

CECIC HKC GANSU CHANGMA WIND POWER PROJECT



Document Prepared By CECEP Wind Power Incorporation Company

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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:**

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CECIC HKC Gansu Changma Wind Power project
Version 1, 20/10/2011

A.2. Description of the project activity:

>>CECIC HKC Gansu Wind Power Co., LTD. (CECIC), a joint venture company between China Energy Conservation Investment Corporation Wind Power Investment Co., LTD. and a subsidiary company of HKC (Holding) Ltd., is currently developing a large 201 MW wind power generation project in Gansu Province, China.

Gansu Province and the local grid (Northwest grid) currently use conventional fossil fuel based thermal power plants to meet the majority of regional demand, resulting in high levels of CO₂ emissions.

The Project involves the construction and operation of a 201 MW wind farm, located in the southwest of Yumen County, Gansu Province. The project will install 134 new wind turbines of 1,500 kW and is expected to generate 431,949 MWh of clean electricity, annually, throughout its lifetime. This generated electricity will partially displace electricity currently generated from grid connected conventional fossil fuel based thermal power plants, while reducing emissions of 430,588 tCO₂ annually.

The Project has been registered as CDM project in EB successfully on 24/09/2011 with registration number of 3670. More details please refer to: <http://cdm.unfccc.int/Projects/DB/TUEV-RHEIN1272607295.17/view>

The project is expected to produce various benefits to society as well as the environment. Therefore, the project will significantly contribute to national as well as local sustainable development, including;

Job creation: Implementation of the Project will generate employment opportunities for local contractors and suppliers, while operation and maintenance of the plant will create additional long term employment opportunities for skilled professionals within CECIC. For the Project, CECIC directly hired 27 new employees, while 300 more new employment opportunities were created for local people through construction companies for the project.

Reduction in GHG emissions: Currently, most of the electricity in the region is generated through conventional fossil fuel based thermal power plants. Through combustion of fossil fuels, they emit a large volume of Greenhouse gasses (GHG) into the atmosphere, which has a negative effect on global society. Generation of GHG emission free electricity, such as wind, will displace electricity generated by these fossil fuel based thermal plants, therefore reducing GHG emissions.

Reduction of fossil fuel use: The Project Activity will reduce reliance on imported fossil fuels, which will contribute to increasing China's energy security, and will also improve local air quality as it reduces the emissions of SO₂ and NO_x associated with fossil fuel use.

Increase of power supply: Due to rapid economic growth in recent years, China is experiencing a serious shortage of electricity, causing blackouts and brownouts throughout the country¹. Such power outage reduces economical activity, and has a negative effect on daily life. With the new wind farm, the grid is expected to improve its supply while contributing to steady and reliable economical growth in the region.

¹ http://www.chinaeconomicreview.com/cer/2008_06/Balance_of_power.html

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In addition, the Project will help the Chinese government to achieve the goal it set itself under the Renewable Energy Law. The Law states that the country is committed to increase the share of renewable energy use in the country's energy mix to 10% by 2010 and 30% by 2030, in order to realize the sustainable development of the economy and society. It is also consistent with the government's National Renewable Energy Development Strategy and Plan (NREDSP) which sets the goal of increasing the share of renewable energy in primary energy consumption to 10% (total 60GW) by 2010 and 12% (total 121GW) by 2020².

A.3. Project participants:

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Name of Party involved(*) (host) indicates a host Party)	Private and/ or Public entity(ies) Project participants(*) (as applicable)	Kindly indicate if the Party involved wishes to be considered a project participant (Yes/ No)
The People's Republic of China (host)	CECIC HKC Gansu Wind Power Co., LTD.	No
United Kingdom	Morgan Stanley & Co. International plc	No

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

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

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A.4.1.1. Host Party(ies):

>>The People's Republic of China

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

>>Gansu Province

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

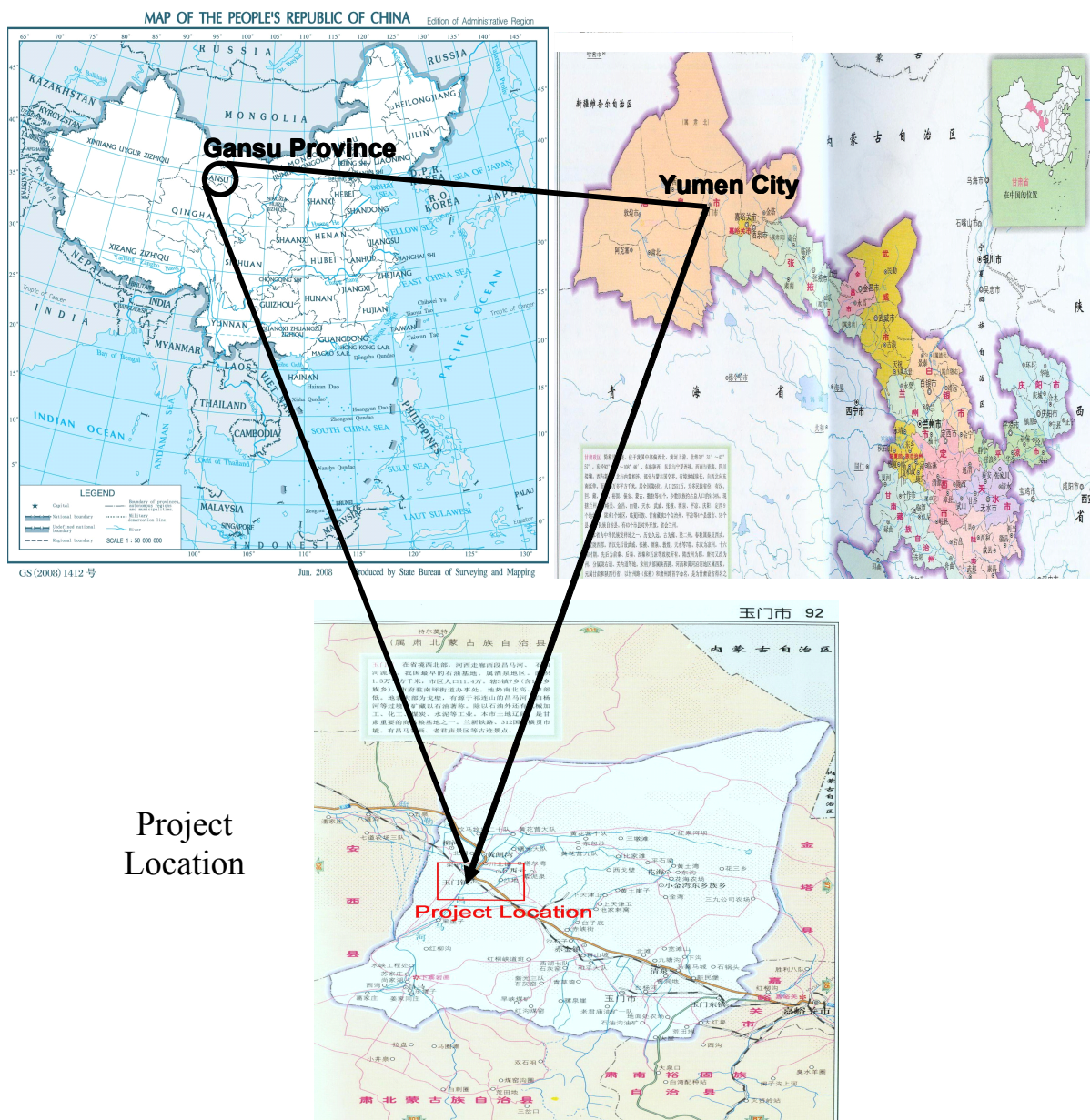
>>Yumen Town, Yumen City

² http://www.sdpc.gov.cn/zcfb/zcfbtz/2007tongzhi/t20070904_157352.htm

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

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The Project site is located 7-10 km southwest of Yumen Town, Yumen City, Gansu Province in the People's Republic of China. It is located at Latitude between +40.1417 and +40.2572, longitude between +96.8583 and +96.9575. Figure A.4-1 shows the location of the Project.

**Figure A.4 - 1 Map of Project Location****A.4.2. Category(ies) of project activity:**

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

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

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Gansu Province and the local grid (Northwest grid) currently use conventional fossil fuel based thermal power plants to meet the majority of regional demand, resulting in high levels of CO₂ emissions³. Installation of new clean power generation will reduce its dependency on fossil fuel based power plants, while contributing to reduce CO₂ emissions within the grid. In the baseline of the Project, the electricity would have been generated from these conventional fossil fuel based thermal power plants.

The Project will install 134 FD77/1500 wind turbines, each of which has a power generation capacity of 1,500 kW. With these turbines, the Project will have a total capacity of 201 MW.

Chinese regulations require that a minimum of 70% of equipment used for wind power plants is to be manufactured domestically. The FD77/1500 turbines will be manufactured and assembled by China's Dongfang Steam Turbine Manufacture, using imported European advanced technology such as the central control system and the monitoring control system. The Project is therefore in line with the aforementioned domestic regulation. In addition, the Project will result in significant technology transfer in terms of its construction and operation, while it will also contribute to the development of environmentally sound technology and the economic development of the region. Sufficient training necessary for construction, operation and maintenance will be provided for local workers.

Table A.4- 1 Technology Parameters

Item	FD77/1500
1. Data for Unit	
Rated capacity (kW)	1500
Number of unit	134
Capacity control method	Pitch-controlled
Turbine diameter (m)	77
Hub height (m)	70
Cut in wind speed (m/s)	3.0
Rated wind speed (m/s)	12.5
Cut out wind speed (m/s)	20
Wind speed limit (m/s)	53.3
Technical lifetime (y)	20
Material of blade	GRP
Blade tip speed (m/s)	69.6
2. Generator	
Type of generator	Double-fed induction generator
Rated capacity (kW)	1500
Output Voltage (V)	690
Rated speed (rpm)	1000-1800 (+10.0%)

In addition, with Mount Qilian to its south and the Beishan Mountains to its north, the Project location has good conditions for power generation. The table below A 4-2 shows average wind speed at the location for the period of 1977 to 2006.

³ <http://cdm.ccchina.gov.cn/web/index.asp>

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Table A.4-2 Wind speed Data at 10.5m from the ground

Unit: m/s

Month	1977-2006	1987-2006	1997-2006	2005	2006
January	3.9	3.5	3.3	3.2	3.2
February	3.9	3.6	3.3	3.8	3.2
March	4.1	3.8	3.6	3.8	4.2
April	4.2	3.9	3.9	3.7	4.4
May	3.5	3.1	2.8	2.4	2.9
June	3.0	2.7	2.5	2.5	2.5
July	2.7	2.6	2.5	2.4	2.7
August	2.7	2.5	2.3	2.4	2.2
September	2.7	2.5	2.3	2.3	2.5
October	3.0	2.7	2.5	2.5	2.3
November	3.7	3.5	3.2	3.5	3.0
December	3.9	3.6	3.4	3.2	3.6
Average	3.4	3.2	3.0	3.0	3.1

Based on these wind data and turbine specifications, it was estimated that the Project will operate 2,149 hours annually, resulting in plant load factor of 24.53%.

Values used in the load factor were taken from the Project's feasibility study report, which was prepared by a third party, China Power Construction Engineering Consulting Corporation, and was also approved by NDRC in June 2008. Therefore, these are in line with the requirements mentioned in the "Guidelines for the Reporting and Validation of Plant Load Factors" (EB48) for ex-ante load factor.

The electricity generated by the Project is exported to the local Yumen town grid, which is then connected the NWPG, via a newly built 35kV/110kV transformer substation located within the Project site.

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

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Table A.4-3 Estimation of the Emission Reduction (1st Crediting Period)

Years	Annual estimation of emission reductions in tonnes CO ₂ e
Aug. 2011-July 2012	430,588
Aug. 2012-July 2013	430,588
Aug. 2013-July 2014	430,588
Aug. 2014-July 2015	430,588
Aug. 2015-July 2016	430,588
Aug. 2016-July 2017	430,588
Aug. 2017-July 2018	430,588
Total estimated reductions (tonnes CO₂)	3,014,116
Total number of crediting years	7
Annual average over the crediting period of estimated reductions (tonnes of CO₂e)	430,588

A.4.5. Public funding of the project activity:

>>There is no public funding from any Annex 1 country.

**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 Methodology ACM0002, “Consolidated Methodology for Grid-Connected Electricity Generation from Renewable Sources”, Version 12.1, was applied to the Project, referring to the most up-to-date version of methodology tools, “Tool for the Demonstration and Assessment of Additionality” version 5.2 and “Tool to Calculate the Emission Factor for an Electricity System” version 2.1.0. Although “Tool to Calculate Project or Leakage CO₂ Emissions from Fossil Fuel Combustion” and “Combined tool to identify the baseline scenario and demonstrate additionality” are listed as a tool used for the ACM0002 Ver. 12.1, the tool was not applied to the Project, as there is no backup power installed in the Project.

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

>>Since it is a wind power generation project which exports electricity to the local grid, ACM0002 has been selected as the methodology for this project.

The project activity conforms to the applicability condition of ACM0002 Version 12.1 – “Consolidated methodology for Grid-Connected Electricity Generation from Renewable Sources” as demonstrated in the table below:

Table B.2-1 Applicability Criteria

<u>Applicability Criteria for ACM0002 Ver. 12.1</u>	<u>Project Activity</u>
1. The project activity is the installation, capacity addition, retrofit or replacement of a power plant/unit of one of the following types: hydro power plant/unit (either with a run-of-river reservoir or an accumulation reservoir), wind power plant/unit, geothermal power plant/unit, solar power plant/unit, wave power plant/unit or tidal power plant/unit.	The Project involves installation of a new wind power plant
2. In the case of capacity additions, retrofits or replacements (except for wind, solar, wave or tidal power capacity addition projects which use Option 2: on page 11 to calculate the parameter $EG_{PJ,y}$): the existing plant started commercial operation prior to the start of a minimum historical reference period of five years, used for the calculation of baseline emissions and defined in the baseline emission section, and no capacity expansion or retrofit of the plant has been undertaken between the start of this minimum historical reference period and the implementation of the project activity;	The Project involves installation of a new wind power plant, and does not involve capacity addition, retrofits or replacements.
3. In case of hydro power plants: - The project activity is implemented in an existing reservoir, with no change in the volume of reservoir. - The project activity is implemented in an existing reservoir, where the volume of reservoir is increased and the power density of the project activity, as per definitions given in the Project Emissions section, is greater than 4 W/m ² . - The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the Project Emissions section, is greater than 4 W/m ² .	The Project does not involve installation, modification or retrofit of hydro power plants. Therefore, this applicability condition is not relevant to the Project.

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

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In accordance with the methodology, the spatial extent of the project boundary includes the project power plant and all power plants connected physically to the Northwest China Grid.

The following table describes which emissions are included and which are omitted from the Project emissions calculations.

Table B.3-1 GHG Included in the Project

	Source	Gas	Included?	Justification/explanation
Baseline	Power plants connected to the Northwest China Grid	CO ₂	Yes	Included as per ACM0002.
		CH ₄	No	Excluded as per ACM0002. This is conservative.
		N ₂ O	No	Excluded as per ACM0002. This is conservative.
Project Activity	Not applicable	CO ₂	No	Excluded. The project activity is a zero-emission wind power generation.
		CH ₄	No	Excluded. The project activity is a zero-emission wind power generation.
		N ₂ O	No	Excluded. The project activity is a zero-emission wind power generation.

The schematic diagram of the Project is as shown on the below figure.

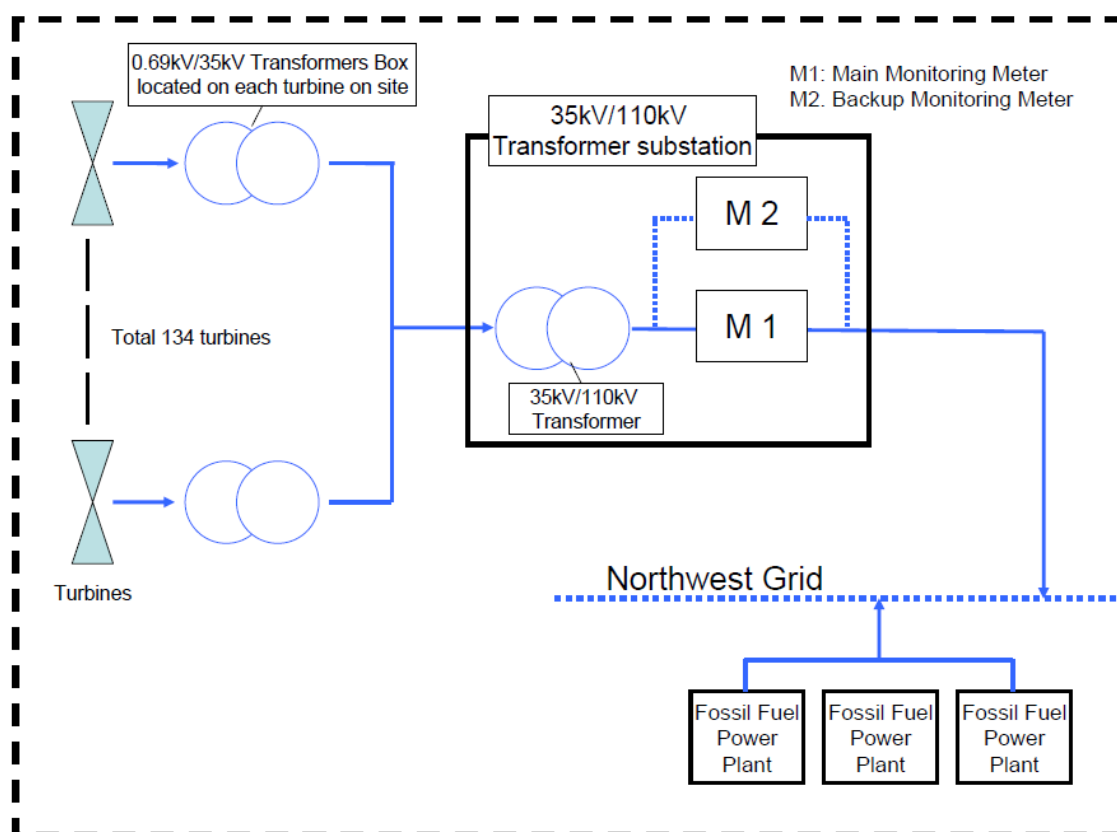


Figure B.3-1 Project Boundary

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



>>The Project involves installation of a new grid connected wind power plant, therefore, is not a modification or retrofit of an existing grid-connected plant. According to the methodology, the following baseline scenario should be applied:

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”.

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

>>The following steps from the combined tool are applied:

Step 1: Identification of alternative scenarios

Step 2: Investment analysis

Step 4 Common practice analysis

Step 1. Identification of alternative scenarios

Sub-step 1a. Define alternative scenarios to the proposed CDM project activity

As mentioned in the section B.4, baseline scenario of the Project is set as 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”.

Step 2- Investment analysis

Sub-step 2a. Determine appropriate analysis method

The “Tool for the Demonstration and Assessment of Additionality” suggests three possible analysis methods: simple cost analysis (Option I), investment comparison analysis (Option II) and benchmark analysis (Option III).

As the Project generates financial and economic benefits (income from electricity sales) other than CDM-related income, Option I (simple cost analysis) is not applicable. From Option II and Option III, Option III (benchmark analysis) will be carried out.

For scenario P2, the development of grid-connected facilities is well established in the country and the risks and returns are well known for projects such as those currently providing electricity to the grid. Investment in grid-connected power generation can therefore be assumed to continue as usual in the absence of the Project activity.

Sub-step 2b – Option III. Apply benchmark analysis

The relevant financial indicator chosen was IRR. As stipulated by ACM0002, the type of IRR used in this analysis is project IRR.

The benchmark will be derived from Interim Rules on Economic Assessment of Electrical Engineering Retrofit Projects⁴, published by Operation Department of Power Generation and Power Transmission of

⁴ <http://cdm.unfccc.int/UserManagement/FileStorage/JL694VF0I1STX3G7M3RL8W0TMHVOAR>

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the State Power Corporation of China. According to this publication, the project IRR benchmark return rate for wind power projects should be 8% after tax.

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

The project IRR of the Project, based on the financing conditions available to CECIC, was calculated using the following variables and data sources.

Table B.5-1 Variables and data used for IRR calculation

Item	Value
Project Information	
Fixed Asset Investment	RMB 1,637.13 million
Project life time	23 years (including 3 years construction period)
Electricity tariff for first 14 years of operation (Year 3-16 of the IRR calculation sheet)	RMB 0.5206 (incl. VAT)
Electricity tariff for 15 th year of operation (Year 17 of the IRR calculation sheet)	RMB 0.5003 (incl. VAT)
Electricity tariff for 16 th through 23 rd year of operation (Year 18-23 of the IRR calculation sheet)	RMB 0.49 (incl. VAT)
Annual Electricity Output	431,949 MWh
Revenues and Expenses	
Electricity sales/yr (average)	RMB 220,881 million
O&M costs/yr (average)	RMB 61.88 million
Income tax	25%
VAT	8.5%
City VAT Surcharge tax for Education	3% of VAT
City VAT Surcharge tax for Urban Construction & Maintenance	5% of VAT
CERs crediting time	7 × 3
Expected CERs Price to Calculate project IRR	12 EUR/CER
IRR Results	
Project IRR (after tax) without CDM	5.40%
Project IRR (after tax) with CDM	9.66%

Source: Feasibility Study Report, produced by China Power Construction Engineering Consulting Corporation (CPCECC) March, 2008

* In year 17, the first 720 hours will be considered as part of the initial 30,000h (tariff of 0.5206 RMB / kWh), whereas the remaining 1429 hours will be considered post 30,000h (tariff of 0.4900 RMB / kWh). Therefore, an average tariff of 0.5003 RMB / kWh was applied for the year 17.



Based on the above information, the project IRR for the Project was calculated to be 5.40%. Against the benchmark mentioned in Sub-step 2b of 8%, it is clear that the project IRR of the Project activity is below the benchmark, and that it is not feasible for the Project to be implemented on a business-as-usual basis.

Electricity Tariffs:

Two different tariffs were applied to the project, depending on the aggregated power generation. According to a Power Purchasing Agreement (PPA) between Gansu Province Electric Company and CECIC, the electricity tariff for the initial 30,000h operation has been fixed at 0.5206 RMB/kWh (incl. VAT), while, post 30,000h, the tariff shall be set to the local average electricity tariff, which was estimated at 0.49 RMB/kWh in the FSR. However, this post 30,000h tariff is only an estimation and actual level will be determined based on the actual performance.

In fact, the assumption in the FSR of a tariff of 0.49 RMB/kWh after 30,000h is very conservative as an estimated average tariff. According to Power Engineering, Economic Evaluation and Tariff (second Edition), an average tariff of coal thermal power plant in Gansu Province was 0.2765 RMB/kWh in 2008, which is 43% lower than the estimated tariff of 0.49 RMB/kWh. On the other hand, an average tariff of Hydro was 0.217 RMB/kWh, according to a study of data available in registered CDM projects, which is 55% lower than the estimated tariff. Since coal thermal power plants and hydro power plants cover over 98% of overall power supply to the NWPG, it is reasonable to conclude that the FSR assumption of 0.49 RMB/kWh is significantly higher than the actual average tariff in Gansu Province. Therefore, it can be concluded that the assumption on tariff is reasonable and conservative.

Fixed Asset Cost:

For the investment cost, the Project has an investment cost ratio of RMB 8,144.93/kw. According to an analysis conducted of other projects⁵, an average ratio of registered wind projects in Gansu Province had a ratio of RMB 9,350.37/kw. The average is 14.8% higher than the Project, therefore, the figure used for the Project is considered to be reasonable and conservative in the context of the financial analysis.

Power generation:

Similarly power generation was also considered. According to an analysis conducted, an average load factor of registered wind projects in the province is 25.20%, whereas the Project applied 24.53%. Although the average is slightly higher than the Project, the difference is less than 1%. Therefore the Project's load factor is considered to be a reasonable estimation.

O&M Cost:

Finally, O&M cost ratio was also considered. According to an analysis conducted, an average annual O&M cost per kw ratio of registered wind projects in the province is RMB 230.40/kw, whereas the Project has a ratio of RMB 307.87/kw. However, it was observed that in the province, the O&M cost/kw ranges from 168.80 RMB/kw to 316.08 RMB/kw. Therefore, the Project's O&M ratio is within the range. Finally, the O&M cost was estimated by an authorized third party and was approved by NDRC. Therefore, it can be assumed that the value is reasonable. This issue is further discussed in the sub-step 2d below.

Based on the above information, the project IRR of the Project was calculated to be 5.40% (post tax). Against the benchmark mentioned in Sub-step 2b of 8%, it is clear that the project IRR of the Project is below the benchmark, and that it is not feasible for the Project to be implemented on a business-as-usual basis. Furthermore, if the PP sells CER generated from the Project at a market value of Euro 12/CER, the IRR becomes 9.66%, which is above the benchmark. This clearly demonstrates that the Project requires extra revenue from the CDM to be implemented.

⁵ List and analysis result of all the registered wind projects in Gansu Province is provided to DOE at the time of validation.

***Sub-step 2d. Sensitivity analysis***

For the sensitivity analysis, 10% variance was applied for four key parameters, electricity tariff, fixed asset interment, O&M costs and power generation. The result is shown below. In all cases, the IRR remained below the benchmark of 8%.

Table B.5-2 Results of the sensitivity analysis

Parameters	-10%	-5%	0	+5	+10%	8% IRR*
Electricity tariffs	3.88%	4.66%	5.40%	6.09%	6.74%	20.70%
Fixed Asset Investment	6.66%	6.01%	5.40%	4.84%	4.32%	-19.05%
O&M costs	5.82%	5.61%	5.40%	5.19%	4.97%	-70.00%
Power Generation	3.93%	4.69%	5.40%	6.08%	6.70%	21.35%

**Values under “8% IRR” indicate percentage change required to make the IRR 8%. For an example, electricity tariffs (including both initial 30,000 hour rate and post 30,000 hour rate) need to increase by 20.7% to have an IRR of 8%.*

For the parameters electricity tariffs, fixed asset interment and power generation, it is reasonable to assume that the 10% variance is deemed sufficient and conservative as stated below.

Electricity Tariffs:

Increase in electricity tariff by 10%: Tariff rate for the initial 30,000h has been finalized by the PPA. As noted above, the tariff of post 30,000h has already been estimated on an extremely conservative basis. Therefore, significant change in the tariff rate is unrealistic and 10% variance is sufficient to deal with unexpected events. Finally, to exceed the benchmark of 8%, tariffs need to increase by 20.70%.

Fixed Asset Cost: Decrease of fixed asset investment by 10%: By mid 2009, immediately after the site visit by the validation DOE, CECIC had already signed most of the key contracts for equipment purchase as well as construction of the Project. The total contracted amount was 1% higher than the fixed asset cost of FSR. Therefore, CECIC is not expecting any significant decrease in the investment costs, and 10% variance is sufficient to deal with unexpected changes. Finally, to exceed the benchmark of 8%, equipment cost must decrease by 19.05%, and as stated above, this is not realistic.

Power generation:

Increase of power generation by 10%: Considering the fact that both CPCECC and the PP are experts in wind power generation in China, their estimates can be considered reliable. In addition, according to the FSR, the minimum average annual wind speed between 1997 and 2007 (data is only available up to 2007) is 2.9m/s whereas the maximum is 3.1m/s, the difference between maximum and minimum is less than 7%. Although wind speed varies between months, the annual average is considered stable. Finally, as mentioned in the sub-step2c, the estimated load factor is comparable with other similar projects located in the Gansu Province. Therefore, 10% variance is sufficient to deal with unexpected events. Finally, to exceed the benchmark of 8%, power generation must increase by 21.35%, and as stated above, this is not realistic.

**Table B.5-3 Annual average wind speed**

Year	Average wind speed (m/s)
1997	2.9
1998	3.1
1999	3.0
2000	2.9
2001	2.9
2002	2.9
2003	2.9
2004	3.1
2005	3.0
2006	3.1
Minimum	2.9
Maximum	3.1
Average	2.98

Source: Feasibility Study Report, produced by China Power Construction Engineering Consulting Corporation (CPCECC) March, 2008

O&M Cost:

For the O&M cost, it was observed that the Project O&M cost/kw is higher than the average of registered projects in the Province. The O&M cost consists of four components, maintenance and repair, insurance, salaries & welfare, material cost and other fee. Each of the components was compared with other registered projects in the province, as shown below.

Table B.5-4 O&M components⁶

	Cost per KW of the Project (RMB/kw)	Average of registered projects (RMB/kw)	Highest of registered projects (RMB/kw)	Cost premium of the Project (1-project cost / average cost)
Maintenance & repair	187.95	151.82	257.60	19.23%
Salaries & welfare	8.41	11.52	31.11	-37.02%
Insurance	21.49	24.40	36.95	-13.52%
Material cost	30.00	14.29	20.00	52.35%
Other fees	60.00	27.12	40.00	54.79%
Total O&M	307.87	230.40	316.08	25.16%

As shown in the table B.5-4, values from the FSR for maintenance & repair, material cost and other fees are found to be higher than the average of registered projects, whereas salaries & welfare and insurance are below the average. As a result, total O&M cost of the registered projects average is 25.16% lower than the Project. Although the FSR was prepared by a reliable, authorized third party, further analyses were carried out.

⁶ List and analysis result of all the registered wind projects in Gansu Province is provided to DOE at the time of validation.

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To see the effect of O&M cost on the IRR result, the sensitivity analysis was extended. In the FSR, the O&M cost of the Project gradually increases over the operational lifetime. This is based on an assumption that more frequent repair, replacement and maintenance work is required as the equipment gets older. However, to test the effect of various O&M cost scenarios, the IRR was recalculated using an assumption that O&M remains constant throughout the operation lifetime. The tested O&M costs/kw values and IRR results are given below.

Table B.5-5 O&M sensitivity⁷

	Tested RMB / kw	IRR Result	Remark
Average O&M cost/kw of the project	307.87	5.31%	An average annual O&M cost/kw of the Project was calculated as 307.87 RMB/kw. Note that the IRR result is slightly different from the original IRR (5.40%), as here we assumed that the annual O&M cost/kw is constant at 307.87 RMB/kw throughout the operation lifetime, whereas the original IRR assumed gradual increase of annual O&M cost/kw over time.
The Project's lowest annual O&M	283.53	5.64%	According to the FSR, O&M is lowest at year 4 through 7 (RMB 56,990,000/year) and the ratio was calculated as RMB 283.53/kw (RMB 56,990,000 / 201,000 kw). Under this scenario, O&M cost was assumed to remain at the 283.53 RMB/kw throughout the operation lifetime. The result indicates that IRR of 5.64%, which is 4% higher than the original project IRR (5.40%). Please note that year 3 and 23 were excluded for the minimum value, as capacity in year 3 and 23 are different from rest of the operation.
Average of the registered projects	230.40	6.35%	As shown in the table B.5-4, the average O&M/kw among the registered projects is 230.40 RMB/kw. When 230.40 RMB/kw was applied to the Project, the IRR becomes 6.35%, which is still below the benchmark.
To get 8% IRR	90.00	8.00%	To have an IRR of 8%, total O&M cost/kw needs to be 90.00 RMB/kw. 90 RMB/kw is over 70% lower than the Project's average annual O&M cost/kw of 307.87 RMB/kw, and much lower than the estimated O&M for any other registered project.

The analysis concluded that for IRR to reach 8%, the total O&M needs to decrease to 90.00 RMB/kw, which is over 70% lower than the FSR estimation. As mentioned above, the provincial average of the total O&M cost is only 25.16% below the FSR estimation, therefore, a 70% decrease is not a realistic scenario.

Highest Tariff of Gansu Province

⁷ Calculation and results of these analyses are available on the IRR calculation sheet, worksheet "Outcome Summary", table 7 and table 8



Aside from the sensitivity analysis, further study on the tariff was conducted. “Information Note on the Highest Tariff Applied by the Executive Board in its Decisions on Registration of Project in the People’s Republic of China”⁸ which was prepared by Secretariat of UNFCCC in accordance with EB54 paragraph 53, confirms that the highest known tariff for wind power plant in Gansu Province is RMB 0.585/kWh (incl. VAT). The IRR was recalculated by applying the highest known tariff in the Gansu Province RMB 0.585 /kWh (incl. VAT) for the first 30,000 hours, while keeping everything else constant in the original IRR calculation (i.e., assumptions listed in table B.5-1). The result indicates that Project IRR (post tax) would become 6.78%, which is still below the benchmark of 8%. Furthermore, when the same highest tariff of 0.585/kWh (incl. VAT) was applied to the entire project lifetime (year 3 through year 23), the IRR (post tax) was recalculated as 7.16%, which is still below the benchmark of 8%.

Under the same condition, further analysis was conducted for various tariff levels. It was concluded that in order for the IRR to reach the benchmark of 8%, the Project would need a tariff of RMB 0.648/kWh (incl. VAT) or higher, for the first 30,000h. Therefore, it can be concluded that even with the highest known tariff in Gansu Province, the Project’s IRR is still below the benchmark and additional.

Step 3. Barrier analysis

Barrier analysis has not been conducted for the Project.

Step 4. Common practice analysis

Using the database of the UNFCCC and ‘Statistics of Windpark Installed Capacities in China of 2007’, published by the Chinese Wind Energy Association⁹, all the CDM projects and non-CDM projects since 2001 located in Gansu Province are considered for the common practice analysis.

According to the “Tool for the demonstration and assessment of additionality”, an analysis of any other activities that are operational and that are similar to the proposed project activity is required. Projects are considered “similar”, if they are

- Same country/region and environment
- Relying on similar technologies
- Similar scale
- Take place in a comparable environment with respect to regulatory framework, investment climate, access to technology, access to financing

Same country/region and environment

In China, there are significant differences between policies, regulations and economic conditions between different provinces, therefore, wind power projects in different provinces face very different operational environments. Further, with a population of 26 million people and area of 454,000 km², Gansu Province is larger than many countries. The common practice analysis in this PDD therefore limits the region to the province, which is standard practice for Chinese CDM projects.

Relying on similar technologies

There is significant difference in technology used, depending on efficiency and capacity of each projects. However, for simplicity and conservative reasons, all the wind projects are considered to use similar technology.

Similar scale

⁸ <http://cdm.unfccc.int/Reference/Notes/index.html>

⁹ <http://www.cwea.org.cn/upload/20080324.pdf>



Clearly, 201 MW should be considered different scale from projects that are less than 100 MW. However, for reasons of simplicity and conservativeness, projects are considered not to be of similar scale only if they are less than 15 MW, which is the threshold for small-scale CDM project.

Take place in a comparable environment with respect to regulatory framework, investment climate, access to technology, access to financing

Each project faces different environment. This is true especially for projects developed before 2002. In April 2002, China implemented power sector reform to establish a more commercialized power market in China.¹⁰ As a result, new generation, including wind power, was expected to run in a fully competitive commercial market. Moreover, the Chinese Government launched the Wind Concession Program in 2003, which was designed to bring wind power development in China onto a new commercial footing. Since market conditions for wind power project development changed significantly as a result of this sector reform, the common practice analysis excludes projects which commenced prior to 2002.

Finally, the Tool states that CDM projects should be excluded from the analysis. As result, the following project has been identified as a similar project.

Table B.5-8 List of Wind Projects in Gansu Province

Name of CDM Project	Date	Capacity (KW)	CDM (Y/N)	Tariff		Reference
				inc. VAT	excl. VAT	
Gansu Anxi Wind Farm Project (Developer is currently developing it as a Gold Standard VER project)	Dec. 2006	750	No	0.4616 ¹¹	0.425	Fa Gai Ban Neng Yuan [2005]2037

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

As shown above, all the wind projects within the Gansu Province have been developed as part of a CDM activity or are in the process of developing as CDM activities, except for the “Gansu Anxi Wind Farm Project”.

The “Gansu Anxi Wind Farm Project” was set up by China Power International New Energy Holding Ltd (CPI) in 2006. The project company is a Joint Venture with two objectives of (a) generate power, (b) generate and sale carbon credit from the project¹². Since CPI is a registered company in Hong Kong, it was not possible to apply for CDM in China (finally in December 2009, Hong Kong registered companies became eligible to apply for CDM)¹³. Therefore, CPI applied for VER (Gold Standard) to cover extra revenue needed to make the project financially viable. It is clear that the CPI project owner is aiming to gain a revenue stream from the sale of carbon credits (Gold Standard VERs), therefore, the “Gansu Anxi Wind Farm Project” can be excluded from the similar project activities analysis.

¹⁰ http://www.ndrc.gov.cn/xwfb/t20050708_28096.htm

¹¹ http://www.86ne.com/Wind/200805/Wind_139705_6.html

¹² <http://www.gs-n-tax.gov.cn:8081/news.asp?id=23424>

¹³ http://www.epd.gov.hk/epd/english/climate_change/cdm_supplementary_notes.html

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From this analysis, it is clear that under normal market conditions, due to the high investment cost and relatively low electricity tariff, wind power projects are generally unattractive for the investors in Gansu Province under business-as-usual circumstances.

The above analysis was performed in line with the additionality tool and clearly shows that the Project activity would not be built were it not for the additional revenue available through the CDM. In its absence, electricity would be supplied by existing and new power generation units connected to the Northwest China Grid.

Additionally, the following tables show the timeline of the actions taken for the project implementation as well as the CDM registration.

Table B.5-9 Timeline for the project implementation

Date	Action taken	Remark
October, 2007	Finalized Environmental Impact Assessment (EIA) report	EIA Report was issued by Gansu Huineng New Energy Technology Institute (GHNETI)
6 th November, 2007	EIA Approval	EIA report was approved by Gansu Provincial Environmental Protection Bureau
March, 2008	CPCECC finalized the FSR	FSR was issued
19 th May, 2008	Equipment purchase agreed	An agreement for the equipment purchase is finalized between Dongfang Steam Turbine Manufacture and CECIC.
6 th June, 2008	Wind turbine construction contract for Phase 1	Construction contract between Gansu Construction Engineering Co.,Ltd and CECIC
16 th June, 2008	Construction Order signed and construction started	Signed the construction contract and started the basement construction.
17 th June, 2008	FSR approval	FSR approval was issued by NDRC
18 th September, 2008	Financing completed	The loan contract is finalized between China Development Bank and CECIC.
10 th Nov. 2008	Wind turbine tower purchase contract	Wind tower equipment contract for Phase I
20 th Nov. 2008	Wind turbine tower purchase contract	Wind tower equipment contract for Phase II
19 th Nov. 2008	Main transformer contract	An agreement for the main transformer between Baoding Tianwei transformer Co.,Ltd and CECIC
20 th Nov. 2008	Comprehensive building construction contract	An agreement for the main transformer between Gansu Construction Engineering Co.,Ltd and CECIC
24 th Nov. 2008	Equipment installation contraction	Wind turbine installation contract between Xinjiang Xinfeng Installation Co.,Ltd and CECIC
27 th March 2009	Wind turbine construction contract for Phase 2	Construction contract between Gansu Huamao Construction Installation Engineering Co.,Ltd and CECIC

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20 th Oct. 2009	PPA was signed	PPA was signed between Gansu Province Electric Company and CECIC. In the PPA, the initial 30,000h tariff was fixed at 0.5206 RMB/kw (incl. VAT).
21 th Jan. 2009	35kV transmission line installation contract	An agreement for the equipment purchase is finalized between Jiayuguan Xingda Construction Installation Engineering Co.,ltd and CECIC
8 th May 2010	Phase 1 construction completed	Construction of phase 1 was completed
15 th Feb 2011	Phase 2 construction completed	Construction of phase 2 was completed

Table B.5-10 Timeline for CDM registration

Date	Action taken	Remark
5 th March, 2008	Final determination by the decision maker	Based on the results from the feasibility study, the board of CECIC decided to implement the wind power project considering the incentive from CDM.
6 th March, 2008	Stakeholders Consultation	44 stakeholders attended the meeting
12 th March, 2008	PIN production	A CDM expert was retained for PIN preparation and CDM preliminary consulting
12 th December, 2008	Sale of CERs and contract for CDM Consulting	Signed the ERPA and CDM Consulting agreement
7 th March, 2009	Start of GSP	PDD was put on UNFCCC website for 28 days publication
30 th April, 2009	Issuance of Chinese LOA	CECIC received a Letter of Approval from Chinese NDRC for the Project
15 th September, 2009	Issuance of UK LOA	Morgan Stanley & Co. International Plc. received a Letter of Approval from Department of energy & Climate Change of UK

As shown in the above table, CECIC considered the incentive from the CDM at a very early stage of the Project activity and has continued to take real actions to secure CDM status in parallel with the implementation of the Project activity.

B.6. Emission reductions:**B.6.1. Explanation of methodological choices:**

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The Project Activity reduces CO₂ through the substitution of fossil fuel fired grid-connected electricity generation with renewable electricity generation.

As described in ACM0002 and the “Tool to calculate the emission factor for an electricity system”, the emission reductions associated with wind projects are calculated as follows:

Baseline emissions (BE_y)

As defined in the above section, the baseline scenario of the Project is CO₂ emissions from electricity generation in fossil fuel based thermal power plants. Based on the methodology, the baseline emissions were calculated as shown below



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

Where:

BE_y	Baseline emissions in year y (tCO ₂ /yr).
$EG_{PJ,y}$	Electricity supplied by the project activity to the grid (MWh).
$EF_{grid,CM,y}$	Combined margin CO ₂ emission factor for grid connected power generation in year y calculated using the latest version of the “Tool to calculate the emission factor for an electricity system”.

For the calculation of $EG_{PJ,y}$, following is applied, as the Project is considered a Greenfield plant, i.e., the project activity is the installation of a new grid-connected renewable power plant at a site where no renewable power plant was operated prior to the implementation of the project activity.

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

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)

As directed in the methodology, the emission factor for the electricity grid is calculated according to the “Tool to calculate the emission factor for an electricity system”. The calculations have been completed by the Chinese DNA - the Office of Climate Change under the National Development and Reform Commission - in line with the Tool. The results can be found on the Chinese DNA’s website.¹⁴ The calculation procedures are as follows

STEP 1. Identify the relevant electricity systems

According to the Tool, project electricity system is defined by the spatial extent of the power plants that are physically connected through transmission and distribution lines to the project activity. The Chinese DNA has published a delineation of the project electricity system and connected electricity system. According to the delineation, the project electricity system of the local grid to which the Project activity is connected is NWPG.

Similarly, a connected electricity system is defined as an electricity system that is connected by transmission lines to the project electricity system. According to the delineation, the NWPG is connected to the Central China Power Grid (CCPG) and CCPG is considered as a connected electricity system. However, as NWPG exports power to CCPG and there is no power import from CCPG to NWPG, CCPG was not considered in the emission factor calculation¹⁵.

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

For the operating margin, “Option I: only grid power plants are included in the calculation” was selected.

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

There are 4 options for calculating the OM, according to the “Tool to calculate the emission factor for an electricity system”.

¹⁴ <http://cdm.ccchina.gov.cn/web/NewsInfo.asp?NewsId=3239>

¹⁵ China Electric Power Yearbooks 2005, 2006, 2007, and 2008



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

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

Dispatch data is unavailable for the Northwest China Power Grid; therefore, this PDD selects option (a), the Simple OM method, to calculate this parameter. As shown in the table below, low-cost/must-run resources constitute less than 50% of total grid generation, averaged over the five most recent years.

Table B.6-1 List of Low-Cost/Must-Run Plants

Year	Low-cost/must-run generation (10 ⁸ kWh)	Total Generation (10 ⁸ kWh)	%
2002	276.24	1210.52	23
2003	261.42	1392.35	19
2004	373.14	1692.53	22
2005	506.53	1845.62	27
2006	490.54	1984.92	25
		Average:	23.2

Source: China Electric Power Yearbooks 2003, 2004, 2005 2006 and 2007

In calculating the simple OM, the ex-ante option of a 3-year generation-weighted average is chosen, and is based on the most recent data available at the time of submission of the CDM-PDD to the DOE for validation. Under the ex ante option, the emission factor is determined once at the validation stage, thus no monitoring and recalculation of the emissions factor during the crediting period is required. For the calculation, data from 2004, 2005 and 2006 is chosen as the data for these years is the most recent available.

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 of CO₂ emissions per unit of net electricity generation (tCO₂/MWh) of all generation power plants serving the system, not including low-cost/must-run power plants/units. It is calculated based 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 B). This option was selected, because the necessary data for option A is not available, only nuclear and renewable power generation are considered as low-cost/ must-run power sources and the quantity of electricity supplied to the grid by these sources is known, and finally, Option I was chosen in Step 2 above. Electricity imports are treated as one power plant.

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

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 _{CO₂,i,y}	CO ₂ emission factor of fossil fuel type i in year y (tCO ₂ /GJ)
EG _y	Net electricity generated and delivered to the grid by all power sources serving the grid 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 relevant year as per the data vintage chosen in Step 3

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

Since the plant specific data for the Northwest China Power Grid is not available, the capacity addition from one year to the next and the efficiency of the best available technology are used as a basis for determining the build margin of the grid, as clarified by the CDM Executive Board¹⁶. The build margin emission factor will be calculated ex-ante based on the most recent information available at the time of CDM-PDD submission to the DOE for validation and applied during the first crediting period. For the second crediting period, the build margin emission factor will be updated based on the most recent information available 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 will be used (Option 1).

STEP 6. Calculate the build margin emission factor

The procedure to calculate the Build Margin emission factor conservatively is as follows:

1) Using the latest available statistical data determine the two years with added capacity closest to 20% (above 20%)

- The capacity of each previous year *x* is compared with the capacity of the most recent year.

$$\text{Capacity increase(\%)} = \left(\frac{\text{Capacity of the most recent year}}{\text{Capacity of the year } x} - 1 \right) \times 100 \quad (\text{B.2})$$

- Select the year of which the capacity increase is closest to and above 20% for the build margin emission factor calculation

2) Calculation of weights of CO₂ emissions of solid, liquid and gas fuel in total emissions for power generation:

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

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



$$\lambda_{Gas,y} = \frac{\sum_{i \in GAS,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO2,i,j,y}}{\sum_{i,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO2,i,j,y}}$$

Where:

$F_{i,j,y}$ the consumption of fuel i for province j in year y (in a mass or volume unit)
 $NCV_{i,y}$ the net calorific value (energy content) per mass or volume unit of a fuel i in year y (country-specific values are used)
 $EF_{CO2,i,j,y}$ the CO₂ emission factor per unit of energy of the fuel i
Coal, Oil, Gas respectively refers to the group of solid, liquid, and gas fuels

3) Calculation of Emission Factor of Relevant Thermal Power

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

Where:

$EF_{Coal,Adv,y}$ the emission factor representing best technology commercially available for fuel of coal fired power plants in year y ;
 $EF_{Oil,Adv,y}$ the emission factor representing best technology commercially available for fuel of oil fired power plants in year y ;
 $EF_{Gas,Adv,y}$ the emission factor representing best technology commercially available for fuel of gas fired power plants in year y .

4) Calculation of BM of the Grid

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

Where:

CAP_{Total} the total of new capacity additions
 $CAP_{Thermal}$ the new capacity addition of thermal power

STEP 7. Calculate the combined margin emission factor

The combined margin emission factor is calculated as follows:

$$EF_{grid,CM,y} = EF_{grid,OM,y} \times w_{OM} + EF_{grid,BM,y} \times w_{BM}$$

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 (%)

The following default values will be applied for w_{OM} and w_{BM} :

For wind and solar projects, $w_{OM} = 0.75$ and $w_{BM} = 0.25$ for the first crediting period and for subsequent crediting periods.

Project Emissions (PE_y)



Wind power generation is considered as a clean energy, and the methodology does not consider any project emissions to result from wind power plants. Project emissions are, therefore, considered to be zero.

Leakage (LE_y)

No leakage emissions are considered. The main emissions 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 (ER_y)

In line with the methodology, emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y$$

ER_y Emission reduction in year y (tCO₂/yr)

BE_y Baseline emissions in year y (tCO₂/yr)

PE_y Project emissions in year y (tCO₂/yr)

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

Data / Parameter:	F_{i,y}
Data unit:	A mass or volume of unit of the fuel i
Description:	The amount of fuel i consumed in the project electricity system in year y (mass or volume unit)
Source of data used:	China Energy Statistical Yearbook
Value applied:	Please see China DNA grid data publication referenced in Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Since the detailed fuel consumption data by power plants are not available, the aggregated data by fuel types recommended by the Chinese DNA are used.
Any comment:	

Data / Parameter:	GEN_{j,y}
Data unit:	MWh
Description:	Electricity delivered to Northwest China Grid by relevant power sources _j excluding low operating cost/must run plants in year y
Source of data used:	China Electric Power Yearbook
Value applied:	Please see China DNA grid data publication referenced in Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Since the detailed fuel consumption data by power plants are not available, the aggregated data by fuel types recommended by the Chinese DNA are used.
Any comment:	

Data / Parameter:	NCV_i
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Data unit:	kJ/kg
Description:	Net calorific value (energy content) per mass or volume unit of fuel type i
Source of data used:	China Energy Statistical Yearbook
Value applied:	Please see China DNA grid data publication referenced in Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	As provided by the Chinese DNA
Any comment:	

Data / Parameter:	OX_i
Data unit:	%
Description:	Oxidation factor of the fuel i
Source of data used:	Revised 2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value applied:	Please see China DNA grid data publication referenced in Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	IPCC default values are used in line with the calculations published by the Chinese DNA.
Any comment:	

Data / Parameter:	EF_{CO₂,i}
Data unit:	tCO ₂ /TJ
Description:	CO ₂ emission factor per unit of energy of the fuel i
Source of data used:	Revised 2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value applied:	Please see China DNA grid data publication referenced in Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	IPCC default values are used in line with the calculations published by the Chinese DNA.
Any comment:	

Data / Parameter:	CAP_{i,y}
Data unit:	MW
Description:	Installed capacity of relevant power source i connected to North West China Grid in year y
Source of data used:	China Electric Power Yearbooks
Value applied:	Please see China DNA grid data publication
Justification of the choice of data or description of measurement methods and procedures actually applied :	For Chinese grids, due to the unavailability of data on individual plants to calculate build margin in accordance with the tool to calculate the emission factor of an electricity system.
Any comment:	



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Data / Parameter:	EF_{grid,BM,y}
Data unit:	tCO ₂ /MWh
Description:	Build margin CO ₂ emission factor in year y
Source of data used:	Calculations
Value applied:	0.6199
Justification of the choice of data or description of measurement methods and procedures actually applied :	Calculated as directed in B.6.1. Calculations shown in Annex 3.
Any comment:	

Data / Parameter:	EF_{grid,OM,y}
Data unit:	tCO ₂ /MWh
Description:	Build margin CO ₂ emission factor in year y
Source of data used:	Calculations
Value applied:	1.1225
Justification of the choice of data or description of measurement methods and procedures actually applied :	Calculated as directed in B.6.1. Calculations shown in Annex 3.
Any comment:	

Data / Parameter:	WOM
Data unit:	Fraction
Description:	Weighting of operating margin emissions factor %
Source of data used:	Tool to calculate the emission factor for an electricity system
Value applied:	0.75
Justification of the choice of data or description of measurement methods and procedures actually applied :	As directed in the tool, a value of 0.75 is to be used for the entire crediting period
Any comment:	

Data / Parameter:	WBM
Data unit:	Fraction
Description:	Weighting of build margin emissions factor
Source of data used:	Tool to calculate the emission factor for an electricity system
Value applied:	0.25
Justification of the choice of data or description of measurement methods and procedures actually applied :	As directed in the tool, a value of 0.25 is to be used for the entire crediting period

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Any comment:

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

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Electricity generated by the project

At full capacity, the project will generate

$$\begin{aligned}
 \text{Gross Power generation (MWh/year)} &= \text{Capacity per Unit (MW)} \times \text{Number of Units (Unit)} \times \text{Hours per year (Hour)} \\
 &= 1.5 \times 134 \times 2,149 \\
 &= 431,949 \text{ (MWh/year)}
 \end{aligned}$$

Baseline EmissionsThe emissions from the grid-electricity displaced in year y are calculated as follows:

$$\begin{aligned}
 BE_y \text{ (tCO}_2\text{)} &= EG_{\text{facility},y} \text{ (MWh)} \times EF_{\text{grid,CM},y} \text{ (tCO}_2\text{/MWh)} \\
 &= 431,949 \times 0.99685 \\
 &= 430,588 \text{ (tCO}_2\text{)}
 \end{aligned}$$

Project EmissionsAs described in section B.6.1., Project emissions, PE_y , are equal to zero.**Leakage**

No leakage is applicable under this methodology.

Emission Reductions

$$\begin{aligned}
 ER_y \text{ (tCO}_2\text{)} &= BE_y \text{ (tCO}_2\text{)} - PE_y \text{ (tCO}_2\text{)} \\
 &= 430,588 - 0 \\
 &= 430,588 \text{ (tCO}_2\text{)}
 \end{aligned}$$

Actual emission reduction from the Project is determined by two key factors, amount of electricity exported to the grid and emission factor of the grid. Major risks and uncertainties which influencing these factors are analyzed below.

Table B.6-1 Major Risks and Uncertainties Associated with the Project

Wind availability	Wind availability fluctuates daily and seasonally, depending on the weather condition. Lower availability of wind leads to lower load factor of the turbines and less electricity to be generated. However, these daily and seasonal fluctuation average out over the course of each year. As result, annual wind availability is reasonably consistent from year to year as shown on the table A.4-2 in the section A.3. Therefore, the risk of significant fluctuations in power output on an annualized basis due to wind availability is not considered to be high.
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Break down	Wind turbines consist of many components including fragile devices. Although the turbines are manufactured by a reputable company and are considered reliable, there is a risk of break down. This is especially true for the Project, since the Project is located in the Gobi desert, where these turbines are put to the challenge of severe weather conditions. However, the Project will install 134 turbines, and break down of a small number of turbines will have limited impact to the overall power generation. Nonetheless, should an unusually large number of breakdowns occur, the emission reductions may be significantly lower than expected.
Commercial operation	Power generation could be seriously impacted, in case where the operation entity cannot continue its commercial operation. However, the fact that CECIC is a joint venture of China Energy Conservation Investment Corporation Wind Power Investment Co., LTD. and a subsidiary company of HKC (Holding) Ltd., companies with outstanding track records and secure financial positions, this risk is considered minimal
Lack of demand	In case that there is lack of demand on electricity generated by renewable energy, there is a risk that grid company would refused to purchase electricity from the Project. However, considering the rapid economic development in the region and country, demand for electricity is not expected to decrease anytime soon. In addition, the Chinese government has the goal it set itself under the Renewable Energy Law, which states that the country is committed to increase the share of renewable energy use in the country's energy mix to 10% by 2010 and 30% by 2030, in order to realize the sustainable development of the economy and society. With this policy, grid is likely to continue purchasing the electricity from the Project, even in case of over supply of electricity in the grid. Therefore, this risk is considered low.
Oversupply	Although the demand for electricity is high, as mentioned above, there is a risk that the grid company will not be able to purchase all the electricity generated from the Project due to lack of infrastructure and poor condition of the grid. Typically, renewable energy projects have large fluctuations in power generation, caused by weather, season and other conditions. With lack of infrastructure and poor condition of the grid, it is possible that electricity generated by renewable power plants can exceed the grid's capacity and prevent the purchase of electricity from the Project.
Policy change	There is a risk that government changes its policy on the renewable energy and grid operation. However, considering the recent movement of government to encourage clean energy in China, this is considered unlikely. Therefore, the risk of policy change is considered minimum.
Grid emission factor	The emission factor was calculated using OM and BM of the "Tool to Calculate the Emission Factor for an Electricity System" version 2.1.0. It is highly possible that situation of these power plants within the grid or grid itself will change during the crediting period. This could impact the actual emission reduction resulted from the Project in the future. However, as far as CDM is concerned, the emission factor is calculated ex-ante, and the factor cannot be changed during the 1st crediting period. Therefore, change of grid

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emission factor is not a risk.

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

>>

Table B.6-2 CER Estimation (for 1st crediting period)

Year	Estimation of baseline emissions (tCO ₂ e)	Estimation of project emissions (tCO ₂ e)	Estimation of leakage (tCO ₂ e)	Estimation of emission reductions (tCO ₂ e)
Aug. 2011-July 2012	430,588	0	0	430,588
Aug. 2012-July 2013	430,588	0	0	430,588
Aug. 2013-July 2014	430,588	0	0	430,588
Aug. 2014-July 2015	430,588	0	0	430,588
Aug. 2015-July 2016	430,588	0	0	430,588
Aug. 2016-July 2017	430,588	0	0	430,588
Aug. 2017-July 2018	430,588	0	0	430,588
TOTAL	3,014,116	0	0	3,014,116

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
Description:	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y
Source of data to be used:	Direct measurement
Value of data applied for the purpose of calculating expected emission reductions in section B.5	431,949 MWh per year at full capacity. Energy generation in the year y (EG _{facility,y}) is electricity net of exports and imports, and is estimated as 431,949 MWh
Description of measurement methods and procedures to be applied:	Measurement will be performed continuously with electricity meters, and it will be recorded monthly. Data will be archived for 2 years following the end of the crediting period by means of electronic and paper backup.
QA/QC procedures to be applied:	Meters will be examined, tested and calibrated regularly according to the manufacturer's standards. Monitoring data are counter-checked by receipt of electricity sales.
Any comment:	

B.7.2. Description of the monitoring plan:



>>

Purpose

The monitoring methodology clearly describes how to identify and collect the necessary data. The following is a summary list of the main items to be monitored:

The operational and management structure to be adopted by CECIC in implementing the monitoring plan for the project activity is outlined in the figureB.7-1 below.

The performance of the Project will be reviewed and analyzed by the consultant on a regular basis.

Metering

The power generated by the Project and supplied to the grid will be monitored at the following points using electricity meters:

Both the main meter(s) and backup meter(s) have been installed at high voltage side of 35kV/110KV substation, located within the site, as described in the section B.3. The main meter(s) will be used to monitor electricity exchanged between the Project and the grid continuously and reported monthly.

The data from the electricity meters can be cross-checked with the Electricity Transaction notes or sales receipts for the electricity.

Calibration

The metering equipment will be calibrated and checked at least once a year by a qualified third party according to an appropriate industry standard or the manufacturer's specifications. The calibration records will be maintained and made available for review by the DOE.

Accuracy

The metering equipment will be calibrated and checked for accuracy according to local industry standards to make sure that any error resulting from such equipment will not exceed 0.5% of full-scale rating. Both meters shall be jointly inspected and sealed on behalf of the parties concerned and shall be only checked in the presence of the other party or its accredited representatives. It will also comply with the national standards Technical Administrative Code of Electric Energy Metering (DL/T 448-2000) and Alternating Current Static Watt-hour Meters for Active Energy, with accuracy of no less than 0.5S (GB/T 17883-1999).

Procedure

When reading error of either meter exceeds the allowable range or any inconsistency occurs, the meter should be repaired and followed by calibration by a third part in accordance with the standard, within 10 days. The grid company must be informed before the calibration and all the record should be kept by the CECIC.

When the main meter detects the error beyond the allowable range or inconsistency, the backup meter, located within the site, will be used. In case that both meters detect errors, CECIC shall repair the meter, recalibrate, or replace, while giving the grid company sufficient notice to allow their representative to attend during any corrective activities. When this happen, the net power generated is calculated by read the backup meter. In case where both meters fail, CECIC and the grid company should formulate reasonable and conservative estimation based on historical or the nearest month power generation data. Also, CECIC should provide the evidence to testify the method is reasonable and conservative.

Data



All data collected as part of monitoring should be archived electronically and be kept for at least 2 years after the end of the last crediting period. 100% of data is to be monitored.

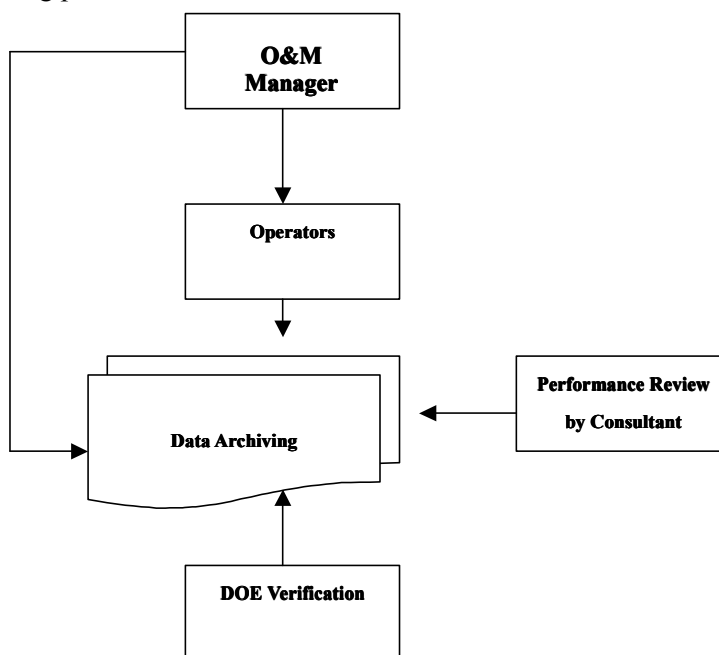


Figure B.7-1 Operational and management structure for monitoring the project activity.

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 was completed in 24/05/2011 by:

Clean Energy Finance Committee
Mitsubishi UFJ Morgan Stanley Securities Co., Ltd.
5th Floor, Toyosu Front
3-2-20 Toyosu, Koto-ku, Tokyo 135-0061, Japan

watanabe-hajime@sc.mufg.jp

Please note that Mitsubishi UFJ Morgan Stanley Securities is not a participant to the Project.

**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:**>> 21st November, 2009 (The date when the Project wind turbines commissioning activity started)**C.1.2. Expected operational lifetime of the project activity:**

>>20years

C.2. Choice of the crediting period and related information:**C.2.1. Renewable crediting period:****C.2.1.1. Starting date of the first crediting period:**

>> 01/08/2011 or registration date, whichever is later

C.2.1.2. Length of the first crediting period:

>> Seven (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 line with the requirements of local government, an Environmental Impact Assessment (EIA) for the proposed wind farm project was carried out. The EIA was completed by Gansu Province Environment and Science Design Institute and has been approved by the Environmental Protection Bureau of Gansu Province, indicating that the proposed project meets all national environmental protection regulations. The analysis and measures to be taken to mitigate the impacts are demonstrated in the following:

- **Impact on Air Quality**
The air pollution during construction mainly comes from flying dust produced by excavating land as well as some exhaust discharge from transportation vehicles and construction machinery. Since the Project site is far away from the nearest local residential area (over 5Km), there is no impact on local residents from dust and air pollution. The main impact is on the construction staff and appropriate measures such as watering and converting will be taken to reduce any negative impact and ensure staff safety.
- **Noise Pollution**
The noise mainly comes from the drilling machines and cement mixers during the construction period, and aerodynamic interaction between the wind and turbine blades during operation. Although the operating level of these turbines is around 100dB, at a range of 150 meters from the turbines the noise weakens to 33dB, which is below the national standard of 45dB. As the proposed project is far away from any residential area, effects on the surrounding environment of noise pollution are not significant.
- **Impact of Solid Waste:**
Solid waste mainly comes from construction and living waste. During the construction period, construction waste will be properly disposed to avoid water and soil erosion problems. The Project will generate living wastes of 87 kg per day during construction, which will be reduced to 15 kg per day during operation. This waste will be properly collected and delivered to the local county for disposal.
- **Impact on Waste Water:**
The waste water generated during the construction includes washing water from machines and wastewater from the project office. Since the project site is located in the Gobi desert area, the waste water will be reused on the construction site or as fertilizer. During operation, the waste water and sewage will be treated by using a septic tank and all-in-one biochemical process equipment to recycle and reuse water on the Project site. The treated waste water will be used for on-site greening and road spreading. The treated waste water quality will meet the requirement of the Fields Irrigation Water Standard (GB 5084-1992), therefore, it has no negative impact on the surrounding environment.
- **Impact on Ecosystem:**
The Project is located in the Gobi desert area with sparse vegetation. The Project construction could exacerbate the soil erosion and blown sand hazards. Through minimizing the construction area, backfilling the gravel, properly disposing of solid waste during construction, and growing drought-resistant, sand-fixing, and fast growing plants after construction, the impact on the ecological environment will be reduced.
- **Impact on Radiation of Electromagnetism**



Radiation of electromagnetism arising from generators, transformer substations and transmission lines is considered insignificant in terms of intensity, and is unlikely to have a negative impact on residents' health because of the long distance between project site and the nearest residential area. Meanwhile, the radiation intensity of high voltage transformer equipments is lower than 3.5kV/m, which is much lower than the requirement of national standards (GB16203-1996).

In conclusion, the proposed project will not have a significant negative impact on the surrounding environment.

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

>>According to the results of the EIA of the proposed Project and the approval from the Gansu Environment Protection Bureau, the impacts on the environment are not significant.

**SECTION E. Stakeholders' comments**

>>

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

>> The local stakeholder's meeting was held in Yumen County on 6 March 2008. 44 participants attended the meeting including local residents, builders and members of the local authorities. The project CECIC introduced the proposed project, and then a survey was arranged through a one-page questionnaire, which was designed to be easily filled in. The opinions expressed by the stakeholders were recorded and are available on request. The survey includes the following sections:

- (i) Project introduction;
- (ii) Respondents' basic information and education level;
- (iii) Questions;
 - Do you consider your current living, studying and working environment to be quiet?
 - Do you think that the project will have a negative impact on the environment, such as air quality, noise, water, etc.?
 - Will the project construction have a negative impact on the living, studying and working environment of you and your family?
 - Do you think the project implementation will have some positive impact on your life?
 - During the project construction which of the following problems concerns you most: noise, air pollution, equipment installation, wastewater discharge, electromagnetic interference, landscape destruction?
 - Do you agree with the development and construction of the project?
 - Do you have any suggestion regarding the kind of measures which should be applied during the project construction and operation in order to protect the environment?
 - Do you have any suggestions/advice for the developer of the proposed project?
- (iv) Space for the respondents' signature and date.



E.2. Summary of the comments received:

>>

- Stakeholder Meeting
Every stakeholder expressed their comments for the proposed project. To date, no negative comments have been received. The summary of stakeholder meeting's comments is as following:
- Promote the local economic development
The local government strongly supports the development and construction of the proposed Project. It will increase local financial income and promote technological progress of local building materials, tower tube manufacturing, and other related industries.
- Local environment protection
According to the project EIA report, the noise level of the installed turbines is below the national standard. The proposed Project site is located in the Gobi desert area. Moreover, there are no residents or industrial firms near the project site. Furthermore, there are no issues related to noise and communications signal interference, or to bird migration.
- Improve the living condition of local residents
The proposed project will create new employment opportunities through the project construction and operation. The project will also purchase the raw materials for construction and other supplies from the local market. Therefore, the local people will benefit from the Project.

Questionnaire Survey

The survey had a 100% response rate with all questionnaires returned. The key findings of the survey and the summary of the consultation are as following:

- 100% of respondents agree with the development and construction of the project.
- 100% of the respondents believe that the proposed project will have no negative impact on their living, studying and working environments.
- 100% of the respondents believe that the project implementation will have a positive impact on their lives.

The stakeholder meeting and the survey showed that the proposed project receives strong support from the local community. They all believe the proposed project will promote local economic development and agree with the project development and construction.



All the concerns and suggestions were summarized below. The number provided after each comments corresponds to CECIC's response given in table E.3-1 below.

Table E.2-1 SUMMARY OF SURVEY (part of stakeholder's meeting)

	Gender	Age	Occupation	Do you think the project will affect the surrounding environment (air, noise and water)?	What do you concern the most during the project construction and operation?	Do you agree with development of this project?	Any environmental protection measurements should be considered?	Suggestions to project developer
1	M	28	Employee	Yes	- Noise: 4 - Electromagnetic: 2	agree	- Protect vegetation: 10 - Greening the project area after construction: 10 - Reduce dust: 3	strengthening the support to local government: 11
2	F	37	Employee	Yes	- Noise: 4 - Air pollution: 3	agree	Suggest building special roads for big trucks to avoid the heavy vehicles damage the Gobi plants: 8	- Construction waste should be dealt properly: 6 - The damage made to the Gobi plants by heavy vehicles should be restored as soon as the construction finished; build special construction-use-only roads: 8
3	M	32	Employee	Yes	- Air pollution: 3 - Electromagnetic: 2	agree	- Disturb the ground surface as less as possible to reduce fugitive dust: 3 & 7 - Equipment maintenance should be carried out as planned: 1 - Use surface water instead of groundwater: 12	- Reduce road occupation, restore the land that temporarily occupied: 7 - Give financial support to local environmental protection, use the profit made from emission reduction: 11
4	F	31	Employee	Not sure	- Air pollution: 3 - Equipment safety: 1 - Electromagnetic: 2	agree	Hardening the road surface to avoid pollution: 7, 8 & 10	Suggest developer to register local company, pay local tax and employ local labor. Participate and support local public welfare: 9, 11
5	M	35	Employee	Yes	Wastewater discharge: 5	agree	- Improve wastewater treatment: 5 - Vehicles carrying heavy equipments should keep distance from residential area and town centre: 8	Protect the road and bridge during construction and pay the repair fee if there is any damage incurred: 8



6	F	22	Other	Yes	• Noise: 4 • Equipment safety: 1	agree	• Use environment friendly material: 13 • Take measures to reduce noise: 4 • Conduct environmental effect assessment beforehand: 14	Improve the economic development and employment in Yumen: 9
7	M	53	Employee	No	• Air pollution: 3	agree		
8	M	29	Employee	Yes	• Equipment safety: 1	agree		
9	F	35	Worker	Yes	• Air pollution: 3	agree		
10	M	46	Employee	No	• Equipment safety: 1 • Wastewater discharge: 5	agree		
11	M	29	Employee	No	• Equipment safety: 1 • Electromagnetic: 2	agree		
12	M	40	Employee	No	• Equipment safety: 1	agree		
13	M	23	Employee	Yes	• Noise: 4 • Equipment safety: 1	agree	• Soil-water protection: 7 & 5 • Vegetation protection: 10	
14	M	48	Other	No	• Equipment safety: 1 • Electromagnetic : 2	agree	Centralized construction and avoid farm land: 7	Develop the project as Yumen is your second home: Not relevant
15	F	21	Worker	No	• Noise: 4 • Air pollution: 3	agree		
16	M	36	Employee	No	• Equipment safety: 1 • Electromagnetic: 2	agree		
17	F	28	Employee	No	• Noise: 4 • Air pollution: 3 • Wastewater discharge: 5	agree		
18	M	45	Employee	No	• Equipment safety: 1	agree		
19	M	56	Employee	No	• Air pollution: 3	agree	Ground surface greening should be included in construction plan: 10	Ground environmental reform should be done properly: 7 & 10
20	F	25	Employee	No	• Electromagnetic: 2	agree		
21	M	36	Employee	No	• Noise: 4	agree		
22	M	41	Farmer	No	• Equipment safety: 1	agree		
23	F	39	Farmer	No	• Electromagnetic: 2	agree		
24	M	46	Employee	No	• Equipment safety: 1	agree		



25	M	36	Farmer	No	• Electromagnetic: 2	agree	Waste in construction site should be treated properly: 6	
26	M	41	Employee	No	• Landscape destruction: 7	agree	Build construction-use-only road to protect environment: 8	
27	F	29	Farmer	Not sure	• Electromagnetic: 2	agree		
28	M	39	Farmer	Yes	• Equipment safety: 1	agree		
29	M	36	Farmer	No	• Noise: 4	agree		
30	M	32	Farmer	No	• Air pollution: 3 • Landscape destruction: 7	agree		
31	M	32	Farmer	Yes	• Noise: 4 • Wastewater discharge: 5 • Electromagnetic: 2	agree		
32	M	38	Farmer	No	• Air pollution: 3 • Landscape destruction: 7	agree		
33	M	48	Farmer	No	• Landscape destruction: 7	agree		
34	M	45	Farmer	No	• Equipment safety: 1	agree		
35	M	40	Farmer	No	• Equipment safety: 1 • Wastewater discharge: 5	agree		
36	F	35	Employee	No	• Air pollution: 3	agree		
37	M	51	Woker	No	• Noise: 4 • Air pollution: 3 • Wastewater discharge: 5	agree		
38	M	28	Farmer	No	• Noise: 4 • Air pollution: 3 • Wastewater discharge: 5	agree		
39	M	29	Farmer	No	• Electromagnetic: 2	agree		



40	M	32	Employee	Yes	• Air pollution: 3 • Wastewater discharge: 5 • Electromagnetic: 2	agree	Reduce electromagnetic interference and wastewater discharge, and strengthening greening: 2, 5 & 10	Construction should be carried out as planned: Not relevant
41	F	34	Other	Yes	• Noise: 4 • Wastewater discharge: 5 • Landscape destruction: 7	agree		
42	M	43	Farmer	No	• Equipment safety: 1 • Electromagnetic: 2 • Landscape destruction: 7	agree		
43	M	49	Farmer	No	• Equipment safety: 1 • Electromagnetic: 2	agree		
44	M	36	Farmer	No	• Noise: 4 • Equipment safety: 1 • Electromagnetic: 2	agree		

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

>> The below table indicates the issues raised by the stakeholders, and the response or action from CECIC on each issue.

Table E.3-1 Responses to comments received by Stakeholders

Issues	Actions taken by CECIC
1. Equipment safety and maintenance	Wind turbine and hub are the key equipment used for the Project. The Project will install efficient and reliable turbines manufactured by Dongfang Steam Turbine Manufacture. In addition, the control system will be imported from EU, which makes the Project very safe. CECIC will conduct regular maintenance in accordance with manufacture's specification.
2. Electromagnetic	Radiation of electromagnetism arising from generators, transformer substations and transmission lines is considered insignificant in terms of intensity, and is unlikely to have a negative impact on residents' health because of the long distance between project site and the nearest residential area. Meanwhile, the radiation intensity of high voltage transformer equipments is lower than 3.5kV/m, which is much lower than the requirement of national standards (GB16203-1996).
3. Air pollution and dust	The air pollution during construction mainly comes from flying dust produced by excavating land, as well as some exhaust discharge from transportation vehicles and construction machinery. Since the Project site is far away from the nearest local residential area (over 5Km), there is no impact on local residents from dust and air pollution. The main impact is on the construction staff and appropriate measures such as watering and converting will be taken to reduce any negative impact and ensure staff safety.
4. Noise	The noise mainly comes from the drilling machines and cement mixers during the construction period, and aerodynamic interaction between the wind and turbine blades during operation. Although the operating level of these turbines is around 100dB, at a range of 150 meters from the turbines the noise weakens to 33dB, which is below the national standard of 45dB. As the proposed project is far away from any residential area, effects of noise pollution on the surrounding environment are not significant.
5. Wastewater	The wastewater generated during the construction includes washing water from machines and wastewater from the project office. Since the project site is located in the Gobi desert area, the wastewater will be reused on the construction site or as fertilizer. During operation, the wastewater and sewage will be treated by using a septic tank and all-in-one biochemical process equipment to recycle and reuse water on the Project site. The treated waste water will be used for on-site greening and road spreading. The treated waste water quality will meet the requirement of the Fields Irrigation Water Standard (GB 5084-1992), therefore, it has no negative impact on the surrounding environment.
6. Solid Waste	Solid waste mainly comes from construction and living waste. During the construction period, construction waste will be properly disposed to avoid water and soil erosion problems. The Project will generate living wastes of 87 kg per day during construction, which will be reduced to 15 kg per day during operation. This waste will be properly collected and delivered to the local county for disposal.



7. Landscape destruction	The Project is located in the Gobi desert area with sparse vegetation. The Project construction could exacerbate the soil erosion and blown sand hazards. Through minimizing the construction area, backfilling the gravel, properly disposing of solid waste during construction, and growing drought-resistant, sand-fixing, and fast growing plants after construction, the impact on the ecological environment will be reduced. Furthermore, there is no farmland or residential area near the Project site, therefore, damage to such farmland or residential areas are considered minimum.
8. Impact of heavy vehicles	All the vehicles used for the Project meet all the regulations and standards required by the law. Therefore, the Project would not cause excess wear and tears to the road. Since the Project is located in the Gobi desert, damage caused by such heavy vehicles at the Project site is considered minimum, while these vehicles will avoid driving in city or close to residential area to minimize the impact of surrounding communities. In addition, CECIC will plant fast growing plants upon completion of the plant, which will restore any damages caused by the Project.
9. Local development	The Project has created new employment opportunities as stated in the Section A.2. Doing the construction, the construction companies hire over 300 local employees specifically for the Project. In addition, generated electricity will reduce grid's power shortage and supporting regional economical activities. Finally, through the Project, CECIC will be paying VAT to local government, which will benefit local government while enhancing economic activity of the surrounding communities.
10. Protection of vegetation and Greening	The Project is located in the Gobi desert area with sparse vegetation and impact to vegetation is considered minimum. In addition, CECIC will plant fast growing plants upon completion of the plant, which will result in a better vegetation condition than before the Project.
11. Support to the local government, welfare, and environmental protection	CECIC will pay all the required VAT in accordance with the tax law. However, it is not role of CECIC to support local government, welfare, and environmental protection agency beyond its obligation under the law. Nonetheless, the CECIC will support the local community by creating new employment opportunities.
12. Use of water resource	The Project will not consume large volume of water, therefore, impact on water resource is not relevant.
13. Construction material	All the material used for the Project meets all the regulations and standards required.
14. Environmental Impact Assessment	As shown in the section D above, CECIC has conducted EIA and Gansu Environment Protection Bureau approved the project, based on the EIA.

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As shown in the above table, most of concerns were related to environmental impact. As mentioned in the Section D, the Project has received EIA approval and has taken necessary measures to minimize these impacts.

**Image E.3-1 stakeholder's Meeting****Image E.3-2 stakeholder's Meeting**

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

Organization:	CECIC HKC Gansu Wind Power Co., LTD.
Street/P.O.Box:	No. 42, Xizhimen North Street, Haidian District
Building:	12 th Floor, A Building Jieneng MansionJ
City:	Beijing
State/Region:	
Postfix/ZIP:	100082
Country:	The People's Republic of China
Telephone:	86-10-62248706
FAX:	86-10-62248700
E-Mail:	gtecc@sohu.com
URL:	-
Represented by:	Shusheng Li
Title:	General Manager
Salutation:	Mr.
Last Name:	Li
Middle Name:	-
First Name:	Shusheng
Department:	-
Mobile:	-
Direct FAX:	86-10-62248700
Direct tel:	86-10-62248706
Personal E-Mail:	gtecc@sohu.com



Annex 2

INFORMATION REGARDING PUBLIC FUNDING

This project will not receive any public funding from an Annex I country



ANNEX 3

BASELINE INFORMATION

The data for calculation of grid emission factors are found on the website of the Office of National Coordination Committee on Climate Change.

China's grid baseline OM calculation progress (Chinese version)

<http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File1879.pdf>

China's grid baseline BM calculation progress (Chinese version)

<http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File1875.pdf>

The relevant information for the calculation of CM is shown below.

**Operating Margin**

Basic data for the Northwest China Power Grid for 2004

Fuel Type	Unit	Shaanxi	Gansu	Qinghai	Ningxia	Xinjiang	Subtotal G=A+B+C+D +E+F	EF (tC/TJ) H	Oxidation factor (%) I	NCV (MJ/t,km3) J
		A	B	C	D	E				
Raw coal	10,000t	2428.7	1595.9	322.8	1270.1	1240.9	6858.4	25.8	100	20908
Clean coal	10,000t						0	25.8	100	26344
Other washed coal	10,000t				102.64	10.5	113.14	25.8	100	8363
Coke	10,000t	0.78					0.78	29.2	100	28435
Coke oven gas	1E+8 m3		0.3				0.3	12.1	100	16726
Other coal gas	1E+8 m3	0.74	1.26				2	12.1	100	5227
Crude oil	10,000t	0.01				0.06	0.07	20	100	41816
Gasoline	10,000t	0.02					0.02	18.9	100	43070
Diesel	10,000t	2.16	0.36		0.05	0.41	2.98	20.2	100	42652
Fuel oil	10,000t	0.01	0.69			0.3	1	21.1	100	41816
LPG	10,000t						0	17.2	100	50179
Refinery gas	10,000t					3.26	3.26	15.7	100	46055
Natural gas	1E+8 m3	1.61	0.59			6.27	8.47	15.3	100	38931
Other petroleum products	10,000t						0	20	100	38369
Other coking products	10,000t						0	25.8	100	28435
Other energy	10,000t ce		6.17			3.46	9.63	0	100	0
Subtotal										

《China Energy Statistics Yearbook 2005》

Electricity Generation from the Thermal Power Plants of Northwest China Power Grid (2004)

Province	Electricity Generation (1E+8 kWh)	Electricity Generation (MWh)	On-site use (%)	Power output (MWh)
Shaanxi	444.39	44439000	7.5	41,106,075
Gansu	332.42	33242000	6.21	31,177,672
Qinghai	62.08	6208000	7.96	5,713,843
Ningxia	252.98	25298000	5.45	23,919,259
Xinjiang	227.52	22752000	9.07	20,688,394
Subtotal				122,605,243

《China Electric Power Yearbook 2005》

Total emission, tCO₂ **138,705,098**
Total Power Output [MWh] **122,605,243**
2004 EF (tCO₂/MWh) **1.13131**



Basic data for the Northwest China Power Grid for 2005

Fuel Type	Unit	Shaanxi	Gansu	Qinghai	Ningxia	Xinjiang	Subtotal G=A+B+C+D +E+F	EF (tC/TJ) H	Oxidation factor (%) I	NCV (MJ/t,km3) J
		A	B	C	D	E				
Raw coal	10,000t	2461.28	1597	345.1	1467.7	1358.09	7229.17	25.8	100	20908
Clean coal	10,000t	16.22					16.22	25.8	100	26344
Other washed coal	10,000t	35.56			101.95	10.2	147.71	25.8	100	8363
Coke	10,000t	3.23					3.23	29.2	100	28435
Coke oven gas	1E+8 m3						0	12.1	100	16726
Other coal gas	1E+8 m3						0	12.1	100	5227
Crude oil	10,000t					0.18	0.18	20	100	41816
Gasoline	10,000t	0.02				0.01	0.03	18.9	100	43070
Diesel	10,000t	2.24	0.46	0.06		0.5	3.26	20.2	100	42652
Fuel oil	10,000t	0.01	0.57			0.25	0.83	21.1	100	41816
LPG	10,000t						0	17.2	100	50179
Refinery gas	10,000t					7.71	7.71	15.7	100	46055
Natural gas	1E+8 m3	1.46	0.52	1.33		7.81	11.12	15.3	100	38931
Other petroleum products	10,000t						0	20	100	38369
Other coking products	10,000t						0	25.8	100	28435
Other energy	10,000t ce	8.24	1.3				9.54	0	100	0
Subtotal										

《China Energy Statistics Yearbook 2006》

Electricity Generation from the Thermal Power Plants of Northwest China Power Grid (2005)

Province	Electricity Generation (1E+8 kWh)	On-site use (MWh)	Power output (MWh)
Shaanxi	411	41100000	7.16 38,157,240
Gansu	331.06	33106000	4.23 31,705,616
Qinghai	55	5500000	2.69 5,352,050
Ningxia	276.43	27643000	5.73 26,059,056
Xinjiang	265.6	26560000	8.8 24,222,720
Subtotal			125,496,682

《China Electric Power Yearbook 2006》

Total emission, tCO₂ **147,425,979**
 Total Power Output [MWh] **125,496,682**
 2005 EF (tCO₂/MWh) **1.17474**



Basic data for the Northwest China Power Grid for 2006

Fuel Type	Unit	Shaanxi	Gansu	Qinghai	Ningxia	Xinjiang	Subtotal	EF	Oxidation factor	NCV
							G=A+B+C+D	(tC/TJ)	(%)	(MJ/t,km3)
		A	B	C	D	E	+E+F	H	I	J
Raw coal	10,000t	2834.44	1660.92	421.86	1833.72	1547.69	8298.63	25.8	100	20908
Clean coal	10,000t						0	25.8	100	26344
Other washed coal	10,000t				112.7	8.45	121.15	25.8	100	8363
Coke	10,000t				0.01		0.01	29.2	100	28435
Coke oven gas	1E+8 m3	0.2				0.08	0.28	12.1	100	16726
Other coal gas	1E+8 m3	0.1					0.1	12.1	100	5227
Crude oil	10,000t					0.02	0.02	20	100	41816
Gasoline	10,000t	0.01					0.01	18.9	100	43070
Diesel	10,000t	1.14	0.24	0.61		1.25	3.24	20.2	100	42652
Fuel oil	10,000t		0.6			0.11	0.71	21.1	100	41816
LPG	10,000t						0	17.2	100	50179
Refinery gas	10,000t						0	15.7	100	46055
Natural gas	1E+8 m3	1.59	0.56	1.06		7.49	10.7	15.3	100	38931
102,355	10,000t						0	20	100	38369
Other coking products	10,000t	1.86					1.86	25.8	100	28435
Other energy	10,000t ce	33.57	8.81			2.2	44.58	0	100	0
										Subtotal

《China Energy Statistics Yearbook 2007》

Electricity Generation from the Thermal Power Plants of Northwest China Power Grid (2006)

Province	Electricity			Power output (MWh)
	(1E+8 kWh)	Generation (MWh)	On-site use (%)	
Shaanxi	544.82	54482000	6.97	50,684,605
Gansu	357.38	35738000	4.29	34,204,840
Qinghai	72.04	7204000	2.57	7,018,857
Ningxia	367.31	36731000	0	36,731,000
Xinjiang	299.01	29901000	8.02	27,502,940
Subtotal				156,142,241

《China Electric Power Yearbook 2007》

Total emission, tCO₂ **167,633,385**
Total Power Output [MWh] **156,142,241**
2006 EF (tCO₂/MWh) **1.07359**

3-year average OM
1.12250

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Build Margin**Added capacity in the Northwest China Grid (2004-2006):****Installed capacity in the Northwest China Grid, 2006**

Type	Unit	Shaanxi	Gansu	Qinghai	Ningxia	Xinjiang	Total
Thermal power	MW	9723	6448	1517	6002	5937	29627
Hydro power	MW	2165	4291	5423	429	1766	14074
Nuclear power	MW	0	0	0	0	0	0
Wind farm and others	MW	46	199	0	11	189	445
Total	MW	11934	10938	6940	6442	7892	44146

Data source: China Electricity Yearbook 2006

Installed capacity in the Northwest China Grid, 2005

Type	Unit	Shaanxi	Gansu	Qinghai	Ningxia	Xinjiang	Total
Thermal power	MW	9132.1	5715	886.8	4577	5051.7	25362.6
Hydro power	MW	1578	4036.2	4825	428.5	1352.1	12219.8
Nuclear power	MW	0	0	0	0	0	0
Wind farm and others	MW	46	109.1	0	112.2	132.2	399.5
Total	MW	10756.1	9860.3	5711.8	5117.7	6536	37981.9

Data source: China Electricity Yearbook 2006

Installed capacity in the Northwest China Grid, 2004

Type	Unit	Shaanxi	Gansu	Qinghai	Ningxia	Xinjiang	Total
Thermal power	MW	7640.4	4975.6	889.8	3782	4959.7	22247.5
Hydro power	MW	1876.5	3566.1	4053.4	366.2	973	10835.2
Nuclear power	MW	0	0	0	0	0	0
Wind farm and others	MW	0	138.2	0	42.5	95.3	276
Total	MW	9516.9	8679.9	4943.2	4190.7	6028	33358.7

Data source: China Electricity Yearbook 2005

Capacity	2004	2005	2006	Added between 2004-2006	
Thermal	22247.5	25362.6	29627	7379.5	68.41%
Hydro	10835.2	12219.8	14074	3238.8	30.02%
Nuclear	0	0	0	0	0.00%
Wind	276	399.5	445	169	1.57%
Total	33358.7	37981.9	44146	10787.3	100.00%
% of 2006 capacity	75.56%	86.04%	100.00%		
Capacity addition	24.44%				

The China DNA has best-efficiency data for three types of power plant: solid-, liquid- and gas-fired. Emissions by type, and the representative emissions factor selected by the NDRC are shown below.



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Thermal power generation in 2005

Fuel Type	CO2 Emission	
	tCO2	%
Raw coal	164138337	97.92%
Clean coal	0	0.00%
Other washed coal	958466	0.57%
Coke	304	0.00%
Crude oil	613	0.00%
Gasoline	298	0.00%
Diesel	102355	0.06%
Fuel oil	22970	0.01%
Other petroleum products	0	0.00%
Other coking products	50033	0.03%
Natural gas	2336911	1.39%
Coke oven gas	20778	0.01%
Other coal gas	2319	0.00%
Liquid Petroleum Gas	0	0.00%
Refinery gas	0	0.00%
	167633385	100.00%

Fuel type	EF (tC/TJ)	Emissions by type
Solid	25.8	98.49%
Liquid	21.1	0.10%
Gas	15.3	1.41%

Best efficiency of Chinese power plants

Fuel type	Efficiency
Solid	37.28%
Liquid	48.81%
Gas	48.81%

Source: NDRC grid publications, 2008

Emission factor for fossil fuel

Fuel Type	Best Efficiency	Carbon emission (tC/TJ)	Oxidation factor (%)	Emission factor tCO2/MWh	Weighting
Solid	37.28%	25.8	1	0.9135	0.8997
Liquid	48.81%	21.1	1	0.5706	0.0006
Gas	48.81%	15.3	1	0.4138	0.0058
Weighted grid emission factor:					0.9061

	2004	New added capacity (2004-2006)	2005	2006
Total installed capacity	33358.7	10787.3	37981.9	44146
Thermal power installed capacity	22247.5	7379.5	25362.6	29627
Total change	24.44%		13.96%	
Thermal split of new capacity		68.41%		
Weighted emission factor (tCO2/MWh)	0.9061			
Build margin emission factor	0.6199			

Note:

There is a discrepancy with the data published on the NDRC website.
 NDRC publication looks at capacity addition between 2005-2006.
 However, the 2005-2006 capacity addition is less than 20%.



Annex 4

MONITORING INFORMATION

Part II Further clarifications on requirements as per VCS 3.0

Annex 1 Clarification of the 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

The proposed project was registered as CDM project on 24 September 2011 and the reference number is 3670. As VCS Version 3.0 came into force on 8 September 2011, the pre-CDM VER shall be verified against the VCS version 3 in terms of the VCS version 3. This clarification is annexed to cover all the requirements set out in the VCS version 3 for project validation together with the UNFCCC registered PDD (Version 3, May 24, 2011), according to the Policy Announcement from the VCS Association.. (<http://www.v-c-s.org/documents.html>)

Clarification of the 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:

1.2 Sectoral Scope and Project Type

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

Project Category: Renewable electricity in grid connected applications

1.3 Project Proponent

Clarification: The project proponent as follow:

CECEP Wind Power Incorporated Company.

Address: 12th Floor, A Building Jieneng Mansion, No.42 Xizhenmen North Street, Haidian District, Beijing, China 100082.

Mr. Shen Hongshuai. Project Manager. Tel: +86-10-62248705, Email: shenhongshuai@gmail.com;

Ms. Chen Dongjuan. Office Manager. Tel: +86-10-62248705, Email: dongjuan.chen@gmail.com;

Mr. Yao Xi. Project Manager. Tel: +86-10-62248706, Email: yaoxi@cecwpc.cn.

1.5 Project Start Date.

Clarification: The Project started commissioning on 21/11/2009.

1.6 Project Crediting Period.

Clarification: The Project crediting period is from 24/09/2011 to 23/09/2018.

1.7 Project Scale and Estimated GHG Emission Reductions or Removals.

Clarification:

Project	√
Mega-project	

Years	Estimated GHG emission reductions or removals (tCO ₂ e)
September 2011-August 2012	430,588
September 2012-August 2013	430,588
September 2013-August 2014	430,588
September 2014-August 2015	430,588
September 2015-August 2016	430,588
September 2016-August 2017	430,588
September 2017-August 2018	430,588
Total estimated ERs	3,014,116
Total number of crediting years	7
Average annual ERs	430,588

1.9 Project Location

Clarification: The Project site is located 7-10 km southwest of Yumen Town, Yumen City, Gansu Province in the People's Republic of China. It is located at Latitude between +40.1417N and +40.2572N, longitude between +96.8583E and +96.9575E.

1.10 Conditions Prior to Project Initiation.

Clarification: Prior to the Project initiation, the electricity in the area of NWPG mainly supplied by the fossil fuel fired power plants, especially coal fired plants. The purpose of the Project is to generate electricity using wind power resources in the project region and to deliver to the Northwest China Power Grid (NWPG). So the Project can reduce GHG emissions by replacing the electricity generated by fossil fuel fired power plants in NWPG.

1.12.1 Proof of Title

Clarification: Evidence of proof of title has been demonstrated via documentation proving ownership of the plant and equipment at the site. The owner has also obtained all relevant permits for to the proposed project including a Business License, FSR (Feasibility Study Report) approval, LoA and PPA. The project's design and implementation has been carried out in compliance with all relevant and national legislation in China.

1.12.2 Emissions Trading Programs and Other Binding Limits

Clarification: The project is not included in an emissions trading program except for that registered as CDM project, and does not take place in a jurisdiction or sector in which binding limits are established on GHG emissions.

1.12.3 Participation under Other GHG Programs

Clarification: The project does not participate in an emissions trading program, so this clause is not applicable.

1.12.4 Other Forms of Environmental Credit

Clarification: The project is located in China and is developed and operated by CECIC HKC Gansu Wind Power Co., LTD. The project is just purely registered as CDM project. There is no other environmental credit (for example renewable energy certificate) which has or will be produced by or obtained for the project during this monitoring period.

1.13 Additional Information Relevant to the Project

Eligibility Criteria

This project is wind farm project, a renewable energy project.

Leakage Management

There no leakage in the project.

Commercially Sensitive Information

N/A

Further Information

No further information.