and checked periodically by qualified institute for accuracy according to Chinese electric industry regulation.
Any comment:	-

B.7.2. Description of the monitoring plan:

Monitoring plan is a division and schedule of a series of monitoring tasks. Monitoring tasks must be implemented according to the monitoring plan in order to ensure that the real, measurable and long-term greenhouse gas (GHG) emission reduction for the proposed project is monitored and reported.

1. Management Structure

The management structure is as follows:



The general manager is in charge of decision-making on major CDM issues, the CDM department is responsible for the concrete implementation of the Monitoring Plan. The monitor manager is responsible for supervising and checking the whole data record process and the calibration of meters. Another main task of the monitor manager is facilitating the verification through providing the DOE with all required necessary information. The site engineers will collect monitoring data (e.g. electric meter data) and keep invoices of sales, etc.

2. Training

Longyuan (Jiuqian) Wind Power Co. Limited will assign and train the dedicated people carrying out the monitoring work. The monitoring personnel training by the contacted CDM consult company will be completed before the registration, further training work will be completed with the preliminary verification

3. Calibration and Arrangement of Meters

An agreement should be signed between the project owner and Power Grid Company that defines the metering arrangements and the required quality control procedures to ensure accuracy.

- + For the proposed project, all the wind turbines will be divided into two loops to parallel-connect with a junction line to new adding transformer shared with other planning wind projects.
- + Two meters are installed at two loops to monitor the electricity generation (accuracy degree is no less than 0.5S, bidirectional).
- + The metering equipment for electricity will be properly configured and calibrated. The metering equipment will be checked by the project owner and Power Grid Company before operation.
- + The verification of electric energy meter should be periodically carried out according to relevant national electric industry standards or regulations. After verification, meters should be sealed. Meters shall be jointly inspected and sealed on behalf of the parties concerned and shall not be accessible by either party except in the presence of the other party or its accredited representatives.
- + All the metering equipment for electricity installed shall be tested by the qualified metrical agency co-authorized by the project owner and Power Grid Company, after:
 - 1) The detection of a difference larger than the allowable error in the reading of meters, when considering the reactive loss of electrical wire;
 - 2) The need for repair or replacement due to the damage of the meters in whole or in parts in accordance with the specifications.
- + The project owner and Power Grid Company should have a remedial measure for the estimation of the correct reading according to agreed procedures under the signed agreement.

4. Monitoring parameters

All relevant parameters listed in Section B 7.1 will be monitored according to the methodology requirements and description of measurement methods and procedures to be applied. The net electricity supplied the grid should be measured continuously and recorded monthly as required by the methodology applied. The data and meter reading will be well documented and be readily accessible for DOE.

5. Data recording

The project owner and Power Grid Company are responsible for the operation of meters, to ensure that all meters are in good conditions. Under such circumstances, the specific steps for data collection and reporting are listed below:

- 1) Power Grid Company and the project owner read the meters and record readings, on a fixed day of every month;
- 2) Power Grid Company supplies readings to the project owner and provides relevant documents. The electricity supplied to the grid is measured according to the read meter;
- 3) Project owner records the data of net electricity delivered to the grid, and the Power Grid Company supplies the confirmed notes to the project owner and keep a copy of the evidences;
- 4) Project owner provides the meter's readings and photocopies of sale evidences to DOE for verification.

Should any previous months reading of the meter be inaccurate by more than the allowable error, or otherwise functioned improperly, the electricity generation supplied to the grid by the proposed project shall be determined by:

- 1) The project owner and Power Grid Company shall jointly prepare an estimate of the correct reading; and, provide ample evidence to DOE that the method is reasonable;
- 2) The meter reading shall be for backup usage;
- 3) If the project owner and Power Grid Company fail to agree the estimate of the correct reading, then the matter will be referred for arbitration according to agreed procedures.

6. Quality Assurance and Quality Control

The project activities will use high-precision monitoring equipment to monitor the electricity to the grid. All meters will be calibrated and sealed as per the industry practices at regular intervals. Hence, high quality is ensured. Electricity sales invoices will be used to test the consistency of the recorded data.

6. Data Management System

All parameters monitored under the monitoring plan will be archived electronically and be kept at least for 2 years after the end of last crediting period. The monitored data will be presented to the verification agency or DOE to whom verification of emission reductions is assigned.

The documents in paper format, such as maps, tables, and the EIA report, will be used in conjunction with the monitoring plan to check the authenticity of the information, and be kept at least one copy by the project owner.

8. Monitoring report

The on-site engineers are responsible for preparing Monitoring reports. The Monitoring report includes monthly monitoring data, amount of emission reductions and operation record of wind power project. The monitoring reports should be checked by responsible officers and offered to DOE.

9. Verification

The main objective of the verification is to independently verify that the project has achieved the emission reductions as reported.

The responsibilities for verification of the project are as follows:

- ✦ Sign a service agreement about verification with specific DOE and agree to a time framework for carrying out verification activities. The project owner will make the arrangements for the verification and will prepare for the audit and verification process to the best of its abilities.
- ✦ The project owner will facilitate the verification through providing the DOE with all required necessary information, before, during and, in the event of queries, after the verification.
- ✦ The project owner will fully cooperate with the DOE for interviews and respond honestly to all questions from the DOE.

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 of the proposed project was completed on 09/09/2010

The persons involved in baseline study are listed as follows:

Li Gang, Longyuan (Beijing) Carbon Asset Management Technology Co. Ltd.
 Address: Floor 7, Tower C, International Investment Building, No.6-9 Fuchengmen North Street,
 Xicheng District, Beijing 100034, China
 Telephone: +8610-66091326
 Email: Ligang@clypg.com.cn

(Not the project participants 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:

06/11/2009 (date of construction contract signed)

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

20 years

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

The project will use a renewable crediting period of up to 7 years

C.2.1. Renewable crediting period:

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

01/07/2011 or the date of registration whichever is later.

C.2.1.2. Length of the first crediting period:

7 years.

C.2.2. Fixed crediting period:

C.2.2.1. Starting date:

N/A

C.2.2.2. Length:

N/A.

SECTION D. Environmental impacts

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

In accordance with relevant environmental law and regulations, the Environmental Impact Assessment Report of the project has been approved by the Environmental Protection Administration of Gansu Province on 06/08/2008.

The proposed project is likely to cause the following main potential environmental impacts during the construction period and operation period:

- **Main Potential Environmental Impacts Associated with the project**

- Impacts from the construction of the wind farm, including construction noise, dust as well as water and soil loss etc;
- Impacts from noise and the electromagnetism pollutions of the wind turbines during the operation period;
- Impacts on native vegetation and environment as a result of construction activities for windmill towers, transformers and access roads;
- Impacts on socio-economy from the construction and operation of the project.

- **Impacts on Air Environment**

Wind Power plants are known to contribute to zero atmospheric pollution as no fuel combustion is involved during any stage of the operation. The sources of air pollution are mainly due to the construction activities including the transportation of construction material, road construction and improvement and cadre construction etc. The impacts on air environment will be ended when the construction is completed. Several measures shall be taken into account, such as prohibiting the construction under strong wind weather, reducing as much as possible the area of construction, spraying water when undertaking construction, and reducing the speed of vehicles in the field. Hence, air pollution caused by the project is not significant to the surrounding environment.

- **Impacts on Noise Environment**

The noise of the project in construction phase is from vehicles and machines on-site. According to the monitoring data from the construction site, the noise is at a level below 55 dB from the distance of 300m away from the construction site. The closest residential area to the site of the project is at least 5km away. Therefore, the noise of the project will not have impact on nearby residents.

- **Impacts on Water and Solid Waste**

The wind-farm does not consume any water, nor does it generate any wastewater in the operation phase. The possible negative impacts are the household wastewater and solid waste produced by builders and staff, and the waste earth from digging of the foundation in the construction phase. Under normal conditions with highly automated monitoring and control system, the household wastewater will sprinkle to the construction road surface. Moreover, the amount of household solid waste will be very little, which will not have impact on the environment. Besides, the solid

waste will be collected and moved to the landfill site of the nearest city. The waste earth from the digging should be firstly used for refilling. The rest of the waste earth should be placed in the low area of the site and replanted with grass. Following the suggestion, the water and solid waste should have no significant impact on the environment.

- **Impacts on telecommunications and television transmissions**

The transformers of the proposed project will be closed down in the metal box which will cause little impact on the surrounding environment. The closest residential area to the site of the project is at least 5km away.. Therefore, the electromagnetism of this project in the operation phase doesn't impact the production and daily life of nearby enterprises and residents.

- **Impacts on Ecosystem Environment**

The proposed wind power project is located in a barren and desolate area with sparse vegetation, exposed dust and high soil erosion. Moreover, the installed height of turbines is lower than the winged height of the birds. So there are no significant impacts on migratory birds / endangered species in the region of the project activity. Therefore, the activities to be carried out will not generate any negative impact on the ecological environment.

- **Socio-Economic Impacts**

The project is estimated to supply annually 480,708MW•h of power to the Gansu Power Grid and to save fossil fuel. So the project generates eco-friendly, GHG free power that contributes to sustainable development of the region. Moreover, the project activity not only helps the uplift of skilled and unskilled manpower in the region, but also improves employment rate and livelihood of local populace in the vicinity of the project.

- **Conclusion**

Being as a typical type of clean renewable energy, the proposed project has no significant impacts on local environment during its construction and operational phase, and will greatly contribute to achievement of sustainable development objective and promote local environmental protection.

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:

Not applicable, since the construction and operation of the proposed project have no significant environmental impacts.

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

According to the requirement by the *Measures for Operation and Management of Clean Development Mechanism Projects in China* and PDD, the staff of Longyuan (Jiuquan) Wind Power Co. Limited held an open public survey during Sept. 2009 and a stakeholders' conference on the local villagers and residents on 20th Sept. 2009. In order to invite comments from local stakeholders, a bulletin was published by the project owner on the bulletin boards in several Towns around the proposed project, providing a detailed introduction of the proposed project, CDM, and the stakeholder meeting. As supplement, the project owner also made telephone calls to the relevant organizations to ensure that they know about the proposed project and the stakeholder meeting.

1) Symposium

On 20th Sept. 2009, under the support of local government, the project owner successfully held a stakeholder s' meeting in Guazhou County. 12 stakeholder representatives participated the meeting, respectively from the Development and Reform Bureau of Guazhou County, the Environmental Protection Bureau, the local Power Grid Corporation and local residents. The project participants informed them about the project, asked for their comments on the project concerning socio-economic and environmental aspects, namely as follows,

- 1) Impact on the economic aspect, including the local economy, income and employment, etc;
- 2) Impact on the environmental aspect, including the ecological environment, air, noise and the impact of soil erosion, etc;
- 3) Impact on sustainable development;
- 4) Suggestions and recommendations on the proposed project;
- 5) Attitude to the implementation of the proposed project, whether or not to support.

2) Questionnaire

The project participants have also carried out a public survey on the project in the format of questionnaires. [Aimed to the dispersive characteristic of stakeholders in the proposed project, the visiting and the investigational way had been used to invite the stakeholders. Moreover,](#) to make sure the results more representative, all these informants came from nearby areas and covered different ages and occupations.

E.2. Summary of the comments received:**1) Summary of the comments received in the symposium:**

- ◆ The proposed project has been approved by the National Energy Bureau, Development and Environmental Protection Bureau of Gansu Province, which shows that the construction and operation of the proposed project will have little impacts on the local environment.
- ◆ All the stakeholder representatives believe that the proposed project will achieve CO₂ emission reduction by replacing electricity generated by fossil fuel fired power plants connected into Northwest Power Grid, and the proposed project will contribute to the mitigation of the GHG emissions.
- ◆ All the stakeholder representatives believe that the proposed project will have positive impacts on economy, environment and social in local region.
- ◆ The local government highly supports the proposed project, and expects the increase of local financial incoming, which can provide more public health services and rebuild schools, etc.
- ◆ All stakeholders think that the proposed project will improve the life quality of local residents, such as, providing more employment opportunities for local residents, increasing incomes of the local residents, increasing revenues from tourism with the wind farm as a beautiful landscape, accelerate the development of local service industry, and tourism.
- ◆ All stakeholders think that the proposed project activity has no significant negative influence on local environment.
- ◆ All the stakeholder representatives support and welcome the proposed project.

2) Public survey results:

Totally 30 questionnaires returned out of 30 with a 100% response rate. Of the 30 respondents, 17 persons are male and 13 persons are female.

Summary views on the questionnaires:

- ◆ 90% of the informants have known about the proposed project.
- ◆ 100% of the informants live or work 1000m away from the proposed project.
- ◆ 100% of the informants are satisfied with the local environment.
- ◆ 100% of the informants believe that the proposed project will have positive impacts on economy, environment or social in local region.
- ◆ 100% of the informants believe that the implementation of the proposed project will improve the life quality of local residents, by providing more employment opportunities for local residents, or increasing incomes of the local residents, etc.
- ◆ 100% of the informants think that the project participants should pay attention to solid waste, noise in the implementation of the proposed project. In this regard, the project participants will be in strict accordance with the environmental impact assessment and take environmental protection measures to ease the impact of the environment.
- ◆ 100% of the informants support and welcome the proposed project, no negative comments were received.

In conclusion, being as a typical type of clean renewable energy, the proposed project has no significant impacts on local environment and will greatly contribute to achievement of sustainable development objective, thus all the stakeholder representatives give no negative comments and support and welcome the proposed project.

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

Since there is no negative comment received, it's no need to make adjustment on design, construction and operation of the project. However, to reduce the impacts on the local environment produced by the construction of the project, the project owner should guarantee and suitably add the investment of environmental protection. At the same time, the construction processes should be strictly implemented according to the national environment criterions.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

Organization:	Longyuan (Jiuquan) Wind Power Co., Ltd.
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Represented by:	Huang Qun
Title:	Vice President CHINA LONG YUAN ELECTRIC POWER GROUP CORP.
Salutation:	Mr
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Personal E-Mail:	CO2@gdfsuez.com

Annex 2**INFORMATION REGARDING PUBLIC FUNDING**

No public funding from Annex I countries is involved in the proposed project.

Annex 3 BASELINE INFORMATION

The Annex 3 provides the basic data and results of the baseline emission factor in the Northwest China Power Grid from 2005 to 2007. Annual electricity generation and electricity delivered to the grid in the baseline scenario from 2005 to 2007 were shown in tables A-1~A-3, in which the main data sources come from China electric Power Yearbook 2006, 2007 and 2008, the detailed references are listed below the tables.

Table A-1 Annual thermal power electricity generation in the Northwest China Power Grid in 2005

Province	Electricity generation (MWh)	Self usage rate (%)	Electricity delivered to the grid (MWh)
Shaanxi	41100000	7.16	38,157,240
Gansu	33106000	4.23	31,705,616
Qinghai	5500000	2.69	5,352,050
Ningxia	27643000	5.73	26,059,056
Xinjiang	26560000	8.8	24,222,720
Total			125,496,682

Data source: China Electric Power Yearbook 2006

Table A-2 Annual thermal power electricity generation in the Northwest China Power Grid in 2006

	Electricity generation (MWh)	Self-use rates of fossil-fired power plants (%)	Electricity delivered to the grid (MWh)
Shaanxi	54482000	6.97	50684605
Gansu	35738000	4.29	34204840
Qinghai	7204000	2.57	7018857
Ningxia	36731000		36731000
Xinjiang	29901000	8.02	27502940
Total			156142241

Data source: China Electric Power Yearbook 2007

Table A-3 Annual thermal power electricity generation in the Northwest China Power Grid in 2007

	Electricity generation (MWh)	Self-use rates of fossil-fired power plants (%)	Electricity delivered to the grid (MWh)
Shaanxi	59100000	6.77	55098930



Gansu	42400000	5.89	39902640
Qinghai	9700000	7.19	9002570
Ningxia	43500000		43500000
Xinjiang	34600000	9.2	31416800
Total			178920940

Data source: China Electric Power Yearbook 2008

The key parameters in OM and BM calculation include the net caloric values (NCVs), oxidation factors (OXIDs), and CO₂ emission factor per unit of energy (EF_{CO₂}s) of various types of fuels, and power supply efficiency of various power generation technologies.

Table A-4 NCVs, OXIDs, and EF_{CO₂}s of various types of fuels

Fuel	NCV	Emission Factor(kgCO ₂ /TJ)	OXID
Coal	20908 kJ/kg	87,300	1
Washed coal	26344 kJ/kg	87,300	1
Other Washed Coal	8363 kJ/kg	87,300	1
Moulded coal	20908 kJ/kg	87,300	1
Coke	28435 kJ/kg	95,700	1
Crude oil	41,816 kJ/kg	71,100	1
Gasoline	43,070 kJ/kg	67,500	1
Diesel	42,652 kJ/kg	72,600	1
Fuel oil	41,816 kJ/kg	75,500	1
Other petroleum products	41,816 kJ/kg	75,500	1
Natural gas	38,931 kJ/m ³	54,300	1
Coke oven gas	16,726 kJ/m ³	37,300	1
Other gas	5,227 kJ/m ³	37,300	1
LPG	50,179 kJ/kg	61,600	1
Refinery gas	46,055 kJ/kg	48,200	1

Data sources:

NCVs are from China Energy Statistical Yearbook 2008, P283.

EF_{CO₂} are from 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Volume 2 Energy, Chapter 1, P1.21-1.22, Table 1-3, and Table 1-4.

Table A-5 Simple OM emission factor of the Northwest China Power Grid in 2005

Fuel Type	Unit	Shaanxi	Gansu	Qinghai	Ningxia	Xinjiang	Total	Carbon Content	Oxidation rate	Emission Factor	NCV	Emission
								tC/TJ	%	kgCO ₂ /TJ	MJ/t, km ³	tCO ₂ e
		A	B	C	D	E	F=A+...+E	G	H	I	J	K=F×I×J/100000 (10000)
Raw Coal	10000t	2461.28	1597.00	345.10	1467.70	1358.09	7229.17	25.80	100.00	87300.00	20908.00	131951755.59
Clean Coal	10000t	16.22	0.00	0.00	0.00	0.00	16.22	25.80	100.00	87300.00	26344.00	373032.62
Other washed coal	10000t	35.56	0.00	0.00	101.95	10.20	147.71	25.80	100.00	87300.00	8363.00	1078415.79
Coke	10000t	3.23	0.00	0.00	0.00	0.00	3.23	29.20	100.00	95700.00	28435.00	87895.71
Coke Oven Gas	10 ⁸ m ³	0.00	0.00	0.00	0.00	0.00	0.00	12.10	100.00	37300.00	16726.00	0.00
Other Coal Gas	10 ⁸ m ³	0.00	0.00	0.00	0.00	0.00	0.00	12.10	100.00	37300.00	5227.00	0.00
Crude oil	10000t	0.00	0.00	0.00	0.00	0.18	0.18	20.00	100.00	71100.00	41816.00	5351.61
gasoline		0.02	0.00	0.00	0.00	0.01	0.03	18.90	100.00	67500.00	43070.00	872.17
Diesel	10000t	2.24	0.46	0.06	0.00	0.50	3.26	20.20	100.00	72600.00	42652.00	100947.05
Fuel Oil	10000t	0.01	0.57	0.00	0.00	0.25	0.83	21.10	100.00	75500.00	41816.00	26204.00
LPG	10000t	0.00	0.00	0.00	0.00	0.00	0.00	17.20	100.00	61600.00	50179.00	0.00
Refinery Gas	10000t	0.00	0.00	0.00	0.00	7.71	7.71	15.70	100.00	48200.00	46055.00	171150.51
Natural Gas	10 ⁶ m ³	1.46	0.52	1.33		7.81	11.12	15.30	100.00	54300.00	38931.00	2350716.07
Other petroleum products	10000t	0.00	0.00	0.00	0.00	0.00	0.00	20.00	100.00	75500.00	41816.00	0.00
other coking products	10000t	0.00	0.00	0.00	0.00	0.00	0.00	25.80	100.00	95700.00	28435.00	0.00
Other energy	10000tce	8.24	1.30	0.00	0.00	0.00	9.54	0.00	0.00	0.00	0.00	0.00
											Subtotal	136146341.12

Data Resource: China Energy Year Book 2006		
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Data sources: *China Energy Statistical Yearbook 2006*

Table 1-3 Northwest China Power Grid simple OM in 2005

Total CO₂ emissions (tCO₂e)	136146341
Total electricity delivered to the grid (MWh)	125496682
OM in 2005(tCO₂e/MWh)	1.08486

Table A-6 Simple OM emission factor of the Northwest China Power Grid in 2006

Fuel Type	Unit	Shaanxi	Gansu	Qinghai	Ningxia	Xinjiang	Total	Carbon Content	Oxidation rate	Emission Factor	NCV	Emission
								tC/TJ	%	kgCO ₂ /TJ	MJ/t,km ³	tCO ₂ e
		A	B	C	D	E	F=A+...+E	G	H	I	J	K=F×I×J/100000 (10000)
Raw Coal	10000t	2834.44	1660.92	421.86	1833.72	1547.69	8298.63	25.80	100.00	87300.00	20908.00	151472271.02
Clean Coal	10000t	0.00	0.00	0.00	0.00	0.00	0.00	25.80	100.00	87300.00	26344.00	0.00
Other washed coal	10000t	0.00	0.00	0.00	112.70	8.45	121.15	25.80	100.00	87300.00	8363.00	884503.91
Coke	10000t	0.00	0.00	0.00	0.01	0.00	0.01	29.20	100.00	95700.00	28435.00	272.12
Coke Oven Gas	10 ⁶ m ³	0.20	0.00	0.00	0.00	0.08	0.28	12.10	100.00	37300.00	16726.00	17468.63
Other Coal Gas	10 ⁶ m ³	0.10	0.00	0.00	0.00	0.00	0.10	12.10	100.00	37300.00	5227.00	1949.67
Crude oil	10000t	0.00	0.00	0.00	0.00	0.02	0.02	20.00	100.00	71100.00	41816.00	594.62
gasoline		0.01	0.00	0.00	0.00		0.01	18.90	100.00	67500.00	43070.00	290.72
Diesel	10000t	1.14	0.24	0.61	0.00	1.25	3.24	20.20	100.00	72600.00	42652.00	100327.74
Fuel Oil	10000t	0.00	0.60	0.00	0.00	0.11	0.71	21.10	100.00	75500.00	41816.00	22415.47
LPG	10000t	0.00	0.00	0.00	0.00	0.00	0.00	17.20	100.00	61600.00	50179.00	0.00
Refinery Gas	10000t	0.00	0.00	0.00	0.00	0.00	0.00	15.70	100.00	48200.00	46055.00	0.00
Natural Gas	10 ⁶ m ³	1.59	0.56	1.06		7.49	10.70	15.30	100.00	54300.00	38931.00	2261930.03
Other petroleum products	10000t	0.00	0.00	0.00	0.00	0.00	0.00	20.00	100.00	75500.00	41816.00	0.00

other coking products	10000t	1.86	0.00	0.00	0.00	0.00	1.86	25.80	100.00	95700.00	28435.00	50614.87
Other energy	10000tce	33.57	8.81	0.00	0.00	2.20	44.58	0.00	0.00	0.00	0.00	0.00
											Subtotal	154812638.82
Data Resource: China Energy Year Book 2007												

Data sources: *China Energy Statistical Yearbook 2007*

Table 1-6 Northwest China Power Grid simple OM in 2006

Total CO₂ emissions (tCO₂e)	154812639
Total electricity delivered to the grid (MWh)	156142241
OM in 2006(tCO₂e/MWh)	0.99148

Table A-7 Simple OM emission factor of the Northwest China Power Grid in 2007

Fuel Type	Unit	Shaan xi	Gans u	Qingh ai	Ningxi a	Xinjian g	Total	Carbon Content	Oxidation rate	Emission Factor	NCV	Emission
								tC/TJ	%	kgCO ₂ /TJ	MJ/t,km ³	tCO ₂ e
		A	B	C	D	E	$F=A+...+E$	G	H	I	J	$K=F \times I \times J / 100000$ (10000)
Raw Coal	10000t	3303.44	1969.03	470.85	2165.8	1762.11	9671.23	25.8	100	87,300	20,908	176525905
Clean Coal	10000t	0	0	0	0	0	0	25.8	100	87,300	26,344	0
Other washed coal	10000t	3.73	0	0	124.31	7.73	135.77	25.8	100	87,300	8,363	991243
moulded coal	10000t	3.53	0	0	0	0	3.53	26.6	100	87,300	20,908	64432
Coke	10000t	0	0	0	0	0	0	29.2	100	95,700	28,435	0
Coke Oven Gas	108m ³	0.52	0.65	0	0	0.26	1.43	12.1	100	37,300	16,726	89215
Other Coal Gas	108m ³	14.14	0.71	0	0	0	14.85	12.1	100	37,300	5,227	289526
Crude oil	10000t		0	0	0	0.09	0.09	20	100	71,100	41,816	2676
gasoline		0.02	0	0	0		0.02	18.9	100	67,500	43,070	581
Diesel	10000t	1.12	0.26	0.42	0	1.77	3.57	20.2	100	72,600	42,652	110546
Fuel Oil	10000t	0.01	1.05	0.04	0	0.05	1.15	21.1	100	75,500	41,816	36307
LPG	10000t	0	0	0	0	0	0	17.2	100	61,600	50,179	0
Refinery Gas	10000t	0	0	0	0	5.99	5.99	15.7	100	48,200	46,055	132969
Natural Gas	10 ⁸ m ³	1.68	0.49	1.93	0	8.66	12.76	15.3	100	54,300	38,931	2697404

Other petroleum products	10000t	0	0	0	0	0	0	20	100	75,500	41,816	0
other coking products	10000t	0	0	0	0	0	0	25.8	100	95,700	28,435	0
Other energy	10000tce	94.36	9.73	0	0	0	104.09	0	0	0	0	0
											Subtotal	180940805
Data Resource: China Energy Year Book 2008												

Data sources: *China Energy Statistical Yearbook 2008*

Table 1-9 Northwest China Power Grid simple OM in 2007

Total CO₂ emissions (tCO₂e)	180940805
Total electricity delivered to the grid (MWh)	178920940
OM in 2007(tCO₂e/MWh)	1.01129

Table A-8 the calculation of the OM emission factor of the Northwest China Power Grid

	2005	2006	2007
Annual CO ₂ emissions (tCO ₂ e)	136146341	154812639	180940805
Annual electricity delivered to the grid (MWh)	125496682	156142241	178920940
Annual OM (tCO ₂ /MWh)	1.08486	0.99148	1.01129
EF _{OM,y} of Northwest China Power Grid(Weight Average) (tCO ₂ /MWh)	1.0246		

Note: Average OM CO₂ emission factor = the sum of each year CO₂ emissions / the total supplied fossil fuel fired electricity of three years

Table A-9. Calculation of emission factor of advanced electricity generation technology

	Variable	Power supply efficiency	Emission Factor (kgCO ₂ /TJ)	EF _{Adv} (tCO ₂ /MWh)
		A	B	C=3.6/A/1000000*B*C
Coal fired plants	EF _{Coal,Adv}	38.10%	87,300	0.8249
Gas fired plants	EF _{Gas,Adv}	49.99%	75,500	0.5437
Oil fired plants	EF _{Oil,Adv}	49.99%	54,300	0.3910

Data sources: <http://cdm.ccchina.gov.cn/web/index.asp>

Table A-10 Calculation of emission weight of solid fuel, liquid fuel and gas fuel in all fuel emission

		Shaanxi	Gansu	Qinghai	Ningxia	Xinjiang	Total	NCV	Emission Factor	OXID	CO2 emissions
Fuel	Unit	A	B	C	D	E	G=A+...+F	H	I	J	K=G×H×I×J/100,000
Raw Coal	104t	3,303.44	1,969.03	470.85	2,165.80	1,762.11	9,671.23	20,908	87,300	1	176,525,905
Clean Coal	104t	0	0	0	0	0	0	26,344	87,300	1	0
Other washed coal	104t	3.73	0	0	124.31	7.73	135.77	8,363	87,300	1	991,243
Moulded coal	104t	3.53	0	0	0	0	3.53	20,908	87,300	1	64,432
Coke	104t	0	0	0	0	0	0	28,435	95,700	1	0
Other coking products	104t	0	0	0	0	0	0	28,435	95,700	1	0
Subtotal											177,581,580
Crude oil	104t	0	0	0	0	0.09	0.09	41,816	71,100	1	2,676
Gasoline	104t	0.02	0	0	0	0	0.02	43,070	67,500	1	581
Diesel	104t	1.12	0.26	0.42	0	1.77	3.57	42,652	72,600	1	110,546
Fuel Oil	104t	0.01	1.05	0.04	0	0.05	1.15	41,816	75,500	1	36,307
Other petroleum products	104t	0	0	0	0	0	0	41,816	75,500	1	0
Subtotal											150,110
Natural Gas	107m3	16.8	4.9	19.3	0	86.6	127.6	38,931	54,300	1	2,697,404
Coke Oven Gas	107m3	5.2	6.5	0	0	2.6	14.3	16,726	37,300	1	89,215
Other Coal Gas	107m3	141.4	7.1	0	0	0	148.5	5,227	37,300	1	289,526
LPG	104t	0	0	0	0	0	0	50,179	61,600	1	0
Refinery gas	104t	0	0	0	0	5.99	5.99	46,055	48,200	1	132,969
Sub-total											3,209,114

Total											180,940,805
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Data sources: *China Energy Yearbook 2008*

From above table and formulae (5),(6) and (7),the weights are as follows:

$$\lambda_{Coal} = 98.14\%, \quad \lambda_{Oil} = 0.08\%, \quad \lambda_{Gas} = 1.77\%$$

Calculating the corresponding emission factor for fossil fuel fired power generation:

$$EF_{Thermal} = \lambda_{Coal} \times EF_{Coal,Adv} + \lambda_{Oil} \times EF_{Oil,Adv} + \lambda_{Gas} \times EF_{Gas,Adv} = 0.8170 \text{ tCO}_2/\text{MWh}$$

Table A-11 Installed capacity in Northwest China Grid in 2007

Type	Unit	Shaanxi	Gansu	Qinghai	Ningxia	Xinjiang	Total
thermal power	MW	12,290	7,840	1,900	7,030	6,560	35,620
hydro power	MW	1,790	4,400	5,830	430	2,140	14,590
nuclear power	MW	0	0	0	0	0	0
wind power and others	MW	72.5	346	0	50	330	798.5
total	MW	14,152.5	12,586	7,730	7,510	9,030	51,008.5

Data Resource: China Energy Year Book 2008

Table A-12 Installed capacity in Northwest China Grid in 2006

Type	Unit	Shaanxi	Gansu	Qinghai	Ningxia	Xinjiang	Total
thermal power	MW	9,723	6,448	1,517	6,002	5,937	29,627
hydro power	MW	2,165	4,291	5,423	429	1,766	14,074
nuclear power	MW	0	0	0	0	0	0
wind power and others	MW	0	199	0	11	189	399
total	MW	11,888	10,938	6,940	6,442	7,892	44,100

Data Resource: China Energy Year Book 2007

Table A-13 Installed capacity in Northwest China Grid in 2005

Type	Unit	Shaanxi	Gansu	Qinghai	Ningxia	Xinjiang	Total
thermal power	MW	9,132.10	5,715	886.8	4,577	5,051.70	25,362.6
hydro power	MW	1,578	4,036.20	4,825	428.5	1,352.10	12,219.8
nuclear power	MW	0	0	0	0	0	0
wind power and 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 Resource: China Energy Year Book 2006

Table A-14 The BM emission factor of the Northwest China Power Grid

	Installed capacity in 2005 (MW)	Installed capacity in 2006 (MW)	Installed capacity in 2007 (MW)	Addition capacity from 2005 to 2007 (MW)	Addition share (%)
	A	B	C	D=C-A	
Thermal Power	25,362.6	29,627	35,620	10, 257. 4	78. 74%
Hydropower	12,219.8	14,074	14,590	2, 370. 2	18. 20%
Nuclear Power	0	0	0	0	0. 00%
Wind Power and Other	399.5	399	798.5	399	3. 06%
Total	37,981.9	44,100.0	51,008.5	13, 026. 6	100. 00%
Share of 2007 installed capacity	74.46%	86.46%	100%		

Data sources: *China Electric Power Yearbook2006-2008*

$$EF_{BM,y} = EF_{Thermal} \times CAP_{Thermal} / CAP_{Total} = 0.6433 \text{ tCO}_2/\text{MWh}$$

Where:

CAP_{Total} is the total capacity addition,

$CAP_{Thermal}$ is the fossil fuel fired capacity addition

Table A-15 Baseline Emission factor (EF_y) of the Northwest China Power Grid

Calculation of the Key factors:

Operating Margin emission factor ($EF_{OM,y}$) (tCO₂/MWh) : 1.0246

Build Margin emission factor ($EF_{BM,y}$) (tCO₂/MWh) : 0.6433

Baseline Emission factor (EF_y) (tCO₂/MWh) : 0.9293

Annex 4

MONITORING PLAN

No appended information.

Clarification of clauses 1.2, 1.3, 1.5, 1.6, 1.7, 1.9, 1.10, 1.12.1, 1.12.2, 1.12.3, 1.12.4 and 1.13, to the VCS PD

According to clause 3.12.8 1) of the VCS Standard v3.2 which came into force on 1 February 2012, “for projects validated under the CDM, the cover page and sections 1.2, 1.3, 1.5, 1.6, 1.7, 1.9, 1.10, 1.12.1, 1.12.2, 1.12.3, 1.12.4 and 1.13 of the *VCS Project Description Template* shall be completed.” Below are the clarifications of the designated clauses in latest *VCS Project Description Template*.

1.2 Sectoral Scope and Project Type

The project is not a grouped project.

The Project comes under sectoral scope 1, Energy Industries renewable sources.

Project Category: Renewable electricity in grid connected applications

1.3 Project Proponent

Project Proponent	Longyuan (Jiuquan) Wind Power Co., Ltd.
Attention	Zhou Jide
Title	Project manager
Direct Tel	0931 2951172
Email address	zhoujide@clypg.com.cn

1.5 Project Start Date

The Project Start Date is 22/01/2011, when it started commissioning.

1.6 Project Crediting Period

The Project crediting period is from 22/01/2011 to 04/07/2011, covering 164 days.

1.7 Project Scale and Estimated GHG Emission Reductions or Removals

Project	yes
Mega-project	no

Years	Estimated GHG emission reductions or removals (tCO ₂ e)
2011	110,255

Total estimated ERs	110,255
Total number of crediting years	0.45
Average annual ERs	110,255

1.9 Project Location

The project is located in Guazhou County, Jiuquan City, Gansu province of China. Four inflexions of geographical scopes are A (E96.257°, N40.674), B (96.304°, N40.674), C (E96.304°, N40.744°) and D (E96.257°, N40.744°).

1.10 Conditions Prior to Project Initiation

The project is a renewable energy generation project, which discharges no emission during operation period. Thus, the project doesn't fall into categories that creating GHG emissions primarily for the purpose of its subsequent removal or destruction.

1.12.1 Proof of Title

The project including the plant, equipment and its emissions reductions are owned by Longyuan (Jiuquan) Wind Power Co., Ltd.. Relevant evidences for the ownership will be provide to the DOE, which involves business license of the project company, Approval of the project from Chinese National Development and Reform Commission (NDRC) and Letter of Approval for the project as a CDM project by Chinese NDRC.

1.12.2 Emissions Trading Programs and Other Binding Limits

The GHG emission reductions generated by the project will not be used for compliance with an emissions trading program or to meet binding limits on GHG emissions.

1.12.3 Participation under Other GHG Programs

The project was registered as a CDM project on 05/07/2011, for which a renewable crediting period of 3×7 years will be used under the CDM GHG Program. Therefore, CO₂ emission reductions generated by the project during the CDM crediting period will be verified as unique CERs but not VCUs to avoid double counting. As to the project under VCS Standard v3.2, only emission reductions achieved from 22/01/2011- 04/07/2011 will be considered as VERs.

1.12.4 Other Forms of Environmental Credit

The project has not created another form of environmental credit, which will be verified by DOE.

1.13 Additional Information Relevant to the Project

Eligibility Criteria

The project is not a grouped project.

Leakage Management

According to the CDM baseline methodology ACM0002, the leakage of the proposed project is not considered for this project.

Commercially Sensitive Information

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

Further Information

NA