CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-PDD)
Version 02 - in effect as of: 1 July 2004)

CONTENTS

Annexes

SECTION A. General description of project activity

A.1. Title of the project activity:

Ningxia Tianjing Shenzhou 30.6MW Wind-farm Project
PDD Version SZWi-03
01 March 2006

A.2. Description of the project activity:

The objective of Ningxia Tianjing Shenzhou 30.6MW Wind-farm Project (hereafter referred to as the project) is to generate renewable electricity using wind power resources and to sell the generated output to the Ningxia grid on the basis of a power purchase agreement (PPA) signed by the project owner and Ningxia Electric Power Company.

The project is located at Qingtongxia of Ningxia and near the Inner Mongolia border. The project will have a total installed capacity of 30.6MW. A total of 36 wind turbines will be installed with a unit capacity of 850 kW. The project is expected to generate 70.38GWh electricity annually and to sell 68.97 GWh power to the grid.

The project will contribute to sustainable development mainly by:

·Reducing greenhouse gas emissions, compared to a business-as-usual scenario;

·Helping to stimulate the growth of the wind power industry in Ningxia and China;

·Reducing other pollutants resulting from the power generation industry in China, compared to a business-as-usual approach;

·Creating local employment opportunities during the project construction and operation period;

·Reducing poverty, which is very important in Ningxia.

The Ningxia Government is supportive of the project because the development of wind power is in accordance with the national criteria for sustainable development and national policies relating to energy resources and the environment, which will push forward the use of renewable and clean energy across China.

A.3. Project participants:

The project participants are shown in Table A3-1:

Table A3-1 Project participants

Name of Party involved	Private (*) and /or public (**) entity	Party's willing or not to be regarded as participants
China (host)	Ningxia Tianjing Shenzhou Wind Power Ltd.**	No
UK	Trading Emissions Limited*	No

Below we provide more information on each of the entities involved in the project activity

Project Owner
Ningxia Tianjing Shenzhou Wind Power Ltd. (TSWP)

TSWP was approved to enrolment by Ningxia industrial and commercial bureau in May, 2002, which mainly deals in wind power. The shareholders of TSWP are Huarui electric Power Company and Ningxia Electric Power Group Co., Ltd. with 50%:50% shareholding.

CER Buyer

Trading Emissions Limited

The buyer of the CERs is Trading Emission Limited, a company registered in the UK. It is a wholly owned subsidiary of Trading Emissions PLC. Trading Emissions PLC raised £135m through its listing on the Alternative Investment Market (AIM) of the London Stock Exchange in April 2005 and its shareholders include several large financial organizations.

CDM Project Developer

Ningxia CDM Service Centre

Ningxia CDM Service Centre is a service institution focusing on CDM-related consulting and facilitation.

For more detailed contact information on participants in the project activities, please refer to Annex 1.

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

A.4.1.1. Host Party(ies):

The People's Republic of China

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

Ningxia Hui Autonomous Region

A.4.1.3. City/Town/Community etc:

Qingtongxia of Ningxia and near the Inner Mongolia border

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

The project is located at Qingtongxia of Ningxia and near the Inner Mongolia border. The coordinates of the project location are 105°46′ east longitude, 38°11′ north latitude. The site is 1300 m above sea level. It is 35 km away from Qingtongxia city and 57 km away from Yinchuan city, the capital of Ningxia. Figure A4.1 is location of the project.

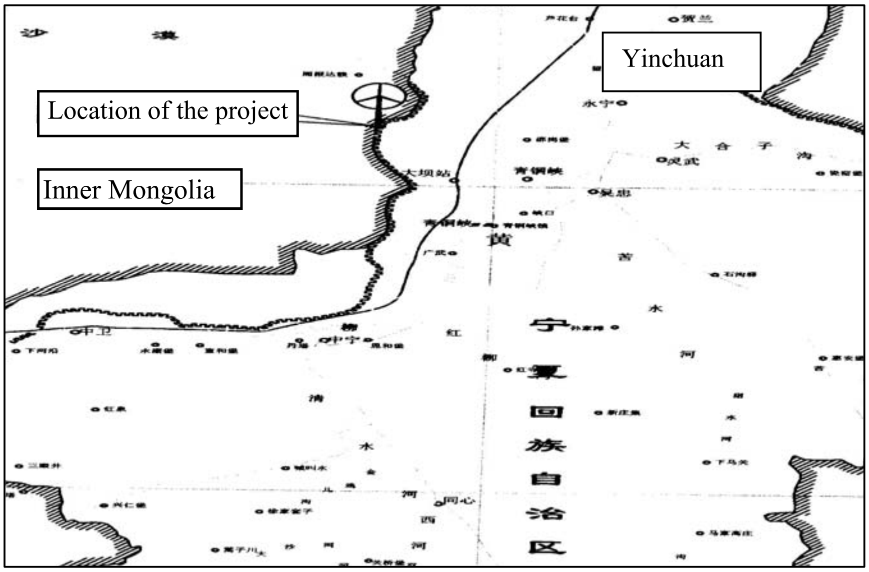

Figure A4.1 Location of the project

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

The project activity category belongs to:
Sectoral Scope 1: Energy industries
- Electricity generation from wind power

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

The project will use the variable pitch wind turbines (G52/58-850kW model) manufactured by the Spanish company Gamesa Eolica. The wind turbine is a proven technology, but still more advanced than the current Chinese wind turbine technology available domestically.

The Gamesa wind turbines with variable pitch can automatically align the tip angle of the blades to an optimum position according to the wind speed, and is therefore appropriate for operating in unstable wind conditions. It has higher wind utilization efficiency, higher energy conversion efficiency, and a better performance in terms of start-up and shutdown of the wind turbine. However, the variable pitch mechanism makes the structure more complicated and therefore the costs higher.

Local engineers and technicians are trained in the implementation of the project. Special attention will be given to the operation and maintenance of pitch-regulated wind turbines as well as the improvement of the technical capacity of monitoring staff.

A.4.4. Brief explanation of how the anthropogenic emissions of anthropogenic greenhouse gas (GHGs) by sources are to be reduced by the proposed CDM project activity, including why the emission reductions would not occur in the absence of the proposed project activity, taking into account national and/or sectoral policies and circumstances:

The electricity generated by the project activity is inputted into Ningxia Power Grid and connected to Northwest China Power Grid by Ningxia Power Grid.

The North-western China has rich and concentrated coal resources. As a result, the overall costs for constructing coal-fired power plants are comparatively low. Up to Dec. 2003, the total power generation of Northwest China Power Grid was 115,625GWh[1] and the power generation of fire power was 93,259GWh, which accounts for 80.66% of total power generation. So the Northwest China Power Grid is dominated by coal-fired power.

Therefore, without the project, the unmet power demand will be satisfied by newly built coal fired power plants and intensified operation of existing plants. The project is a renewable energy project, the generated power will displace part of the electricity generated by coal-fired power plants, and it will thus mitigate GHG emissions from coal fired power plants.

The Chinese government makes series of policies to encourage and promote the development of wind power industry, but there are no compulsory rules to wind power.

A.4.4.1. Estimated amount of emission reductions over the chosen crediting period:

The estimation of the emission reductions in crediting period is presented in Table A4-1.

Table A4-1 The estimation of the emission reductions in crediting period

Year	The estimation of annual emission reductions (tCO_2e)
2004	9,791
2005	26,110
2006	48,956
2007	58,747
2008	58,747
2009	58,747
2010	58,747
2011	58,747
2012	58,747
2013	58,747
2014	58,747
2015	58,747
2016	58,747
2017	58,747
2018	58,747
2019	58,747
2020	58,747
2021	58,747
2022	58,747
2023	58,747
2024	58,747
2025	29,374
The estimation of total emission reductions	**1,171,685**

[1] The State Electric Industry Yearbook 2004 p. 709

Total number of crediting years	7*3
The estimation of annual average emission reductions in crediting period(21 years)	*55,795*
The estimation of annual average emission reductions in crediting period(first crediting period)	*49,888*

A.4.5. Public funding of the project activity:

No public funding from the Annex 1 countries is provided to the project.

B Application of a baseline methodology

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

Revision to the approved consolidated baseline methodology ACM0002 (Version 5): Consolidated baseline methodology for grid-connected electricity generation from renewable sources. This methodology is available on the following website: http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html.

B.1.1. Justification of the choice of the methodology and why it is applicable to the project activity:

The baseline methodology ACM0002 is applicable to the project, because the project meets all the applicability criteria stated in the methodology:

·The project is a capacity addition from a renewable energy source, i.e. wind resources.

·The project does not involve an on-site switch from fossil fuels to a renewable source.

·The geographic and system boundaries for the relevant electricity grid, the Northwest China Power Grid, can be clearly identified and information on the characteristics of the grid is available.

· Be used in conjunction with the approved consolidated monitoring methodology ACM0002 (Consolidated monitoring methodology for grid-connected electricity generation from renewable sources).

Therefore, the project activity is in accordance with the applicability of ACM0002.

B.2. Description of how the methodology is applied in the context of the project activity:

According to the latest rules to project boundary of version 5 of ACM0002,
1. Use the delineation of grid boundaries as provided by the DNA of the host country if available; or
2. Use, where DNA guidance is not available, the following definition of boundary:

·In large countries with layered dispatch system (e.g. state/provincial/regional/national) the regional grid definition should be used.

According to above requirements, the Northwest China Power Grid is selected as the project boundary. The Northwest China Power Grid includes Shaanxi Power Grid, Gansu Power Grid, Qinghai Power Grid and Ningxia Power Grid.

The baseline emission factor (EF_y) is calculated as the simple average of the operating margin emission factor ($EF_{OM,y}$) and the build margin emission factor ($EF_{BM,y}$). In accordance with version 5 of ACM0002, the baseline emission factor can be calculated with the 3 steps described below:

STEP 1. Calculate the Operating Margin Emission Factor(s) ($EF_{OM,y}$)

Based on one of the four following methods:

(a) Simple *OM*, or
(b) Simple adjusted *OM*, or
(c) Dispatch data analysis *OM*, or
(d) Average *OM*.

Each method is described as below.

Method (a) Simple *OM*

The simple *OM* method only can be used when low-cost/must run resources constitute less than 50% of total amount grid generating output. Among the total electricity generations in 1999-2003 of the Northwest China Power Grid where the project connected into, the low-cost/must run resources constitute less than 50% of total amount grid generating output. The detailed information could be seen in Table B2-1.

Table B2-1 Annual electricity generation of Northwest China Power Grid 1999-2003

No.	Year	Electricity generation （GWh）			Proportion of hydropower etc.
		Total generation	Fire power	Hydropower etc.	
1	1999[2]	73614	49519	24097	32.73%
2	2000[3]	83408.99	56496.40	26912.59	32.27 %
3	2001[4]	85,978.97	62,314.81	23,664.16	27.52%
4	2002[5]	96,206.73	72,858.04	23,348.69	24.27%
5	2003[6]	115,625.0	93,259.0	22,364.33	19.34%

Method (b) Simple adjusted *OM*

The simple adjusted *OM* needs the annual load duration curve of the grid. As the detailed data of dispatch of Northwest China Power Grid and power plants are often taken as confidential business information, those data are not publicly available. It is difficult to adopt Method (b) for the calculation of the baseline emission factor of operating margin ($EF_{OM,y}$).

Method (c) Dispatch data analysis *OM*

Dispatch data analysis *OM* should be the first methodological choice if the dispatch data are available, because the method can truly reflect the substitutable relationship between the amount of electricity output from power plants of the baseline grid and from the proposed project activity and the emission reductions generated. However, Method (c) cannot be adopted for the proposed project because of unavailability of the dispatch data of the Northwest China Power Grid.

[2] The Sate Electric Industry Yearbook 2000 p.577
[3] The Sate Electric Industry Yearbook 2001 p.667
[4] The Sate Electric Industry Yearbook 2002 p.625
[5] The Sate Electric Industry Yearbook 2003 p.593
[6] The Sate Electric Industry Yearbook 2004 p.709

Method (d) Average *OM*

Method (d) can only be used when low-cost/must run resources constitute more than 50% of total amount of grid output. According to the calculation of Table B2-1, the project doesn't apply to the method, so it is not suitable for the project.

Thus, the method (a) Simple *OM* can be used to calculate the baseline emission factor of operating margin ($EF_{BM,y}$) for the project.

In accordance with ACM0002, the Simple *OM* emission factor ($EF_{OM,,y}$) is calculated as the generation-weighted average emissions per electricity unit (tCO_2/MWh) of all generating sources serving the system, excluding those low-operating cost and must-run power plants. The formula of $EF_{OM,simple,y}$ calculation is

$$EF_{OM,simple,y} = \frac{\sum_{i,j} F_{i,j,y} \cdot COEF_{i,j}}{\sum_{j} GEN_{j,y}} \qquad (B.1)$$

Where:
$F_{i,j,y}$ is the amount of fuel *i* consumed (tce) by relevant power sources *j* in years *y*,
j refers to the power sources delivering electricity to the grid, not including low-operating cost and must run power plants, and including imports to the grid.
$COEF_{i,j,y}$ is the CO_2 emission coefficient of fuel *i* (tCO_2/tce), taking into account the carbon content of the fuels used by relevant power sources *j* and the percent oxidation of the fuel in years *y*,
$GEN_{j,y}$ is the electricity (MWh) delivered to the grid by source *j*.

According to ACM0002, when *OM* emission factor ($EF_{OM,y}$) is calculated by using simple *OM* or average *OM*, if the plants and data are not available, i.e. lacking of amounts of generation/power supply, amount of fuel consumption, fuel type and emission factor etc., the aggregated generation and fuel consumption data could be used. The aggregated generation and fuel consumption data of 4 provincial-level grids (Shaanxi, Guansu, Qinghai and Ningxia) which constitute the Northwest China Power Grid are used for the project.

The CO_2 emission coefficient $COEF_{i,j,y}$ is then obtained from the following equation as

$$COEF_i = NCV_i \cdot EF_{CO2,i} \cdot OXID_i \qquad (B.2)$$

Where:
NCV_i is the net calorific value per ton of coal equivalent (GJ/tce);
$OXID_i$ is the oxidation factor of coal;
$EF_{CO2,i}$ is the CO_2 emission factor per GJ of coal (tCO_2/GJ).

Up to 2003, the Northwest China Power Grid has no electricity trade with other grids (The State Power Information Website http://www.sp.com.cn/zgdl/spw/12y/wsdljh.htm), so the emission factor of imported grid is needn't to be considered when calculating emission factor. As all of the thermal power plants are coal-fired power plants and the aggregated generation and fuel consumption data of 4 provincial-level grids (Shaanxi, Guansu, Qinghai and Ningxia) which constitute the Northwest China Power Grid could be obtained.

According to the suggestions by EB to the project participants by using the following alternatives when lacking of data: ((ii) Use the efficiency level of the best technology commercially available in the provincial/regional or national grid of China, as a conservative proxy, for each fuel type in estimating the fuel consumption to estimate the build margin (*BM*). For the estimation of the operating margin (*OM*) the average emission factor for the grid for each fuel type can be used.)

Then if without plant data, the aggregated generation/power supply, coal consumption of generation/power supply and emission coefficient of fuel types of each plant could be weighted, and the average emission factor for the grid for each fuel type can be used to estimation of *OM* emission coefficient.

Therefore, in formula B.1:
$F_{i,j,y}$ is the amount of coal consumption (tce) in years *y* of Shaanxi Power Grid, Gansu Power Grid, Qinghai Power Grid, Ningxia Power Grid;
j is the Shaanxi Power Grid, Gansu Power Grid, Qinghai Power Grid, Ningxia Power Grid connected into the Northwest China Power Grid, not including low-operating cost and must run power plants, and including imports to the grid;
COEF is the CO_2 emission coefficient of fuel i (tCO_2/tce);
$GEN_{j,y}$ is the power generation (MWh) provided to the Northwest China Power Grid in years *y* by Shaanxi Power Grid, Gansu Power Grid, Qinghai Power Grid, Ningxia Power Grid.

The fraction of carbon oxidised *OXIDi* is chosen as 98%[7], since specific value is available for neither the Northwest China Power Grid nor China's power sector as a whole; the *NCVi* for standard coal is 29.27GJ/tce [8] ; $EF_{CO2,i}$ equals to 25.8tC/TJ, which is equivalent to 0.0946tCO_2/GJ [9] (25.8tC/TJ*44/12/1000=0.0946tCO_2/GJ).

As a result, the *COEFi* = 94.6* 29.27 * 98% = 2.713563 tCO_2 /tce

The *OM* emission factor ($EF_{OM,y}$) is calculated as a 3-year average (2001-2003), based on the most recent statistics available. The details could be seen in Annex 3.

The Operating Margin Emission Factor ($EF_{OM,y}$) could be calculated according to above equation and data of the Northwest China Power Grid in 2001-2003 in Annex 3:

Table B2-2: *OM* emission factor

Year	Emission factor（tCO_2/MWh）
2001	0.998383
2002	0.984468
2003	0.986494
Average of 3 years	**0.989782**

Step 2. Calculation of the Build Margin Emission Factor ($EF_{BM,y}$)

The Build Margin Emission Factor ($EF_{BM,y}$) is calculated according to ACM0002:

7 IPCC Good Practice Guidance, p1.29
8 China Energy Statistics Yearbook 2004 p535
9 www.ipcc.ch

$$EF_{BM,y} = \frac{\sum_{i,m} F_{i,m,y} \times COEF_{i,m}}{\sum_{m} GEN_{m,y}} \qquad (B.3)$$

Where
$F_{i,m,y}$ is the amount of fuel *i* (tce) consumed by plant *m* in year *y*;
$COEF_{i,m,y}$ is the CO_2 emission coefficient (tCO_2/tce) of fuel *i*, taking into account the carbon content of the fuels used by plant *m* and the percent oxidation of the fuel in year *y*;
$GEN_{m,y}$ is the electricity (MWh) delivered to the grid by plant *m*.

Calculate the Build Margin emission factor $EF_{BM,y}$ ex ante based on the most recent information available on plants already built for sample group m at the time of PDD submission. The sample group m consists of either:
• The five power plants that have been built most recently, or
• The power plants capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently.

The following clarifications are given by EB for deviation in use of methodology AM0005 and AMS-I.D by several project activities in China when estimating *BM* emission coefficient:
1) Use of capacity additions during last 1 - 3 years for estimating the build margin emission factor for grid electricity.
2) Use of weights estimated using installed capacity in place of annual electricity generation to calculate *BM* emission coefficient.
3) Use the efficiency level of the best technology commercially available in the provincial/regional or national grid of China, as a conservative proxy, for each fuel type in estimating the fuel consumption

The formula B.3 could be rewrote as:

$$EF\_BM_y = \frac{\sum_i (F_{i,y} \times COEF_i)}{\sum_k^m GEN_{k,y}} = \frac{\sum_k^m ((CAP_{k,y} \times Hour_{k,y} \times Effi_k) \times COEF_k)}{\sum_k^m (CAP_{k,y} \times Hour_{k,y})} \qquad (B.4)$$

Where:
$CAP_{k,y}$ is the capacity additions of plant k in newly built plants for sample group m;
$Hour_{k,y}$ is the annual operating hours in year(s) y by plant k (assuming load factor is 100%);
$Effi_k$ is the switch efficiency of plant k (gce/kWh).

According to above deviation accepted by EB, assuming that:
) $CAP_{k,y} \rightarrow CAP_{i,k}$. $CAP_{i,k}$ is the capacity additions *k* during last i (i=1,2,3) years, not calculating in term of plants one by one. The capacity additions during last 1-3 years add up to the most close to 20% of total installed capacity;
ii) The annual operating hours $Hour_k$ of capacity additions for the same type *k* are same;
iii) $Effi_k \rightarrow Effi_{best,k}$, is the efficiency level of the best technology commercially available in the provincial/regional grid of China for installed capacity of fuel type *k*.

So formula B.4 could be further deviated as:

$$EF\_BM_y = \frac{\sum_i (F_{i,y} \times COEF_i)}{\sum_k^m GEN_{k,y}} = \frac{\sum_k ((\sum_i^3 CAP_{i,k}) \times Hour_k \times Effi_{best,k} \times COEF_k)}{\sum_k ((\sum_i^3 CAP_{i,k}) \times Hour_k)} \quad (B.5)$$

Use of weights estimated using installed capacity in place of annual electricity generation to calculate *BM* emission coefficient has been presented.

If further assuming that the annual operating hours $Hour_k$ of capacity additions for various fuel type *k* are similar, it could be considered as constant in formula B.5 and B.5 can be simplified:

$$EF\_BM_y = \frac{\sum_i (F_{i,y} \times COEF_i)}{\sum_k^m GEN_{k,y}} = \frac{\sum_k ((\sum_i^3 CAP_{i,k}) \times Effi_{best,k} \times COEF_k)}{\sum_k (\sum_i^3 CAP_{i,k})} \quad (B.6)$$

The above formula is typically simplified as using of weights estimated using installed capacity in place of annual electricity generation to calculate *BM* emission coefficient has been presented.

The fraction of new added coal-fired plants (20%) of Northwest China Power Grid could be seen in the following table.

Table B2-3: Installed capacity of Northwest China Power Grid, 1999-2003

	1999	2000	2003
Thermal Plants (MW)	10 743.0	12,364.0	16,079.0
Hydro Plants (MW)	7,267.9	7,822.9	8,392.2
Other (MW)	0	0	31.6
Total of installed capacity (MW)	18,010.9	20,186.6	24,503.0
Capacity as of installed capacity of 2003	26.50%	17.62%	100%
The fraction of newly added coal fired capacity	82.20%		
Data Source: Installed capacity in 1999: The State Electric Industry Yearbook 2000 p. 577 Installed capacity in 2000: The State Electric Industry Yearbook 2001 p. 666 Installed capacity in 2003: The State Electric Industry Yearbook 2004 p. 709			

TableB2-3 shows the installed power capacity in Northwest China Power Grid in year 1999 and 2003. It can be seen that the capacity additions during 1999-2003 exceed 26.50% of installed capacity in 2003, so data in years 1999 and 2003 are used to calculate the BM emission coefficient of Northwest China Power Grid. Thermal power plants accounted for 82.20%of the total capacity additions in Northwest China Power Grid during 1999-2003.

According to the request for clarification on use of approved methodology AM0005 for several projects in China ((ii) Use the efficiency level of the best technology commercially available in the provincial/regional or national grid of China, as a conservative proxy, for each fuel type in estimating the fuel consumption to estimate the build margin (*BM*). For the estimation of the operating margin (*OM*) the average emission factor for the grid for each fuel type can be used.) The clarification applies to ACM0002. The coal consumption of power supply of advanced fire power technology is 320gce/kWh[10].

The Building Margin Emission Factor ($EF_{BM,y}$) is calculated according to above data:
BM=0.713735 tCO_2/MWh

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[10] China Climate Change Country Study p. 199

Step 3. Calculation of the baseline emission factor (EF_y)

Based on ACM0002, the baseline emission factor EF_y was calculated as the weighted average of the Operating Margin emission factor ($EF_{OM,y}$) and the Build Margin emission factor ($EF_{BM,y}$).

$$EF_y = w_{OM} \cdot EF_{OM,y} + w_{BM} \cdot EF_{BM,y} \quad \text{(B.4)}$$

Where the weights by default are 50%, i.e. the weights of *OM* and *BM* are same.

$w_{OM} = w_{BM} = 0.5$

Hence $EF_y = 0.5*EF_{OM,y} + 0.5*EF_{BM,y}$

$EF_y = 0.5*0.989782 + 0.5*0.713735$

$= 0.851758$ (tCO_2/MWh)

The above calculation is shown as follows:

Calculation of the baseline emission factor

Emission factor	Value (t CO_2/MWh)	Weight	Weighted Value (t CO_2/MWh)
OM Emission Factor	0.989781627	0.5	0.494891
BM Emission Factor	0.713734698	0.5	0.356867
Baseline Emission Factor			0.851758

Step 4. Calculate the baseline emissions (BE_y) and emission reductions (ER_y)

According to ACM0002, the baseline emissions (BE_y) are calculated as:

$$BE_y = EG_y \cdot EF_y \quad \text{(B.5)}$$

Where:

BE_y the baseline emission of Northwest China Power Grid in year *y*, EG_y the amount of power generated by the project and supplied to the grid, and EF_y the emission factor in year *y*.

B.3. 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:

The following steps are used to demonstrate the additionality of the project according to latest version of the "Tool for the demonstration and assessment of additionality" agreed by the Executive Board.

Step 0. Preliminary screening based on the starting date of the project activity

The project activity was commenced in 01 December 2002. According to the decision CP.1 of Kyoto Protocol (Decides that project activities that started in the period between 1 January 2000 and 18 November 2004 and have not yet requested registration but have either submitted a new methodology or have requested validation by a designated operational entity by 31 December 2005 can request retroactive credits if they are registered by the Executive Board by 31 December 2006 at the latest), the crediting period of the project is from 1 Jul. 2004.

In 18 September 2002, TSWP organized managerial staff to study and held a meeting of the board to construct planned 30.6MW wind power project by using CDM (See Additional Annex).

This clearly demonstrated that the Project Entity was aware about the potential for CDM before the start of the CDM activity, and has incorporated this information in its decision-making.

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

The objective of the Step 1 is to define realistic and credible alternatives to the project activity that can be part of the baseline scenario through the following sub-steps:

Sub-step 1a. Alternatives

In the absence of the proposed project, the alternative baseline scenarios would be:

Scenario 1: Construction of a fuel-fired power plant with equivalent amount of installed capacity or annual electricity output;
Scenario 2: Construction of a commercialised wind power project with equivalent amount of installed capacity;
Scenario 3: Construction of a power plant using other sources of renewable energy with equivalent amount of installed capacity;
Scenario 4: Provision of equivalent amount of annual power output by the grid where the proposed project is connected into (excluding low cost/must run plants).

Sub-step 1b. Applicable laws and regulations

At present, national planning frameworks, policies and regulations promoting wind power development have been made. For example, *Wind Power Medium- and Long-term National Planning Framework, Program of Action for sustainable Development in China in the Early 21st Century, Renewable Energy Promotion Law*. Policies and regulations promoting the industrialization of renewable energy technology options and localization of equipments, such as *New and Renewable Energy Industrial Development Planning Outline for 2000-2015, Renewable Energy Promotion Law, Guide to Key Areas for High-tech Development (2004) Circular on Organizing*. These regulations are benefit for implementation of the project.

The scenario most likely to occur among the four alternative scenarios is analysed as follow:

·In generally speaking, the annual operational hours for a fossil fuel-fired power plant are about at least 2 times more than that of a wind power project. Therefore the power generation capacity for a fuel-fired power plant is about at least 2 times more than that of a wind power project with equivalent amount of installed capacity. If taking the same annual power generation capacity, the alternative baseline scenario for the project should be a fuel-fired power plant with installed capacity of 15MW or lower. Further, as the proposed project is a grid-connected wind power generation project, the alternative baseline scenario must be a grid-connected fuel-fired power generation project. However, according to Chinese regulations, coal-fired power plants of less than 135MW are prohibited for construction in the areas covered by the large grids such as provincial grids[11], and the fossil fuel-fired power units with less than 100MW is strictly regulated for installation[12]. For these reasons, the possible alternative

[11] Notice on Strictly Prohibiting the Installation of Fuel-fired Generators with the Capacity of 135MW or below issued by the General Office of the State Council, decree no. 2002-6.
[12] Interim Rules on the Installation and Management of Small-scale Fuel-fired Generators (issued in Aug. 1997)

baseline scenario of building a 15MW fuel-fired power plant conflicts with Chinese regulations. So, scenario 1 is not feasible as an alternative scenario.

·The unit capacity of turbine for the proposed project was selected for 850KW, and under the current market condition in China, the wind turbine with the capacity exceeding 600KW has not yet been commercialised at present. So, the scenario 2 is not feasible as an alternative scenario.

·Among all the possible technology options of grid-connected renewable energy power projects, only the hydropower project has the investment rate of return that can compete over that of wind power in China. But the project location has no exploitable hydropower resources. Hence the scenario 3 is not feasible as an alternative scenario.

·According to the regulation and policies that currently governing the Chinese power market, the Northwest China Power Grid will have the installation capacity not only for the existing power plants including those incremental plants built during the past three years, but also for the new power plant to be developed in a foreseeable future. Therefore, alternative 4 is the only feasible alternative scenario. The Northwest China Power Grid is selected as the baseline for the project. For detailed information on the analysis please see section B.4.

To summarize, the project is not a baseline scenario, and the baseline scenario is alternative 4, the provision of equivalent amount of the annual power output of the grid where the project connected into.

Step 2. Investment Analysis

The purpose of this step is to determine whether the project activity is economically or financially less attractive than other alternatives without an additional revenue/funding, possibly from the sale of certified emission reductions (CERs). The investment analysis was conducted in the following steps:

Sub-step 2a. Determine appropriate analysis method

Tools for the demonstration and assessment of additionality suggest three analysis methods are simple cost analysis (option I), investment comparison analysis (option II) and benchmark analysis (option III). Since the project will earn the revenues not only the CDM but also electricity sales, the simple cost analysis method is not appropriate. Investment comparison analysis method is applicable to projects whose alternatives are similar investment projects. Only on such basis, comparison analysis can be conducted. The alternative baseline scenario of the project is the Northwest China Power Grid rather than new investment projects. Therefore option 2 is not an appropriate method. The project will use benchmark analysis method based on the consideration that benchmark IRR and equity IRR of the power sector are both available.

Sub-step 2b. Benchmark Analysis Method (Option 3)

With reference to *Interim Rules on Economic Assessment of Electrical Engineering Retrofit Projects*, the financial benchmark rate of return (after tax) of Chinese power industries accounts for 8% of the total investment IRR or 10% of the IRR on equity. Presently, the financial benchmark rate of return is used in the analysis of the majority of power projects in China including wind power.

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

(1) Basic parameters for calculation of financial indicators

Based on the feasibility study report of the project, basic parameters for calculation of financial indicators are shown in the following Table:

Table B3-1: Basic parameters of the feasibility study report

No.	Name of the project	Indicators parameters
1	Installed capacity	30.6MW
2	Estimated annual output	68,972.4MWh
3	Project lifetime	21
4	Total investment	RMB 257.03 million yuan
5	Prospective bus-bar tariff	0.56 yuan/kWh
6	Tax	
	VAT	8.5%
	income tax	33%

·Crediting period: 7*3 yrs (Renewable)

·Expected CERs price: Euro 6.35/tCO_2e

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

In accordance with benchmark analysis (Option III), if the financial indicators (such as *IRR* and *NPV*) of the project are lower than the benchmark, the project is not considered as financially attractive.

Table B3-2: Financial indicators of the project

	NPV (total investment) (RMB million yuan)	*NPV* (equity) (RMB million yuan)	*IRR* (total investment) Benchmark=8%	*IRR* (equity) Benchmark=10%
Without CDM	–2,505.83	-1,055.05	7.02%	9.0%
With CDM	2,621.95	1,714.39	9.0%	13.0%

Table B3-2 shows the *IRR* and *NPV* of the project, with and without CDM revenues. Without CDM, the IRR of total investment is lower than the benchmark 8% and the *IRR* of equity is lower than the benchmark 10%. Thus, the project is not financially attractive. With CDM, CERs revenue will significantly improve both *IRR* of total investment and of equity, which exceed the benchmarks. Therefore, the project, with CDM revenue, can be considered as financially attractive to investors.

Sub-step 2d. Sensitivity analysis

The objective of sensitivity analysis is to show whether the conclusion regarding the financial attractiveness is robust to reasonable variations in the critical assumptions. The investment analysis provides a valid argument in favour of additionality only if it consistently supports (for a realistic range of assumptions) the conclusion that the project activity is unlikely to be the most financially attractive or is unlikely to be financially attractive.

For the project, the following financial parameters were taken as uncertain factors for sensitive analysis of financial attractiveness:

·Total investment

·Annual O&M cost

·Power delivered to the grid

The impact of change for on-grid price is not considered as the on-grid price is approved by related price department.

When the above three financial indicators where fluctuated within the range of –10% to +10%, the IRR of total investment of the project varies to different extent. The impacts to IRR of total investment by above parameters fluctuation are (not considering CERs income):

·Total investment: When total investment decreases 6.3%, the IRR of total investment is equal to benchmark. However, the total investment may not have large fluctuation, especially the decrease. The project feasibility study report shows that the equipment investment of the project accounts for 92% of the total investment and the equipment price is fixed by open tendering.

·When annual power delivered to the grid increases 6.1%, the *IRR* of total investment is equal to benchmark. However, the operating hours in the project feasibility study report is decided by the wind resources. The annual average operating hours and power delivered to the grid may fluctuate within small range, but they may not achieve or exceed 6.1%.

·When annual O&M cost decreases 33%, *IRR* of total investment exceeds the benchmark.

Based on above analyses, without support of CER income, the project is not economically attractive, so the project is additional.

Step 3. Barrier analysis

Sub-step 3a. Identify barriers that would prevent the implementation of type of the proposed project activity:

The barriers may include:

·Investment barrier

The per KW total investment cost of 850kW wind turbine adopted by the project is 8,376.7 yuan/kW which is much higher than that of conventional coal-fired power plants of the Northwest China Power Grid. Although prospective tariff policy and other incentives with respect to wind power projects are currently in place, financial indicators of grid-connected wind power projects have not fundamentally changed and the loan repayment capability remains weak.

Moreover, investment barrier is from external investors of the project. Financial institutions perceive some risks associated with the operation and maintenance of the equipment, making it difficult for the project to gain loans.

·Technical barrier

The project introduces technology and equipment from overseas, which is in a stage of technical demonstration for TSWP. TSWP maybe faces the risk of project management and actual operation.

·Power price barrier

The power price of loan repayment capacity expected in the project feasibility study report is 0.56 yuan/kWh (excluding VAT), but the power price of the project approved by the related department of

Ningxia government is 0.53 yuan/kWh (excluding tax), which causes more financing and operation barriers.

Sub-step 3b. Show that the identified barriers would not prevent the implementation of at least one of the alternatives (except the project activity)

As mentioned in Sub-step 1a, the feasible and reasonable alternative baseline is alternative 4, i.e. the Northwest China Power Grid that the project sites in provides equivalent capacity and equivalent annual electricity generation, not including low operating cost and must run power plants. The existing and new incremental power capacity in the Northwest China Power Grid is in compliance with Chinese laws and regulations without any investment, technological or tariff barrier etc..

Step 4. Common practice analysis

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

At present, only Ningxia Electric Power Group Co., Ltd build Ningxia Helanshan Wind-farm Project with 111.9MW installed capacity and the project is developed as CDM project.

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

There is a big difference between above built project and the project:
Ningxia Electric Power Group Co., Ltd, the owner of Ningxia Helanshan Wind-farm Project, is mainly engaged in the construction of power sources in Ningxia and has rich experience of electricity generation and management. However, the project owner, Ningxia Tianjing Shenzhou Wind Power Ltd., was built in May 2002, which has limited financing and loan channels. So there is a big difference on investment environment between the project and above built project.

Step 5. Impact of CDM registration

It is obvious that CDM income is one of the important income sources for the project activity. If the CER price is set as 7.5US$/t$CO_2$, the CER revenue is about 3.29 million yuan, which accounts for 9.5% of the project total income. The potential benefit will increase investment return and reduce investment risk directly. It is benefit for project owner to push ahead the project activity.

In conclusion, the project is additional.

B.4. Description of how the definition of the project boundary related to the baseline methodology selected is applied to the project activity:

According to ACM0002, the spatial extent of the project boundary includes the project site and all power plants connected physically to the electricity system that the CDM project power plant is connected to. Project boundary of the project is the project and other power plants connected to the Northwest China Power Grid (including Shaanxi Province, Gansu Province, Qinghai Province, and Ningxia Autonomous Region).

B.5. Details of baseline information, including the date of completion of the baseline study and the name of person (s)/entity (ies) determining the baseline:

Date of completion: 30/11/2005
Name of person determining the baseline: Zhang Jisheng

Tel：0951-6193183

Fax：0951-6193563

Email: nxzjsh@vip.sina.com
Affiliated institution: Ningxia CDM Service Centre (CDM project developer, not a project participant)
Contributors:
Zhao Ying Ningxia CDM Service Centre
Dou Zixi Ningxia CDM Service Centre
Zhao Xianxiang Ningxia Tianjing Shenzhou Wind Power Ltd.
Li Xinzhong Ningxia Tianjing Shenzhou Wind Power Ltd.

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:

01/12/2002

The starting date for the CDM project activity is 01 December 2002, between Jan. 1, 2000 and Nov. 18, 2004, as may be illustrated by related conference information of the project entity. See Additional Annex.

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

The lifetime of the project is expected to be at least 21 years.

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

C.2.1. Renewable crediting period

A renewable crediting period will be used

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

01/07/2004

C.2.1.2. Length of the first crediting period:

7 years

C.2.2. Fixed crediting period:

Not applicable – left open on purpose

C.2.2.1. Starting date:

Not applicable – left open on purpose

C.2.2.2. Length:

Not applicable – left open on purpose

SECTION D. Application of a monitoring methodology and plan

D.1. Name and reference of approved monitoring methodology applied to the project activity:

Revision to the approved consolidated monitoring methodology ACM0002: "Consolidated monitoring methodology for zero-emissions grid-connected electricity generation from renewable sources". This methodology is available on the following website: http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html.

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

The monitoring methodology ACM0002 is applicable to the project, because the project meets all the applicability criteria stated in the methodology:

·The project is a capacity addition from a renewable energy source, i.e. wind resources.

·The project does not involve an on-site switch from fossil fuels to a renewable source.

·The geographic and system boundaries for the Northwest China Power Grid can be clearly identified and information on the characteristics of the grid is available.

·Be used in conjunction with the approved consolidated baseline methodology ACM0002 (Consolidated baseline methodology for grid-connected electricity generation from renewable sources).

D.2. 1. Option 1: Monitoring of the emissions in the project scenario and the baseline scenario

D.2.1.1. Data to be collected in order to monitor emissions from the project activity, and how this data will be archived:

ID number (Please use numbers to ease cross-referencing to D.3)	Data variable	Source of data	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	For how long is archived data kept?	Comment
NA									

This table is left open on purpose. The project activity, being a zero-emission activity, does not have any project emissions. Hence the monitoring is unnecessary.

D.2.1.2. Description of formulae used to estimate project emissions (for each gas, source, formulae/algorithm, emissions units of CO_2 equ.)

This table is left open on purpose. The project activity, being a zero-emission activity, does not have any project emissions. $PE_y = 0$

D.2.1.3. Relevant data necessary for determining the baseline of anthropogenic emissions by sources of GHGs within the project boundary and how such data will be collected and archived:

ID number (Please use numbers to ease cross-referencing to table D.3)	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e),	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	For how long is archived data kept?	Comment
1. EG_y	The electricity supplied to the grid by the project	Measured and verified against sales data	MWh	Directly measured (m)	Measured on an hourly basis and recorded on a monthly basis	100 %	Electronic with paper back-up	During the crediting period and two years after	Power supplied to the grid and double checked according to receipts of power selling.

D.2.1.4. Description of formulae used to estimate baseline emissions (for each gas, source, formulae/algorithm, emissions units of CO_2 equ.)

The important steps of ACM0002 are:

1. Calculation of Operating Margin (*OM*) emission factor
2. Calculation of Build Margin (*BM*) emission factor
3. Calculation of Combined Margin (*CM*) emission factor

Calculation of *OM* emission factor ($EF_{OM,y}$):

According to Simple *OM*, the *OM* emission factor ($EF_{OM,y}$) is calculated as:

$$EF_{OM,simple,y} = \frac{\sum_{i,j} F_{i,j,y} \cdot COEF_{i,j}}{\sum_{j} GEN_{j,y}} \qquad \text{(D.1)}$$

With:

·$F_{i,j,y}$ the amount of fuel i consumed by relevant power sources j in year(s) *y*.

· *j* runs over all power sources including imports, but excludes low operating costs and must-run power plants.

·$COEF_{i,j,}$ the CO_2 emission coefficient of fuel i, taking into account the carbon content of fuels used by relevant power sources j and the percentage oxidation of the fuel in year(s) *y*;

·$GEN_{j,y}$ the electricity delivered to the grid by source j in year *y*.

The CO_2 emission coefficient $COEF_i$ is obtained as

$$COEF_i = NCV_i \cdot EF_{CO2,i} \cdot OXID_i \qquad \text{(D.2)}$$

Where:

NCV_i is the net calorific value of coal equivalent (GJ/tce);

$OXID_i$ is the oxidation factor of coal;

$EF_{CO2,i}$ is the CO_2 emission factor of coal (tCO_2/GJ).

The *OM* emission factor is calculated as a 3-year average (2001-2003), based on the most recent statistics (See Annex 3) available.

Calculation of *BM* emission factor ($EF_{BM,y}$):

According to ACM0002, the *BM* emission factor ($EF_{BM,y}$) is calculated as:

$$EF_{BM,y} = \frac{\sum_{i,m} F_{i,m,y} \times COEF_{i,m}}{\sum_{m} GEN_{m,y}} \quad (D.3)$$

Where

$F_{i,m,y}$ is the amount of fuel *i* (tce) consumed by plant *m* in year *y*.

$COEF_{i,m,y}$ is the CO_2 emission coefficient (tCO_2/tce) of fuel *i*, taking into account the carbon content of the fuels used by plant *m* and the percent oxidation of the fuel in year *y*.

$GEN_{m,y}$ is the electricity (MWh) delivered to the grid by plant *m*.

The conservative estimation of emission factor of *BM* ($EF_{BM,y}$) can be represented by the product of the fraction of new added coal-fired plant (20%) of the Northwest China Power Grid, the PSCC of best practice in newly added coal-fired plants and the emission coefficient of coal.

CM emission factor (EF_y):

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

$$EF_y = w_{OM} \cdot EF_{OM,y} + w_{BM} \cdot EF_{BM,y} \quad (D.4)$$

The default weights are used: $w_{OM} = w_{BM} = 0.5$

The Baseline Emission Factor (EF_y) could be calculated according to default weights ($w_{OM} = w_{BM} = 0.5$) and $EF_{OM,y}$ and $EF_{BM,y}$.

Calculate the baseline emissions (BE_y).

According to ACM0002, the baseline emissions (BE_y) is calculated as

$$BE_y = EG_y \cdot EF_y \quad \text{(D.5)}$$

The baseline emission could be calculated according to the amount of power generated by the project and supplied to the grid (EG_y) and EF_y.

D.2.2. Option 2: Direct monitoring of emission reductions from the project activity (values should be consistent with those in section E).

Leave intentionally blank. This option is not applied to the project.

D.2.2.1. Data to be collected in order to monitor emissions from the project activity, and how this data will be archived:

ID number (Please use numbers to ease cross-referencing to table D.3)	Data variable	Source of data	Data unit	Measured (m), calculated (c), estimated (e),	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	For how long is archived data kept?	Comment
NA									

Leave intentionally blank. This option is not applied to the project.

D.2.2.2. Description of formulae used to calculate project emissions (for each gas, source, formulae/algorithm, emissions units of CO_2 equ.):

Leave intentionally blank. This option is not applied to the project.

D.2.3. Treatment of leakage in the monitoring plan

D.2.3.1. If applicable, please describe the data and information that will be collected in order to monitor leakage effects of the project activity

ID number (Please use numbers to ease cross-referencing to table D.3)	Data variable	Source of data	Data unit	Measured (m), calculated (c) or estimated (e)	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	For how long is archived data kept?	Comment

Leave intentionally blank. In accordance with ACM0002, there is no leakage.

D.2.3.2. Description of formulae used to estimate leakage (for each gas, source, formulae/algorithm, emissions units of CO2 equ.)

Leave intentionally blank. In accordance with ACM0002, there is no leakage. Hence $L_y = 0$.

D.2.4. Description of formulae used to estimate emission reductions for the project activity (for each gas, source, formulae/algorithm, emissions units of CO_2 equ.)

The emission reduction ER_y by the project activity during a given year y is the difference between baseline emissions (BE_y), project emissions (PE_y) and emissions due to leakage (L_y), as follows:

$$ER_y = BE_y - PE_y - L_y \quad \text{(D.6)}$$

There is no project emission, then PE_y=0.
There is no leakage due to the project activity, then L_y=0.

So the emission reductions by the project activity are as follows:
$ER_y = EG_y \times EF_y$

So the Emission Reductions due to the project (ER_y) are equal to the baseline emissions (BE_y).

D.3. Quality control (QC) and quality assurance (QA) procedures are being undertaken for data monitored		
Data (Indicate table and ID number e.g. 3.-1.; 3.2.)	Uncertainty level of data (High/Medium/Low)	Explain QA/QC procedures planned for these data, or why such procedures are not necessary.
1. EG_y in Table D.2.1.3	Low	The data will be directly used to calculate emission reductions. The record of sales to the grid and other relevant records are used to ensure consistency.

Power generated and delivered from the wind-farm to the grid is monitored via the two interconnected transformers and archived for future verification. The electricity quantity will be measured through national standard electricity meters.

D.4 Please describe the operational and management structure that the project operator will implement in order to monitor emission reductions and any leakage effects, generated by the project activity

The project developer has established a specialized control centre for project monitoring. The control centre will provide the operation reports of the project activity in line with actual needs. The reports will record daily operation of the wind turbines, including operating periods, power generation, power delivered to the grid, equipment defects, etc. The monitoring reports will be archived. The control centre will also carry out regular calibrations on the related equipment, to insure the accuracy of the monitoring data. The operation reports will reflect the calibration results as well.

For more details refer to Annex 4.

D.5 Name of person/entity determining the monitoring methodology:

Person determining the monitoring methodology: Zhang Jisheng
Tel: 0951-6193183
Fax: 0951-6193563
Email: nxzjsh@vip.sina.com

Entity:
Ningxia CDM Service Centre (CDM project developer, not a project participant)

Zhao Xianxiang	Ningxia Tianjing Shenzhou Wind Power Ltd.
Li Xinzhong	Ningxia Tianjing Shenzhou Wind Power Ltd.
Zhao Ying	Ningxia CDM Service Centre
Dou Zixi	Ningxia CDM Service Centre

SECTION E. Estimation of GHG emissions by sources

E.1. Estimate of GHG emissions by sources:

The Project emissions are zero according to ACM0002, as argued above. Hence PE_y=0.

E.2. Estimated leakage:

As explained in Section D.2.3.2, the project produces no GHG emissions through leakage, i.e., L_y=0.

E.3. The sum of E.1 and E.2 representing the project activity emissions:

$PE_y + L_y = 0$
This means the project activity emissions are zero.

E.4. Estimated anthropogenic emissions by sources of greenhouse gases of the baseline:

According to Section B.2, the *CM* emission factor of the project is EF_y= 0.851758 tCO2/MWh.
The annual amount of electricity to be delivered to the grid from the project is EG_y=68.97 GWh.
The baseline emissions (BE_y) are $BE_y = EG_y * EF_y$=58,748 tCO_2.

E.5. Difference between E.4 and E.3 representing the emission reductions of the project activity:

In a given year, the emission reductions realised by the project activity (ER_y) is equal to baseline GHG emissions (BE_y) minus project direct emissions and leakages during the same year:

$$\begin{aligned} ER_y &= BE_y - PE_y - L_y \\ &= BE_y - 0 - 0 \\ &= BE_y \end{aligned}$$

Hence the emission reductions due to the project are equal to the baseline emissions, i.e. ER_y =58,748 tCO_2.

E.6. Table providing values obtained when applying formulae above:

Table E6-1 Estimation of emission reductions due to the project

No.	Year	Estimation of project emission (PE_y) (tCO_2e)	Estimation of baseline emission (BE_y) (tCO_2e)	Estimation of leakage (tCO_2e)	Estimation of emission reductions (ER_y) (tCO_2e)
1	2004	0	9,791	0	9,791
2	2005	0	26,110	0	26,110
3	2006	0	48,956	0	48,956
4	2007	0	58,747	0	58,747
5	2008	0	58,747	0	58,747
6	2009	0	58,747	0	58,747
7	2010	0	58,747	0	58,747
8	2011	0	58,747	0	58,747

9	2012	0	58,747	0	58,747
10	2013	0	58,747	0	58,747
11	2014	0	58,747	0	58,747
12	2015	0	58,747	0	58,747
13	2016	0	58,747	0	58,747
14	2017	0	58,747	0	58,747
15	2018	0	58,747	0	58,747
16	2019	0	58,747	0	58,747
17	2020	0	58,747	0	58,747
18	2021	0	58,747	0	58,747
19	2022	0	58,747	0	58,747
20	2023	0	58,747	0	58,747
21	2024	0	58,747	0	58,747
22	2025	0	29,374	0	29,374
Total		**0**	**1,171,685**	**0**	**1,171,685**

SECTION F. Environmental impacts

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

In accordance with relevant environmental law and regulations, a Preliminary Appraisal Table of Environmental Impacts of a Construction Project was completed. The project is likely to cause the following environmental impacts:

1. Impacts on air pollution

The preliminary appraisal assumed a larger installed capacity and higher coal displacement than the PDD; the figures below have been revised to bring them in agreement with the eventual capacity of the wind-farm and the assumptions in the remainder of the PDD. The project will have a total installed capacity of 30.6MW, installing altogether 36 wind turbines. The wind-farm is estimated to supply 68.97 GWh of power to the Ningxia grid. It is estimated that 23,924 tce will be saved. This implies air pollution emission reductions equal to (annually) 167 tonne SO_2, 277 tonne NO_x and 324 tonne particulate matter.

2. Noise pollution

When the wind-farm is put into operation, the noise caused by the wind turbine operation will be less than 100dB, and can be reduced to under 65dB at the distance of 200m – 500m from the wind turbines. This complies with the National Urban Environmental Noise Standard (GB3096-93). The project is located in the desert with little vegetation. There are no residents within 10 km distance from the project site. Therefore, noise will not cause any impact to nearby residents.

The construction noise mainly comes from manual drills and cement mixers. It is recommended that all construction be conducted during the day and it will have little impact on neighbouring residents. According to the monitoring data from the construction site, a small-sized concrete mixer produces noise at a level between 91-102 dB, and a manual drill between 90-100 dB. According to the formula of declining of sound emitted from a non-directional source, it is estimated that, as close as 50 meters from the construction site, the noise produced by construction machinery will be under the 70 dB limit. Therefore, the construction noise imposes no harm to the surrounding area.

3. Impacts on telecommunications and television transmissions

The project site is at least 10 km away from the nearby enterprises and residential areas. It is concluded that the operation of the wind-farm will not cause any problem with telecommunications and television signals, which is very important to the production and daily life of nearby enterprises and residents.

4. Impacts on soil conservation
The project is located in the Gobi desert with little ground vegetation. Because the topsoil is quite loose and soft, the smaller particulates have been blown away by strong winds and only larger particulates are left near the project site. After the mechanical extraction during the project construction, small particulates will be stirred up on the ground surface again and cause local dust problem again. For this reason, the construction roads shall be watered and rolled regularly. As soon as the base pits are extracted, concrete should be cast and the holes shall be refilled and the surface shall be rolled in time, so as to reduce the occurrence of local dust pollution.

5. Impacts on domestic sewage

The operation of the wind-farm is based on a highly automated monitoring and control system. Under normal conditions, no staff or very few staff is needed to work on site. Therefore, little sewage will be generated. The sewage will be first treated in a septic tank, then discharged to a settlement tank, and finally evaporated, thus causing little environmental impact.

6. Impacts on the landscape and birds
The development of the project will not only provide adequate electricity to the famous historical site, Xi Xia Emperor's Tomb, but also add another tourist attraction to Qingtongxia City and Ningxia Autonomous Region.

The project is entirely built in the Gobi area. When migratory birds fly across the region in autumns and springs, there is no water body that birds can stay near the project site. As a result, birds are seldom seen throughout the year. Therefore the project is unlikely to affect birds' flight and migration.

7. Other impacts

The wind-farm does not consume any water, nor does it generate any wastewater. It will improve the local environment and is beneficial to natural resource conservation. The possible negative impacts during the project construction include dust, solid waste, decreased biomass, etc. However, the pollution will not be severe, and can and will be mitigated to a marginal level through effective management measures.

Summary

The Preliminary Appraisal Table of Environmental Impacts of a Construction Project concerning the project concludes: The operation of the project will not discharge wastewater, nor emit air pollutants to the local environment. Noise from the wind turbines will have little impact on the neighbourhood, given that the terrain that the wind-farm is located is uncultivated and unpopulated. The construction site of the project is confined to a small area. The soil extracted will be refilled, which will not damage the vegetation, nor will it cause water and soil degradation.

During the construction period, the project will still have modest impact on the environment, such as on soil and the natural environment. Generally speaking, the project is compatible with the environment, and only during the construction of the project shall be subject to strict environmental protection measures.

We therefore conclude that the environmental impacts of the project are minor, and the project is definitely an environmentally more friendly way of providing power than the main alternatives in Ningxia, coal-fired power and to a lesser extent hydropower.

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

The environmental impact assessment of the project has been approved by the related environmental department..

SECTION G. Stakeholders' comments

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

1. Open public conference was held on Nov. 4, 2003 in Yinchuan city to better understand stakeholders' comments. Its attendees included 30 representatives and experts from 14 organizations, such as Ningxia Development and Reform Committee, Ningxia Commission of Economy and Trade, Environmental Protection Bureau of Ningxia, Ningxia Electric Power Co., Ningxia Branch of China Construction Bank, Northwest Investigation Design & Research Institute (*NIDRI*), Ningxia Electric Power Design Institute etc..
   The information of project entity was introduced with paper materials and slide show, mainly on wind resources, wind-farm area, transportation, techniques applied, economic benefit and environmental protection etc., and then following further discussion.
2. On-site survey of local community's comments was done by project entity at the project site and its surrounding areas.

G.2. Summary of the comments received:

There are no adverse comments on the project activity and all are supportive of it. However the following concerns still need to be considered.

1. It is advised the project entity try to lower its cost, as it is much higher than that of coal-fired. Special efforts should be made to get CDM revenues to complete its financing.
2. The project activity should pay more attention to technology exchange and training, as it is not universal in Ningxia and with a relatively high risk in technology.
3. It is also suggested the project entity pay special attention to and make efforts to vegetation recovery, soil and water conservation and related facility construction.

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

The following measures have been or will be taken by the project entity to answer the comments of the stakeholders.

1. Project entity will try to get CDM approval and use the revenues from its CERs product to improve profit of the project.
2. Imported facility will be used to make it more competitive while some technicians will get trained overseas.
3. Efforts will be made to recover vegetation and reduce soil and water loss.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

The Project Entity:

Organization:	Ningxia Tianjing Shenzhou Wind Power Ltd.
Street/P.O.Box:	No. 277 Changcheng Eastern Road, Xingqing District
Building:	Electric Power Design Building
City:	Yinchuan
State/Region:	Ningxia
Postfix/ZIP:	750001
Country:	People's Republic of China
Telephone:	+86-951-4912 098
FAX:	+86-951-4914 499
E-Mail:	
URL:	
Represented by:	
Title:	Deputy General Manager
Salutation:	Mr.
Last Name:	Zhang
Middle Name:	/
First Name:	Yutang
Department:	/
Mobile:	+86-139 9511 3725
Direct FAX:	+86-951-4914 499
Direct tel:	+86-951-4912 098
Personal E-Mail:	zhangyutang163@163.com

The Buyer

Organization:	Trading Emissions Limited
Street/P.O.Box:	Carmelite, 50 Victoria Embankment, Blackfriars
Building:	
City:	London
State/Region:	
Country:	UK
Telephone:	+44 20 7984 8709
FAX:	+44 20 7984 8661
E-Mail:	info@tradingemissionsplc.com
URL:	http://www.tradingemissionsplc.com
Represented by:	
Title:	Investment Advisor
Salutation:	Mr.
Last Name:	Godson
Middle Name:	/
First Name:	Des
Department:	EPIC Equity Advisors
Mobile:	+44 79 3138 5213
Direct FAX:	+44 20 7984 8661
Direct tel:	+44 20 7984 8709
Personal E-Mail:	des.godson@epicip.com

Annex 2

INFORMATION REGARDING PUBLIC FUNDING

There is no public funding from UNFCCC Annex 1 countries for the project.

Annex 3

BASELINE INFORMATION

Table 3-1: Main parameters for calculation

	Net caloric value per tce	Emission factor	Oxidation factor
Parameters	*NCV*	EF_{CO2}	*OXID*
Unit	GJ/tce	tCO_2/GJ	
Amount	29.27	0.0946	98%
Emission factor of carbon: *COEF*=0.0946*29.27*98%=2.713563 (tCO_2/tce)			
Data Source: *NCV*: China Energy Statistics Yearbook 2004, p 535. EF_{CO2}:www.ipcc.ch *OXID*: IPCC Good Practice Guidance, p 1.29.			

Table 3-2: Installed Capacity, generation and coal consumption of Northwest China Power Grid in 1999

No.	Name of the Power Grid	Installed capacity（MW）			Generation（MWh)			Coal consumption of power generation (tce/kWh)
		Thermal capacity	Hydro capacity	Other	Thermal capacity	Hydro capacity	Other	
1	Shaanxi	4,996.0	1,104.6	/	22,804,000	1,902,000	/	377
2	Guansu	3,259.0	2,868.0	/	14,492,000	11,747,000	/	364
3	Qinghai	576.0	2,993.3	/	2,273,000	9,442,000	/	473
4	Ningxia	1,912.0	302.0	/	9,949,000	969,000	/	353
Data sources: 1. Installed capacity: The State Electric Industry Yearbook 2000 p. 577 2. Generation: The State Electric Industry Yearbook 2000 p. 577 3. Coal consumption: The State Electric Industry Yearbook 2000 p. 576								

Table 3-3: Installed Capacity, generation and coal consumption of Northwest China Power Grid in 2000

No.	Name of the Power Grid	Installed capacity（MW）			Generation（MWh)			Coal consumption of power generation (tce/kWh)
		Thermal capacity	Hydro capacity	Other	Thermal capacity	Hydro capacity	Other	
1	Shaanxi	5,924.4	1,451.2	/	24,700,000	3,600,000	/	377
2	Guansu	3,595.5	2,951.5	/	16,590,490	11,433,760	/	354
3	Qinghai	839.8	3,113.9	/	2,909,460	10,970,930	/	452
4	Ningxia	2,000.0	306.3	/	12,296,450	905,620	/	355
Data sources: 1. Installed capacity: The State Electric Industry Yearbook 2001 p. 666 2. Generation: The State Electric Industry Yearbook 2001 p. 667 3. Coal consumption: The State Electric Industry Yearbook 2001 p. 672								

Table 3-4: Installed Capacity, generation and coal consumption of Northwest China Power Grid in 2001

No.	Name of the Power Grid	Installed capacity（MW）			Generation（MWh)			Coal consumption of power generation (tce/kWh)
		Thermal capacity	Hydro capacity	Other	Thermal capacity	Hydro capacity	Other	
1	Shaanxi	5,836.5	1,251.6		26,097,150	2,582,730		374
2	Guansu	3,874.8	3,118.3	8.4	18,485,020	11,030,220	14,050	357
3	Qinghai	649.0	3,408.5		4,232,530	9,693,650		413
4	Ningxia	2,046.0	307.9		13,500,110	843,510		357
OM emission factor = (26097150*374+18485020*357+4232530*413+13500110*357) *2.71356316/(26097150+18485020+4232530+13500110) =0.998383 (tCO_2/MWh)								
Data sources: 1. Installed capacity: The State Electric Industry Yearbook 2002 p. 625 2. Generation: The State Electric Industry Yearbook 2002 p. 625 3. Coal consumption: The State Electric Industry Yearbook 2002 p. 624								

Table 3-5: Installed Capacity, generation and coal consumption of Northwest China Power Grid in 2002

No.	Name of the Power Grid	Installed capacity（MW）			Generation（MWh)			Coal consumption of power generation (tce/kWh)
		Thermal capacity	Hydro capacity	Other	Thermal capacity	Hydro capacity	Other	
1	Shaanxi	6,266.5	1,261.2		29,872,960	2,590,900		368
2	Guansu	3,881.8	3,238.6	8.4	23,503,520	10,758,660	17,920	352
3	Qinghai	735.0	3,188.6		4,648,330	9,119,760		412
4	Ningxia	1,946.0	307.9		14,833,230	861,450		354
OM emission factor = (29872960*368+23503520*352+4648330*412+14833230*354） *2.71356316/(29872960+23503520+4648330+14833230) =0.984468 (tCO_2/MWh)								
Data sources: 1. Installed capacity: The State Electric Industry Yearbook 2003 p. 593 2. Generation: The State Electric Industry Yearbook 2003 p. 593 3. Coal consumption: The State Electric Industry Yearbook 2003 p. 592								

Table 3-6: Installed Capacity, generation and coal consumption of Northwest China Power Grid in 2003

No.	Name of the Power Grid	Installed capacity (MW)			Generation (MWh)			Coal consumption of power generation (tce/kWh)
		Thermal capacity	Hydro capacity	Other	Thermal capacity	Hydro capacity	Other	
1	Shaanxi	7,326.4	1,462.3	21.6	38,144,000	4,560,000	33,000	361
2	Guansu	4,745.0	3,280.6		29,494,000	9,812,000		351
3	Qinghai	905.8	3,341.1		6,446,000	7,136,000		506
4	Ningxia	3,102.0	308.2		19,175,000	822,000	1,000	340

OM emission factor = (38144000*361+29494000*351+6446000*506+19175000*340)
*2.71356316/(38144000+29494000+6446000+19175000)
=0.986494 (tCO_2/MWh)

Data sources:
1. Installed capacity: The State Electric Industry Yearbook 2004 p. 709
2. Generation: The State Electric Industry Yearbook 2004 p. 709
3. Coal consumption: The State Electric Industry Yearbook 2004 p. 670

Table 3-7: Calculation of *BM*

	1999	2000	2003
Thermal capacity (MW)	10 743.0	12,364.0	16,079.0
Hydro capacity (MW)	7,267.9	7,822.9	8,392.2
Other (MW)	0	0	31.6
Total (MW)	18,010.9	20,186.6	24,503.0
Proportion in 2003	26.50%	17.62%	100%
Fraction of new thermal addition	82.20%		

Coal consumption of power supply of advanced fire power technology: 320gce/kWh
BM emission factor ($EF_{BM,y}$)=320*2.713563*82.20%
=0.713735 (tCO_2/MWh)

Data sources:
Installed capacity in 1999: The State Electric Industry Yearbook 2000 p. 577
Installed capacity in 2000: The State Electric Industry Yearbook 2001 p. 666
Installed capacity in 2003: The State Electric Industry Yearbook 2004 p. 709
Coal consumption of power supply: China Climate Change Country Study p.199

Annex 4

MONITORING PLAN

1. The Monitoring Plan

This Monitoring and Verification Protocol, hereafter referred to as Monitoring Plan (MP), describes how the performance of the "Ningxia Tianjing Shenzhou 30.6MW Wind-farm Project" will be monitored and verified in terms of its greenhouse gas (GHG) emission reductions (ERs) and conformance with all relevant Clean Development Mechanism (sustainable development) criteria.

The MP builds on the baseline scenario identified in the main text of the Project Design Document (PDD) of the "Ningxia Tianjing Shenzhou 30.6MW Wind-farm Project" project and is fully consistent with it. The MP is based on the approved methodology ACM0002, "Consolidated monitoring methodology for zero-emissions grid-connected electricity generation from renewable sources". The MP will be used by the Project Entity, Ningxia Electric Power Group Co. Ltd., and by consultants appointed by the project owner.

This MP must be used by the project owner during all stages of the project design and implementation, e.g. planning, construction and operation. The MP's instructions should be followed to successfully measure and track the project impacts and prepare for the periodic audit and verification process that will have to be undertaken to confirm the achieved ERs.

Specifically, the MP provides the requirements and instructions for:

- Establishing and maintaining the appropriate monitoring system, including spreadsheets for the calculation of ERs.
- Checking whether the project meets key sustainable development indicators;
- Implementing the necessary measurement and management operations;
- Preparing for the requirements of independent, third party verification and audits.

The MP must be used throughout the life of the project. It must be

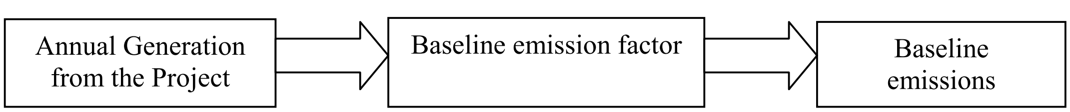
- Adopted as key input into the detailed planning of the project; And
- Included into the operational manuals of the project.

The project owner can update and adjust the MP to meet operational requirements, provided the Verifier and buyer(s) approve these modifications during the process of initial or periodic verification.

This MP should be read together with the PDD, and be implemented by the project owner, also taking into account the guidance of the UNFCCC, the Executive Board on CDM, and the contents of the ERPA that will be signed between the project owner and the buyer(s).

2 Calculating Emission Reductions

The emission reduction from the project result from the electricity is from the Ningxia Tianjing Shenzhou 30.6MW Wind-farm Project displacing power generated by other sources of power, including most importantly coal. The outline of the method to calculate the emission reduction is presented on the following page.



3. Operational and Monitoring Obligations

The owner of the "Ningxia Tianjing Shenzhou 30.6MW Wind-farm Project" project will need to fulfil the following requirements:

·Take all reasonable steps to maximise the generation from the project, so that the GHG emissions reduction is maximized. This is also in the commercial interest of the project owner.

4. Description of the spreadsheet

The project only need to monitor the power generation delivered to the grid generated by the project activity. The emission reduction generated by the project activity could be obtained by multiplying the power generation delivered to the grid by the baseline emission factor calculated ex ante. The full monitoring plan contains sections that are not including here for reasons of space.

Additional Annex

DIRECTORATE DECISION OF NINGXIA TIANJING SHENZHOU WIND POWER LTD.

宁夏天净神州风力发电有限公司董事会

会 议 决 议

董事会一届三次会议

时　间：2002 年 9 月 18 日

地　点：会议室

主持人：赵显翔

出　席：王迅、张思民、汪奎、湛滨（受李新忠、余海声委托）

列　席：王海明

记　录：严秀芬

公司一届三次董事会会议于 2002 年 9 月 18 日上午在公司会议室召开，会议内容是：专题研究将公司拟开发建设的 30.6MW 风力发电项目按照清洁发展机制规则进行开发。

会议认为，全球气候变化问题带来巨大挑战的同时，也带来了新的发展机遇。我国政府已于 2002 年 8 月 31 日正式核准《京都议定书》，这意味着中国将全面启动 CDM 运作。这将为我公司 30.6MW 风力发电项目的建设带来新的融资渠道，有利于加快风电项目建设及公司的发展。

鉴于此，董事会责成公司尽快咨询、了解清洁发展机制，并将公司拟建的 30.6MW 风力发电项目按照清洁发展机制规则进行开发，以解决项目的融资障碍等。

董事会成员签字：

Ningxia Tianjing Shenzhou Wind Power Ltd.
Directorate Decision

The 3rd directorate conference

Time：Sep. 18, 2002

Place：Meeting room

Chief：Zhao Xianxiang

Attendees：Wang Xun, Zhang Simin, Wang Kui, Zhan Bin (commissioned by Li Xinzhong and Yu Haisheng)
Attendee: (as a nonvoting delegate): Wang Haiming
Recorder: Yan Xiufen

The 3rd directorate conference was held on the morning of Sep. 18, 2002 in the meeting room of the company. The subject of the conference: discuss the development of 30.6MW wind power project in terms of CDM rules.

The members of the directorate realized that the global climate change issues have brought the great challenges and new development opportunity. Chinese Government has ratified Kyoto Protocol on Aug. 31, 2002, which means CDM has been started up in China. It will bring new financing for the construction of 30.6MW wind power project and is benefit for accelerating the construction of wind power project and the development of the company.

Therefore, the directorate requires the company to consult and realize CDM as soon as possible and develop 30.6MW wind power project in terms of CDM rules so as to overcome the financing barrier of the project etc.

Signature of directorate members:
Zhao Xianxiang, Wang Xun, Zhang Simin, Wang Kui, Zhan Bin