



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

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

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Chengde Hongsong Windfarm Project

PDD version 1.2

Date of document: 21 December 2006

A.2. Description of the project activity:

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The objective of the Chengde Hongsong Windfarm Project is to generate renewable electricity using wind power resources and to sell the generated output to the North China Power Grid on the basis of a power purchase agreement (PPA). The project activity will generate greenhouse gas (GHG) emission reductions by avoiding CO₂ emissions from electricity generation by fossil fuel power plants that is supplied to North China Power Grid.

The windfarm has an abundant wind resource. The Chengde Hongsong Windfarm installed a total of 6 turbines each with 750kW and 78 turbines each with 600kW to best suit the conditions. The combined total power output of the Chengde Hongsong Windfarm will be 51.3MW. The project is conservatively expected to generate 110GWh per year at a net capacity factor of about 23.1%.

The project will assist China in stimulating and accelerating the commercialisation of grid-connected renewable energy technologies and markets which is an important objective of the Chinese government. The project will therefore help reduce GHG emissions versus the high-growth, coal-dominated business-as-usual scenario. Furthermore, the project will improve air quality and local livelihoods and promote sustainable renewable energy industry development. The specific goals of the project are to:

- generate electricity;
- reduce greenhouse gas emissions in China compared to a business-as-usual scenario;
- help to stimulate the growth of the wind power industry in China;
- create local employment opportunity during the assembly and installation of wind turbines, and for operation of the windfarm;
- reduce other pollutants resulting from the power generation industry, compared to a business-as-usual approach, such as SO₂ and soot.

A.3. Project participants:

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Name of Party involved	Private and/or public entity(ies) project participants
P.R. China (host)	Project proponent: Hebei Hong-Song Wind Power Share Holding Ltd.
United Kingdom of Great Britain and Northern Ireland	Credit buyer: Carbon Resource Management Ltd.



Please see Annex 1 for detailed contact information.

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

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A.4.1.1. Host Party(ies):

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People's Republic of China

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

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Hebei Province

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

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Weichang County, Chengde City, see figure below.

Figure 1 China map showing the location of Chengde



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

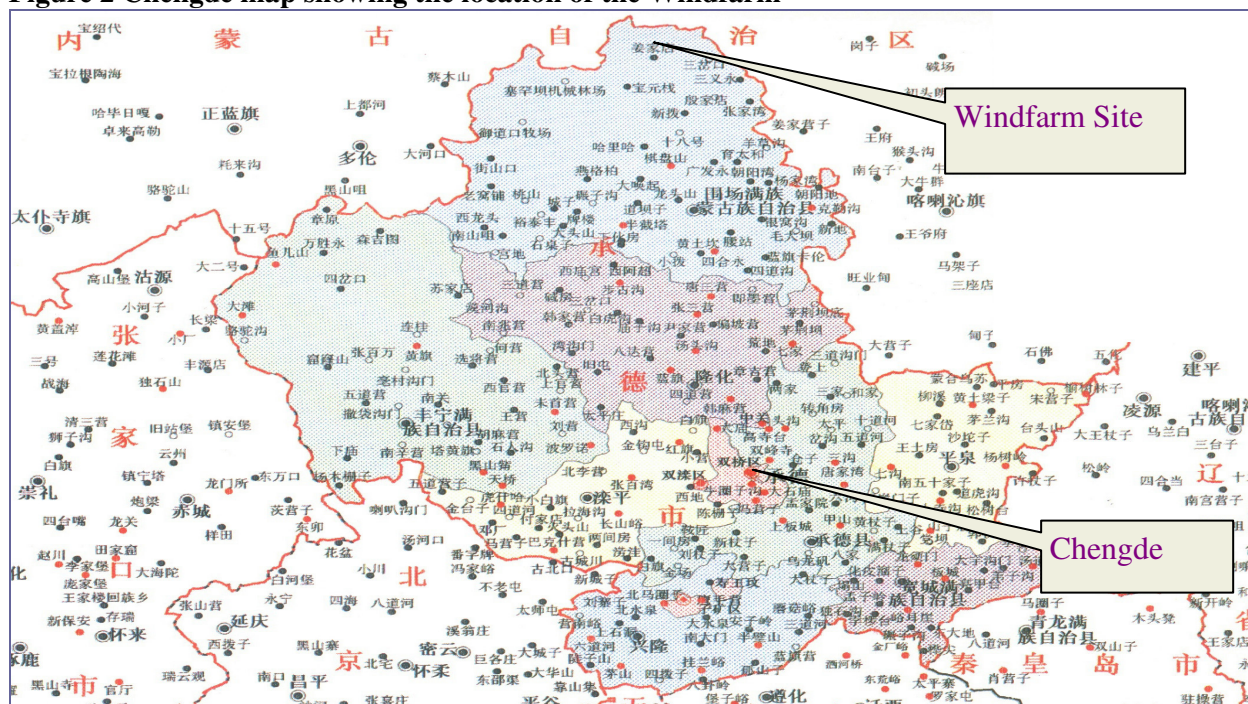
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The Chengde Hongsong Windfarm phase I and II are located in the north of Weichang County, Chengde City in Hebei Province, in the People's Republic of China. The city of Chengde lies about 230 kilometres from Beijing. It is located at longitude 117°40' East and latitude 42°35' North. Average altitude of the site is approximately 1800m above mean sea level.

The figure below shows the location of Chengde and the windfarm.

Figure 2 Chengde map showing the location of the Windfarm



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

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Using the approved consolidated methodology ACM0002 the category of the project activity is:

- Sectoral scope 1: Energy industries
- Category: Grid-connected electricity generation from renewable energy sources
- Sub-type: Wind

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

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The 600kW (S43) and 750kW Goldwind turbines (S48) were selected through competitive bidding. During the warranty term, there is on-the-job-training provided by the manufacturer for staff of the Hebei Hong-Song Wind Power Share Holding Ltd. It is planned that the windfarm will be operational for a minimum of 21 years.

The total generation is expected to be 110,000MWh with the number of full load utilisation hours being 2027 per year. The electricity power generated from the project will be transmitted to Shanwanzi substation of North China Power Grid via an 110kV transmission line. A new windfarm substation and one 110kV transmission line are installed.



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:

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The project activity mainly reduces carbon dioxide (CO₂) by substituting fossil fuel generated electricity. Electricity generation in the North China Power Grid is dominated by coal-fired power plants. It is estimated that the Chengde Hongsong Windfarm project would generate about 110GWh clean electricity per year.

In the absence of the project, in order to meet the increasing electricity demand in North China Power Grid, other types of power plants have to be built, mainly including hydropower stations and thermal power plants. In North China Power Grid, only new addition of thermal power plants is practical to meet the new electricity demand increase, because hydropower resources in North China Power Grid have nearly all been exploited, although hydropower stations can produce emission reductions. However, thermal power plants will cause significant CO₂ emissions when burning fossil fuels. Therefore, without the project activity, emission reductions will not occur.

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

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Applying the proposed methodology to the Chengde Hongsong Windfarm Project, operating in the North China Power Grid, the project will achieve an estimated emission reduction of 80,185 tCO₂ in 2005, and an estimated average annual emission reduction of 104,720 tCO₂ in every year from 2006 to 2014.

Table 1 Estimated emission reductions of Chengde Hongsong Windfarm Project

Period	Estimated emission reductions (tCO ₂ e)	Estimated generation (MWh)	EF (tCO ₂ e/MWh)
2005	80,185	84,228	0.952
2006	104,720	110,000	0.952
2007	104,720	110,000	0.952
2008	104,720	110,000	0.952
2009	104,720	110,000	0.952
2010	104,720	110,000	0.952
2011	104,720	110,000	0.952
2012	104,720	110,000	0.952
2013	104,720	110,000	0.952
2014	104,720	110,000	0.952
Total	1,022,665		
Crediting time	10 years		
Annual average	102,267		

The baseline emissions factor has been fixed for the 10 years from 2005 to 2014. In the every year from 2006 to 2014, the amount of VCU's actually generated by the project will vary depending on the metered generation of the project.

A.4.5. Public funding of the project activity:

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There is no public funding for this Project.

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

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The project participants propose to use the approved baseline methodology ACM0002 (version 06, 19 May 2006) “Consolidated baseline methodology for grid-connected electricity generation from renewable sources”. For more information regarding the methodology, please refer to the link: <http://cdm.unfccc.int/methodologies/approved>.

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

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The approved baseline methodology ACM0002 is applicable to the project activities, because:

- The project involves electricity capacity additions from wind sources; and
- The project does not involve switching from fossil fuels to renewable energy at the site of the project activity; and
- The geographic and system boundaries for the North China Power Grid can be clearly identified and information on the characteristics of the grid is available.

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

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The project does not modify or retrofit an existing electricity generation facility. ACM0002 defines that for such project activities the baseline scenario is the following:

Electricity delivered to the grid by the project 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 below.

The baseline emission factor (EF) is calculated as a combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) factors according to the following three steps defined in ACM0002.

Data for the calculations are based on official national statistics books: China Energy Statistical Yearbook and China Electric Power Yearbook.

Step 1. Calculate the Operating Margin emission factor (EF_{OM})

Under ACM0002, four various methods are provided for calculating the Operating Margin, including:

- a) Simple OM;
- b) Simple Adjusted OM;
- c) Dispatch data analysis OM; or
- d) Average OM.



Detailed information to carry out a dispatch data analysis or apply simple adjusted OM is not publicly available; therefore the dispatch data analysis OM method or simple adjusted OM method is not suitable for the project.

According to ACM0002, the Simple OM method is applicable to the project if the low-cost/must run resources constitute less than 50% of total grid generation in average of the five most recent years, while average OM method is applicable to the project if this percentage is more than 50%. Since generation from all sources other than thermal plants has been less than 2% of total generation in the North China Power Grid in the period 2000 to 2004¹, the Simple OM method is applicable to the project.

ACM0002 allows project participants to choose between two given options for calculating the OM for the project, one is *ex-ante* calculation, and the other is annual *ex-post* updating. Here the EF_{OM} is determined ex-ante, and EF_{OM} is fixed during the crediting period.

The Simple Operating Margin emission factor EF_{OM} is defined as the generation-weighted average emissions per electricity unit (tCO₂/MWh) of all generating sources serving the system, not including low-operating cost and must-run power plants, based on the latest years for which statistical data is available. In any given year the following equation is used:

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

$F_{i,j,y}$ and $COEF_{i,j}$ are the amount and associated CO₂ emission coefficient of the fossil fuel i consumed by relevant power sources j in year y , not including low-operation cost and must run power plants, and including imports to the grid, and here it includes the electricity imports from Northeast Power Grid to North China Power Grid. $GEN_{j,y}$ is the electricity (MWh) delivered to the grid by source j , including the electricity imports (MWh) from Northeast Power Grid to North China Power Grid.

The fuel consumption and the total electricity generation of thermal plants connected to the North China Power Grid can be obtained from China Energy Statistical Yearbook and China Electric Power Yearbook. More than 10 types of fuel are used in the power plants in the North China Power Grid; tables with consumption figures for each fuel for each of the three years are presented in Annex 3.

The CO₂ emission coefficient $COEF_i$ for each fuel i is obtained as

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

Where:

NCV_i is the net calorific value (energy content) per mass or volume unit of a fuel i . This value can be obtained from China Energy Statistical Yearbook.

$EF_{CO_2,i}$ is the CO₂ emission factor per unit of energy of the fuel i , and it can be calculated by multiplying the carbon emission factor by 44/12. The carbon emission factor can be obtained from page 1.6 in the National Greenhouse Gas Inventory of 1996 Revised IPCC Guidelines.

¹ See Annex 3 for details.



$OXID_i$ is the oxidation factor of the fuel, and it can be obtained from page 1.29 in the Reference Manual of 1996 Revised IPCC Guidelines.

According to ACM0002, if net imports do not exceed 20% of total generation in the project electricity system, the average emission rate of the exporting grid is adopted. Project electricity system of the project is North China Power Grid and the connected electricity system is Northeast Power Grid. In 2004, the electricity imports² from Northeast Power Grid to North China Power Grid is only 0.9% of the total generation³ from North China Power Grid, furthermore this percentage has not changed significantly in recent years, so the average emission rate of Northeast Power Grid is taken as the emission factor of the import electricity.

The Simple OM for North China Power Grid has been calculated ex-ante using a 3-year generation-weighted average, based on the most recent statistics available at the time of PDD submission. This allows the Simple OM to be fixed for the crediting period.

Based on these data, the simple OM emission factor of North China Power Grid is calculated as 0.984 tCO₂/MWh (Annex 3 for details).

Step 2. Calculate the Build Margin emission factor (EF_{BM})

The Build Margin is calculated as the generation-weighted average emission factor (tCO₂/MWh) of a sample of power plants m , as follows:

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

$F_{i,m,y}$ and $COEF_{i,m}$ are analogous to the variables used for the Simple OM calculation above, for all plant m , including the must-run and low-operating cost plant which were excluded for the OM calculation. 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, and if 20% falls on part capacity of a plant, that plant is fully included in the calculation.. Given the size of the North China Power Grid, the most recent 20% of additional units is chosen as this would represent a larger, more representative of annual generation.

ACM0002 allows project participants to choose between two given options for calculating the Build Margin for the project, one is *ex-ante* calculation, and the other is annual *ex-post* updating in the first crediting period. For this project the first option is chosen. The Build Margin Emission Factor therefore is based ex-ante on the most recent information available on plants already built at the time of PDD submission. The EF_{BM} therefore is fixed for the first crediting period.

However, because of the limited availability of publicly available data, at present it is impossible to know how much generation of North Power Grid was from the new-built power plant and it is also impossible

² China Electric Power Yearbook (2005 edition), Page 491.

³ China Electric Power Yearbook (2005 edition), Page 474.



to find the exact new-built plants which comprise the 20% of the system generation. Considering this situation, this project uses a substitute method accepted by EB to calculate EF_{BM} .

However, because of the limited availability of publicly available data, it is impossible to know how much generation of North China Power Grid was from the new-built power plant and it is also impossible to find the exact new-built plants which comprise the 20% of the system generation. Considering this situation, this proposed project uses EB guidance⁴ to calculate EF_{BM} .

The procedure to be used for calculating the build margin using the most recent additional capacity follows the two steps below:

- Using the latest statistical data available (from the China Electric Power Yearbook) determine the year since which the added generation capacity is equal to or just exceeds 20% of the capacity of the latest statistic year.
- Regarding the added generation capacity above 20%, calculate the Build Margin by the different type of plant power capacity-weighted average emission factor.

The content and result of the procedure above is as follows:

- The latest year with available data is 2004, and by calculation, the year since which capacity additions are equal to or just exceed 20% is identified as 2001.
- Based on the added capacity from 2001 to 2004, the emission factor is calculated respectively as follows:

$$EF_{BM} = \sum_i S_i \cdot C_{EFi}$$

Where S_i (Unit: %) is the share in the added capacity of different types of power plant from 2001 and C_{EFi} (tCO₂/MWh) is the CO₂ emission factor for type i power plant. The C_{EFi} reflects the best available technology (with the lowest carbon emission level) in the North China Power Grid at present.

The emissions factor is weighted according to the percentages of solid (99.3%), liquid (0.1%) and gaseous fuels (0.6%) used in 2004 in thermal generation. To be conservative, emissions from liquids and gases are assumed to be zero. The BM emission factor of North China Power Grid is now calculated as 0.859 tCO₂/MWh (see Annex 3 for more details).

Step 3. Calculate the baseline emission factor (EF)

The baseline emissions factor (EF) is calculated as the weighted average of the Operating Margin emission factor and Build Margin emission factors following ACM0002. For wind projects, the default weights are as follows: $w_{OM} = 0.75$ and $w_{BM} = 0.25$:

$$EF = w_{OM} \cdot EF_{OM} + w_{BM} \cdot EF_{BM}$$

⁴ The EB issued guidance upon DNV's request for deviations of 7 October 2005, see http://cdm.unfccc.int/UserManagement/FileStorage/AM_CLAR_QEJWJEF3CFBP1OZAK6V5YXPQKK7WYJ. While the request for deviation was submitted relating to AM0005 and AMS-I.D, the guidance has also widely been used for ACM0002 as this directly replaces AM0005 and all OM and BM calculations in these two methodologies are the same.



$$= 0.75 \cdot 0.984 + 0.25 \cdot 0.859 = 0.952 \text{ tCO}_2/\text{MWh}$$

Using Operating Margin and Build Margin emission factors that are fixed for the duration of the first crediting period, the baseline emissions factor is also fixed for the first crediting period. These parameters will be recalculated at any renewal of the crediting period using the same steps 1-3 in the baseline methodology and the latest data available at that time.

Table 2 gives an overview of EF:

Table 2 Values obtained when calculating the baseline emission factor using ACM0002

Variable	Value	Weighting
Operating Margin Emissions Factor (EF_{OM} in tCO_2/MWh)	0.984	0.75
Build Margin Emissions Factor (EF_{BM} in tCO_2/MWh)	0.859	0.25
Baseline Emissions Factor (EF in tCO_2/MWh)	0.952	

Baseline emissions (BE_y) now can be calculated as the baseline emissions factor (EF) multiplied by the annual net generation of the project (EG_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:

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Approved methodology ACM0002 prescribes the use of the latest version of the 'Tool for the demonstration and assessment of additionality' agreed by the Executive Board; version 02 is adopted here. The Tool consists of 6 steps as described below.

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

The windfarm phase I and phase II were commissioned in November 2001 and November 2004 respectively. The emission reductions have all been generated after 1 January 2000.

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

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

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

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

- *The project activity not undertaken as a project activity receiving revenues from sale of VCUs.* The project will face many barriers, as demonstrated below, and the project activity not undertaken as a project activity receiving carbon finance is not a realistic alternative.
- *The thermal or hydro and other kinds of power plant with the comparable capacity or electricity power generation.*



The utilisation hours, the operation period and season of the thermal, hydro power and other kinds of plant are absolutely different from the project, i.e. without comparable properties. In this sense, therefore they are not realistic alternative, either.

Besides wind energy, other kinds of energy like solar PV, geothermal, biomass and hydro are the possible grid-connected renewable energy technologies that could be applied in China. Due to the technology development status and the high cost for power generation, solar PV, geothermal and biomass of the similar installed capacity as the proposed project are alternatives far from being attractive investment in the grid in China. Only hydropower projects have the investment return rate that can compete over that of wind power projects in China. But because hydropower resources in North China Power Grid have nearly all been exploited, the hydro power plant are also not realistic alternative.

From installed capacity data in 2004 it can be seen that 96.5% of all capacity is thermal generation. Since 2001, nearly 25 GW of new installed capacity has come online, 99.6% of this is derived from thermal power plant. Therefore, new thermal power generation capacity can be used as the only reasonable alternative.

However, if taking the capacity with the same annual generation, according to the current laws and regulations, thermal generation is not a realistic alternative (please refer to the analysis in sub-step 1b).

- *Comparable capacity or electricity generation addition provided by North China Power Grid.*
To satisfy the increase of the electricity demand, the power grid company can either increase the output generation from operating units or increase installed capacity of the grid, therefore comparable capacity or electricity generation addition provided by North China Power Grid can be taken as a realistic alternative for the project activity.
- *Continuation of the current situation (no project activity or other alternatives undertaken).*
North China is one of the regions where the electricity restriction measure is taken during the load peak in summer. With the further development of North China region over the next few years, electricity demand in the North China Power Grid area will go on increasing. So without additions of new generating capacity, the shortage of electricity supply would be worse in North China Power Grid. A continuation of the current situation therefore is not a realistic alternative.

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

For the alternative b described in sub-step 1a, if taking the capacity that can generate the same annual power generation and estimating utilisation hours as 5991 which is the average utilisation hours of the thermal units in China in 2004⁵, the alternative baseline scenario for the Project should be a grid-connected fossil fuel fired power plant with about installed capacity of 18MW. 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 grids⁶. Meanwhile, National Development and Reform Committee (NDRC) requested to execute strictly the policy to close fossil fuel fired power plants less than 50MW. Therefore, alternative b described in sub-step 1a conflicts with Chinese regulations. In this sense, alternative b cannot be a realistic alternative.

⁵ China Electric Power Yearbook (2005 edition), page 472.

⁶ 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.



The other alternatives described in sub-step 1a are all in compliance with all applicable legal and regulatory requirements as required by the methodology used.

To conclude from the sub-step 1a and 1b, comparable capacity or electricity generation addition provided by North China Power Grid is the realistic alternative consistent with current laws and regulations.

Step 2. Investment analysis

The purpose of this step is to determine whether the proposed project activity is the economically or financially less attractive than other alternatives without the revenue from the sale of emission reductions (VCUs).

Sub-step 2a. Determine appropriate analysis method

The proposed project activity generates financial benefits by the sales of electricity, so the simple cost analysis (Option I) can not be applied. The investment comparison analysis (Option II) is suitable for a CDM project which has a similar type alternative project. The alternative of the proposed project is comparable capacity or electricity generation addition provided by North China Power Grid, not a concrete project, so Option II is not suitable, either. Therefore, the benchmark analysis (Option III) is adopted.

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

Identify the financial indicator, such as IRR, NPV, cost benefit ratio, or unit cost of service (e.g., levelized cost of electricity production in \$/kWh or levelized cost of delivered heat in \$/GJ) most suitable for the project type and decision context. Identify the relevant benchmark value, such as the required rate of return (RRR) on equity. The benchmark is to represent standard returns in the market, considering the specific risk of the project type, but not linked to the subjective profitability expectation or risk profile of a particular project developer. Benchmarks can be derived from:

- Government bond rates, increased by a suitable risk premium to reflect private investment and/or the project type, as substantiated by an independent (financial) expert;
- Estimates of the cost of financing and required return on capital (e.g. commercial lending rates and guarantees required for the country and the type of project activity concerned), based on bankers views and private equity investors/funds' required return on comparable projects;
- A company internal benchmark (weighted average capital cost of the company) if there is only one potential project developer (e.g. when the project activity upgrades an existing process). The project developers shall demonstrate that this benchmark has been consistently used in the past, i.e. that project activities under similar conditions developed by the same company used the same benchmark.

According to the *Interim Rules on Economic Assessment of Electrical Engineering Retrofit Projects* issued by former State Power Corporation of China in 2002, the benchmark of total investment financial internal rate of return (IRR) of electric power industry is 8%. Nowadays many of China's existing power projects have applied this as the benchmark IRR for financial estimation, such as hydropower projects, fossil fuel fired projects, transmission and substation projects, 8% therefore is adopted as the benchmark.

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



Calculate the suitable financial indicator for the proposed CDM project activity. Include all relevant costs (including, for example, the investment cost, the operations and maintenance costs), and revenues (excluding CER revenues, but including subsidies/fiscal incentives where applicable), and, as appropriate, non-market cost and benefits in the case of public investors.

The relevant costs are estimated from the Feasibility Study Report and actual data reported since the start of the project. Revenues are estimated on the basis of projected generation and the expected on-grid tariff. Inputs into the financial analysis are presented below.

Table 3 Inputs into the investment analysis

Variable	Value	Note
Total static investment costs	375.76 mRMB	Investments were made in 2004 and 2005. The actual costs were below those estimated in the Feasibility Study.
Annual operation & maintenance costs	12.49 mRMB/y	Once fully operational.
Operating life	20 years	
Projected generation	110 GWh/y	Once fully operational
Tariff (net)	0.549 RMB/kWh	Gross tariff of 0.600 RMB/kWh includes 8.5% VAT plus additions
Depreciation term	15 years	
Taxes	36%	Income tax at 33% plus welfare tax, discounted to 2007
Benchmark	8%	

Using the inputs above, the IRR of the project can be calculated. The project IRR is 6.9%, which is below the benchmark, as presented in Table 4.

Table 4 Results of the financial analysis

Project IRR	6.9%
Benchmark	8.0%

Sub-step 2d. Sensitivity analysis

A sensitivity analysis is included to show that the conclusion above regarding the financial attractiveness is robust to reasonable variations in the critical assumptions. The most important variables are:

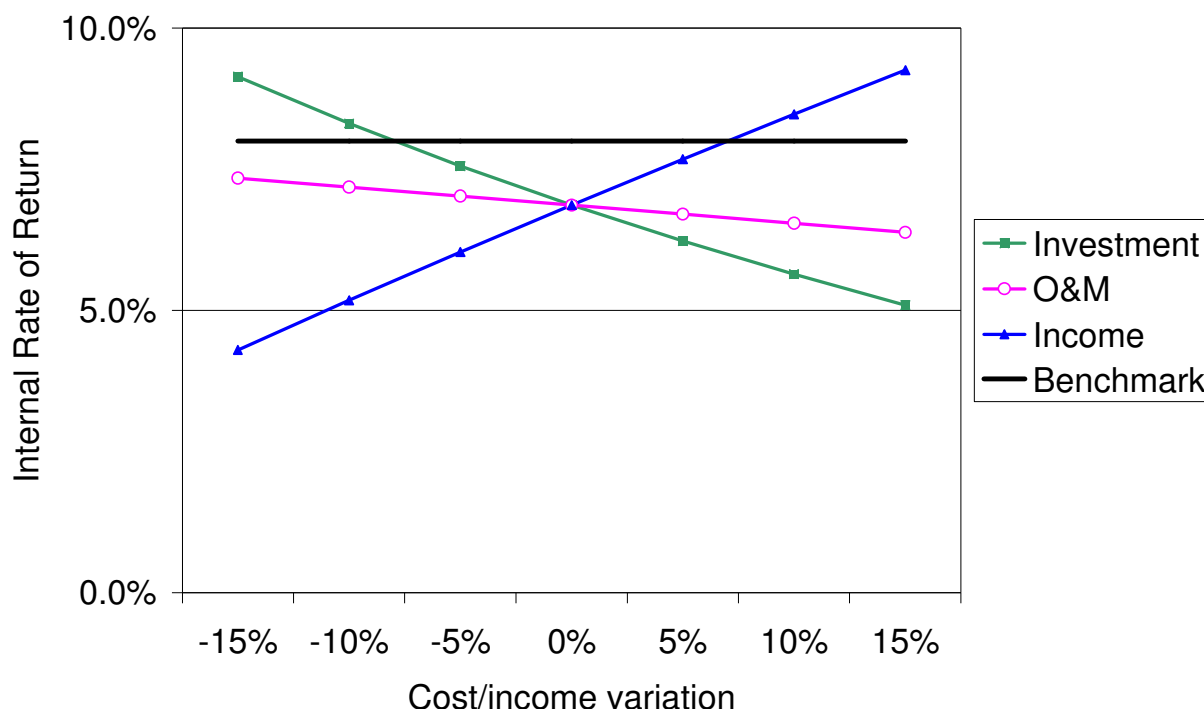
- Total investments
- Annual operating and maintenance costs
- On-grid tariff
- Annual generation

Each of the variables is varied from 15% lower to 15% higher than the central estimate. The variation of the latter two variables is identical, and is presented in the graph below as the variable “income”. The graph shows that it is unlikely that the project activity is financially attractive under reasonable assumptions. As project investment has already been committed, significant changes in investment levels are therefore no longer likely. The required 8% reduction of investment costs to raise the IRR to the



benchmark is very unlikely. The required tariff increase to achieve sufficient income to reach the 8% benchmark would result in a tariff of about 0.70 RMB/kWh which would be significantly higher than other agreed and approved tariff levels and must be considered very unlikely.

Figure 2 Sensitivity analysis



Step 3. Barrier analysis

This analysis shows that the project activity faces barriers that (a) prevent the implementation of this type of project activity; and (b) do not prevent the implementation of the alternatives.

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

Power generation projects using new renewable energy technologies face significant barriers in most countries. Many industrialised countries have established financial support systems to encourage such environmentally friendly power generation. However, such support systems can be expensive and are not generally available in developing countries.

While the government of China has supported renewable energy sources for more than a decade, the development of wind power projects has not been very fast. Indeed, many of the wind projects in China do not receive satisfactory tariffs and are applying for CDM registration or other types of carbon finance.

Barriers are identified and assessed below.

Investment barriers



International development aid, e.g. from the World Bank, Asian Development Bank, and KfW, as well as government tariff support have been used in China since 1993 to encourage the development of the wind power industry in the country. However, in recent years, the provisions of such soft loans and subsidised government interest rates have gradually decreased, furthermore, for a windfarm project only with attractive financial expectation, can the commercial loan be obtained in time successfully.

In China the approximate investment costs of the windfarm exceeds 8,000 RMB Yuan per kW, which is double that of the thermal plant, furthermore the utilization hours of windfarm are about from 2000 to 3000 hours, which is up to half of that of the thermal plant.⁷ The projected investment costs for the project as presented in the feasibility study was 8,282 RMB/kW, however, total actual costs achieved are about 7,500 RMB/kW, still significantly higher than that of thermal plants in China.

All these factors above make the financial return rate of the investment and the ability of loan repayment of the project at a lower level.

For the project, additional VCU financing may enable the investment return to be competitive with other projects. Having a full realisation of this, the developer of the windfarm project started the VCU application process aiming to obtain the additional funding to secure the project financially and institutionally.

Tariff barriers

In the China Renewable Energy Law, which came into force on 1 January 2006, it is encouraged to develop the renewable energy project; however there is no measure that guarantees an on-grid tariff which can attract the windfarm developers.

In the Notice (dated 29 June 2006) issued by the Pricing Bureau of Hebei province, the on-grid tariff of the Chengde Hongsong phase II windfarm is adjusted to 0.60 RMB/kWh (including VAT), which is much lower than the on-grid tariff 0.73 RMB/kWh proposed in the feasibility study. Without the support from VCU revenue, the IRR of the project based on this on-grid tariff will be 6.9%, and this is a great barrier to this windfarm project as it is significantly below the 8% benchmark for energy sector projects.

Technological barriers

The windfarm is located in a less economically developed region of China and skilled and properly trained labor to operate and maintain the technology is not available. Furthermore, Chengde Hongsong Windfarm is one of the first groups of large-scale projects to use domestically manufactured turbines to stimulate national economic development. Without enough related experience, the Project will face some technological barriers.

The documented evidence is provided from official files, including written document and feasibility study reports from the company that develops the project. This evidence is sufficient to demonstrate the additionality for wind power projects widely in China like the Chengde Hongsong Windfarm project.

⁷ For example, see http://news.xinhuanet.com/fortune/2005-09/21/content_3522210.htm.



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

As demonstrated in Sub-step 1a, comparable capacity or electricity generation addition provided by North China Power Grid is the alternative. The concrete plan can be the increase of the generation output of the operating unit or building the new plant.

In fact, it is very common in the power grid to increase the generation output of some operating units to satisfy the load demand, and in 2005, 46 new generators (12,404MW)⁸ have been installed in North China Power Grid. That is to say, either to increase the generation output or to build the new power plant is needed and the actual choice, so there are no barriers that would prevent the implementation of the alternative.

It is obvious that the alternative is financially attractive and encouraged by the grid company and government policies and the barriers identified here therefore are not applicable to the alternative or baseline scenario.

Step 4. Common practice analysis

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

Some regions in Hebei Province, such as Zhangjiakou and Chengde regions where the windfarm project lies have rich wind resources in China and the similar windfarms in Hebei Province are listed below:

Table 6 Some windfarm projects located in Hebei Province

Name	Commissioning Date	Capacity (MW)	On-grid Tariff including VAT (RMB/kWh)	Notes
Zhangbei Huicailiang	Dec, 1998	9.85	0.65	This tariff is the result of adjusting from 0.984 by Pricing Bureau of Hebei province
Shangyi Manjing East	Under construction	49.5	0.55 (e)	Facing financial barriers and is applying for CDM
Zhangbei Mijiagou	Under construction	49.5	0.653 (e)	Facing financial barriers and is applying for CDM

Source: China Wind Power Information Center Website: <http://www.bwp.com.cn>.

China New energy Website: <http://www.newenergy.com.cn>.

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

⁸ North China Electricity Regulatory Commission: Year Report of North China Electric Power Safety in Production in 2005.



The Zhangbei Huicailiang windfarm project in the table 6 obtained the favourable higher on-grid tariff 0.984 RMB/kWh originally. However, with the prevalent decrease of on-grid tariff for wind power projects in China, this windfarm is also facing the pressure that on-grid tariff will be adjusted to lower level. In fact, its on-grid tariff has been adjusted to 0.65 RMB/kWh recently.

At present, the on-grid tariff of the windfarms nearby can not reach the level of the Zhangbei Huicailiang, and other windfarms under construction are applying for being the CDM project, because the very low on-grid tariff makes the projects face the financial barrier.

Facing the same difficulties, another windfarm named Zhangbei Manjing Windfarm in Zhangjiakou region has already applied for the support of CDM fund, and the project was registered in EB on 23 March 2006 and has already been the second windfarm CDM project in China⁹.

Step 5. Impact of VCU revenues

If the project can get the revenue from sale of VCUs, the impact will include:

- The realisation of the promise of additional income from the sale of VCUs, will improve the developer's loan repaying ability, and give developer's lender more great confidence in the windfarm project development in China.
- The VCUs revenue for the project will compensate the tariff gap between the expected price and the financial feasibility price for the project.
- The VCUs revenue will help the project improve the ability to hedge risk, and the successful operation of this windfarm will improve the confidence of investor of the project and stimulate the investor to invest more renewable energy power projects.

In addition, the experience with this new carbon finance instrument and the continuing improving experience with CDM in China will boost the developer's appetite for future windfarm investment.

In conclusion, all the steps above are satisfied, the project is not the baseline scenario, and the project activity is additional.

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

>>

Emission sources:

For the baseline determination, only CO₂ emissions, from electricity generation by fossil fuel fired power plant that is displaced due to the project activity, are taken into account.

Spatial boundary:

The spatial extent of the project boundary includes the Windfarm Project site and the North China Power Grid that the windfarm is connected to.

⁹ <http://cdm.unfccc.int/Projects/registered.html>.



The North China Power Grid is the project electricity system, which is defined by the spatial extent of the power plants that can be dispatched without significant transmission constraints. The electricity transmission between different provinces in the North China Power Grid is very large and it is unreasonable for the project to regard the Provincial Power Grid as the project boundary.

The connected electricity system of the North China Power Grid is Northeast Power Grid, the electricity transfers are from Northeast Power Grid to North China Power Grid.

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:

>>

Details of baseline information can be found in Annex 3.

Date of completion of the baseline information: 21/12/2006.

Name of persons determining the baseline:

- Ms. Qian Yiwen, qyw@carbonresource.com. Carbon Resource Management China Representative Office, Suite 1310, Air China Plaza, No 36 Xiaoyun Lu, Chaoyang District, Beijing, China, 100027, Tel: +86 10 844 75246/8.
- Mr. Christiaan Vrolijk, cv@carbonresource.com. Carbon Resource Management Limited, Technology House, 16-18 Whiteladies Road, Bristol, BS8 2LG, UK, Tel: +44 117 980 9442.
- Mr. He Zhiyuan, onelook1982@sina.com. Hebei Hong-Song Wind Power Share Holding Ltd. No. 10, Xinhua Street North, Chengde, China, 067000.

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:

>>

The first turbines of the windfarm were commissioned in September 2004.

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

>>

20y-0m.

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

>>

The project proponent wishes to obtain VCUs for the first 10 years of the windfarm operation.

C.2.1. Renewable crediting period

>>

Not applicable

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

>>

Not applicable

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

>>

Not applicable

C.2.2. Fixed crediting period:**C.2.2.1. Starting date:**

>>

1/1/2005

C.2.2.2. Length:

>>

10 years

SECTION D. Application of a monitoring methodology and plan**D.1. Name and reference of approved monitoring methodology applied to the project activity:**

>>

The project participants propose to use the approved consolidated monitoring methodology ACM0002 entitled “Consolidated monitoring methodology for zero-emissions grid-connected electricity generation from renewable sources”, which has to be used in conjunction with the ACM0002 baseline methodology.

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

>>

This monitoring methodology is to be used in conjunction with the chosen baseline methodology ACM0002 “Consolidated baseline methodology for grid-connected electricity generation from renewable sources”. Application of the approved monitoring methodology ACM0002 to the project is justified because:

- the approved baseline methodology ACM0002 is used;
- the project activity is connected to the grid;
- the electricity is generated using wind sources;
- it is not a fuel switching project; and
- the boundary of the grid to which the Windfarm Project is connected is clearly identifiable as the North China Power Grid and the information on the characteristics of the grid is available.

**D.2.1. Option 1: Monitoring of the emissions in the project scenario and the baseline scenario**

In accordance with the ACM0002 baseline methodology, the project participants have chosen to use data based on ex-ante monitoring, using the best data available at the time of submission of the PDD.

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 type	Data variable	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)	Comment

The project is a zero-emission electricity generating activity; therefore no emissions from the project activity were identified.

D.2.1.2. Description of formulae used to estimate project emissions (for each gas, source, formulae/algorithm, emissions units of CO₂ equ.)

>>

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	Data type	Data variable	Data unit	Measured (m), calculated (c), estimated (e),	For which baseline method(s) must this element be included	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	For how long is archived data kept?	Comment

This template shall not be altered. It shall be completed without modifying/adding headings or logo, format or font.



1. EG_y	Electricity quantity	Electricity supplied to the grid by the project	MWh	m	Simple OM, BM	Continuously measurement and monthly recording	100%	Electronic	During the crediting period and two years after	Electricity supplied by the project activity to the grid. Double check by receipt of sales.
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D.2.1.4. Description of formulae used to estimate baseline emissions (for each gas, source, formulae/algorithm, emissions units of CO₂ equ.)

>>

The Baseline Emissions (BE_y , in t CO₂), for each year y , are calculated by multiplying the baseline emissions factor (EF , in tCO₂/MWh) by the annual generation of the project (EG_y , in MWh), as follows:

$$BE_y = EG_y \cdot EF$$

With the baseline emissions factor (EF) calculated using operating and build margins as described in detail in section B.2 and following ACM0002 with the following formulae:

$$EF = w_{OM} \cdot EF_{OM} + w_{BM} \cdot EF_{BM}$$

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

$$EF_{BM} = \sum_i S_i \cdot C_{EFi}$$

$$COEF_i = NCV_i \cdot EF_{CO2,i} \cdot OXID_i$$



The weight for operating and build margin emission factors by default is: $w_{OM} = 0.75$, $w_{BM} = 0.25$. The operating margin is calculated using the weighted average of generation in most recent data-obtainable three years in North China Power Grid. The build margin is calculated from publicly available statistics using more than 20% most recently added capacity following the procedure as explained in section B.2.

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

D.2.2.1. Data to be collected in order to monitor emissions from the <u>project activity</u> , and how this data will be archived:									
ID number	Data type	Data variable	Data unit	Measured (m), calculated I, estimated (e),	For which baseline method must this element be included	Recording frequency	Proportion of data to be monitored	How will the data be archived? (electronic/ paper)	Comment

Not applicable.

D.2.2.2. Description of formulae used to calculate project emissions (for each gas, source, formulae/algorithm, emissions units of CO₂ equ.):

>>

Not applicable.

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	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)	Comment

This template shall not be altered. It shall be completed without modifying/adding headings or logo, format or font.



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Indirect emissions can result from project construction, transportation of materials and other upstream activities. In the case of the project activity, these emissions are thought to be comparable or less to the emissions which would result from the eventual construction and operation of alternative capacity. Therefore no leakage is identified and no data will be collected.

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

>>

Not applicable as no sources of leakage have been identified.

D.2.4. Description of formulae used to estimate emission reductions for the project activity (for each gas, source, formulae/algorithm, emissions units of CO₂ equ.)

>>

The project activity mainly reduces carbon dioxide through substitution of grid electricity generation with fossil fuel fired power plants by renewable electricity. The emission reductions 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:

$$ER_y = BE_y - PE_y - L_y$$

With PE_y and L_y being zero as indicated estimated emission reductions can be calculated using the formula for calculating the baseline emissions (BE_y). The Baseline Emissions are calculated by multiplying the baseline emissions factor (EF) by the annual net generation of the project (EG_y), as follows:

$$ER_y = BE_y = EG_y \cdot EF$$

With the baseline emissions factor (EF) calculated using operating and build margins as described in detail in section B.2.

D.3. Quality control (QC) and quality assurance (QA) procedures are being undertaken for data monitored		
Data	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	Low	These data will be directly used for calculation of emission reductions. The data are double-checked against commercial data. The meter for monitoring and validation will be used for electricity sales to the grid.
-----------	-----	---

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

>>

Overall responsibility for monitoring and carrying out the monitoring following this monitoring plan lies with Hebei Hong-Song Wind Power Share Holding Ltd.

Hebei Hong-Song Wind Power Share Holding Ltd. will establish CDM project management office and assign dedicated people responsible for the monitoring and report the emission reduction due to the project activity.

The output from Chengde Hongsong Project is monitored and recorded using two meters. These meters are used for both CDM purposes and sales of the electricity generated to the grid company.

The monitoring plan is presented in Annex 4.

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

>>

- Ms. Qian Yiwen, qyw@carbonresource.com. Carbon Resource Management China Representative Office, Suite 1310, Air China Plaza, No 36 Xiaoyun Lu, Chaoyang District, Beijing, China, 100027, Tel: +86 10 844 75246/8.
- Mr. Christiaan Vrolijk, cv@carbonresource.com. Carbon Resource Management Limited, Technology House, 16-18 Whiteladies Road, Bristol, BS8 2LG, UK, Tel: +44 117 980 9442.
- Mr. He Zhiyuan, onelook1982@sina.com. Hebei Hong-Song Wind Power Share Holding Ltd. No. 10, Xinhua Street North, Chengde, China, 067000.

**SECTION E. Estimation of GHG emissions by sources****E.1. Estimate of GHG emissions by sources:**

>>

Project emissions are zero, as this is a wind power project.

E.2. Estimated leakage:

>>

No leakage is identified and no data will be collected, as this is a wind power project.

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

>>

Both project emissions (PE_y) and leakage emissions (L_y) are zero, therefore total emissions from the project activity are zero.

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

>>

The Baseline Emissions (BE_y , in t CO₂), for each year y , are calculated by multiplying the baseline emissions factor (EF , in tCO₂/MWh) by the net generation of the project (EG_y , in MWh), as follows:

$$BE_y = EG_y \cdot EF$$

With the baseline emissions factor (EF) calculated using operating and build margins as described in detail in section B.2.

$$EF = w_{OM} \cdot EF_{OM} + w_{BM} \cdot EF_{BM} = 0.952 \text{ tCO}_2/\text{MWh}$$

The first turbines of the windfarm were commissioned in September 2004 respectively. Generation in 2005 was 84,228 MWh in aggregate. Reductions achieved during the calendar year 2005, therefore, are:

$$BE = EG \cdot EF = 84,228 \text{ MWh} \cdot 0.952 \text{ tCO}_2/\text{MWh} = 80,185 \text{ tCO}_2.$$

It is estimated that the generation in every full year from 2006 to 2014 will be 110,000 MWh. Expected annual reductions therefore will be:

$$BE = EG \cdot EF = 110,000 \text{ MWh} \cdot 0.952 \text{ tCO}_2/\text{MWh} = 104,720 \text{ tCO}_2.$$

The total estimated emission reductions from the project during the ten year period 2005-2014 are:
971,257 tCO₂

These values obtained are presented in the table in section E.6. The exact reductions are calculated ex-post on the basis of actual net electricity generation from the project.

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

>>



With E.3 being zero, the emission reductions (*ER*) from the project activity are given by the baseline emissions given in section E.4.

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

>>

Table 7 Estimated values obtained when applying formulae above (tCO₂e)

Period	Baseline emissions	Project emissions	Leakage	Emission reductions
2005	80,185	0	0	80,185
2006	104,720	0	0	104,720
2007	104,720	0	0	104,720
2008	104,720	0	0	104,720
2009	104,720	0	0	104,720
2010	104,720	0	0	104,720
2011	104,720	0	0	104,720
2012	104,720	0	0	104,720
2013	104,720	0	0	104,720
2014	104,720	0	0	104,720
Total	1,022,665	0	0	1,022,665

SECTION F. Environmental impacts

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

>>

Environmental Impact Assessment (EIA) for the windfarm phase I and II have been completed by the Resource and Environment Research Institute of Hebei Normal University (for phase I) and Chengde Environment Protection Science Institute (for phase II) assigned by the project owner. Both EIAs have been approved by the Environmental Protection Bureau of Hebei Province. The followings are summaries of the EIA of phase I and II.

EIA summaries of windfarm phase I:

The analysis of the environment impact in the construction period and the environment protection measurements to be taken

- The vegetation removed and covered temporarily during the construction period are 4800 and 7700 m², respectively. The area permanently covered is 460 m². Grass will be planted during the construction period to minimise the impact of construction.
- The area is not a wetland rich in flora and fauna, and the construction period is only 3 months, so the impact of the construction of the windfarm will have little effect on animals in the area.
- The additional water and soil loss caused by the project construction is about 140 tonne. The area will be recovered immediately to minimise the impact.

The analysis of the environment impact in operation period

The operating noise of the wind turbines is 100dB, dropping to 45dB 250m away. The nearest residential areas are 0.6 km away from the windfarm, so the noise does not influence the residential districts nearest to the site.



Conclusion

The proposed project will utilise the local wind resource and complies with the nature protection area planning. The project makes use of renewable energy and causes little pollution. The project will have little impact on the ecological environment provided that the area impacted is recovered quickly. Therefore, the proposed project is feasible from the environmental viewpoint.

EIA summaries of windfarm phase II:

The analysis of the environment impact in the construction period and the environment protection measurements to be taken

- The impacted vegetation area during the construction is about 48,939 m². The vegetation removed and covered temporarily can be recovered completely within 1 year while the other impacted vegetation can be recovered within 4-5 years.
- The additional water and soil loss caused by the project is about 139.3 tonne. The area will be recovered immediately to minimise the impact.
- Since the occupied grassland area by the structures is limited and the distances between construction sites are big, there is ample undisturbed grasslands connecting the areas around. Additionally, the construction period is only 5 months. Therefore, the project construction will have little impact on local animals.
- On windy days dust is likely to occur from temporary storage piles, construction sites and fields where the vegetation has been affected. The occurrence of dust can be minimised by watering the area, clearing the sites regularly and the construction of a temporary anti-dust wall, etc. The highest dust levels for the surrounding areas can be guaranteed at a level lower than 1.0mg/m³.
- The noise intensity is relatively big during the construction period. However, these noise sources can be limited through an agreement on construction times.

The analysis of the environment impact in operation period

- The noise level beyond 120 m away from the project site during operation period can reach below 45dB(A). Since the residence area closest to the project is at 1500 m away from the project site, the noise will not have an adverse impact on the local area.
- The power generation equipment will not produce any waste during operation, and the wind turbines are far away from each other (over 100 m). Therefore, the project will not impact the local vegetation and animals.
- The waste and waste water caused by the daily operation and maintenance staff is little and will not have obvious impact on the surrounding environment.
- Since the wind speed is high and the base noise level is 40-50 dB(A) all around the year, the project construction will not change the sound environment in this area, therefore having no impact on the local animals.

Conclusion



The proposed project belongs to the industry that is encouraged and supported by the state, and complies with the state industry policy. The proposed project can produce good economic benefit and social benefit. The construction of the proposed project is feasible provided that the relevant environmental protection measurements.

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:

>>

Environmental impacts are not considered significant.

SECTION G. Stakeholders' comments

>>

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

>>

Without any legal requirement to carry out a stakeholder consultation when project approval has been granted, no specific consultation was held for the Chengde Hongsong Windfarm Phase I and Phase II. However, In January 2006, there were consultations carried out by staff from Hebei Hong-Song Wind Power Share Holding Ltd. with the local government for the proposed third phase of the windfarm which is applying for CDM registration.

The consultations with the local government, which represents the local community, resulted in a clear support letter for the Project from the local government – see G.2 below. A survey of the local villagers and residents in the area, carried out at the same time, indicated support from all local stakeholder to the project. A summary of the survey – see G.2.

G.2. Summary of the comments received:

>>

Following is a translation of the letter received from the local government.

Comments from Local Government about the Songshan Wind Farm Project

Chengde Hongsong Windfarm is located in Weichang County, in the North part of Hebei Province. We believe the construction and operation of the windfarm will promote the development of related industries e.g. tourism and will create jobs for the county. Using local wind resources, the project will contribute to the sustainable development of this underdeveloped region. And as green electricity, this project will be an environment-friendly one. As the local government, we fully support the development of the Windfarm project.

The People's Government of Weichang County

21 Jan. 2006

Stamp

Following is a summary of the Local Survey. The survey forms are available from the developer.

A 1 page questionnaire was designed to be easy to fill in and had the following sections:

Project introduction

Respondent's basic information and education level



Questions on:

What is their opinion on their current environment?

Is their environment of living, studying and working quiet?

Will the project have a negative impact on the environment, such as air, noise and water?

Will the project have a negative impact on their livelihood?

Will the project have a positive impact on their livelihood?

What are the concerns they have with respect to the project—air pollution, equipment safety, electromagnetic interference, sight spoiling, noise or daily life waste/ sewage?

Do they agree with the development of the Project?

What environment protection methods should be considered during the Project construction and operation?

What other comments and suggestions do they have for the developer regarding the Project?

The survey had a 100% response rate and the following is a summary of the key findings (The questionnaires were sent to 50 households):

100% of respondents agreed with the development of the Project.

100% respondents believed they currently lived in a pleasant environment.

100% believed that that the project construction will not have impact on their livelihoods.

78% believed there would be positive benefits to their livelihood from the Project.

The three main concerns were sight spoiling (33%), equipment safety (22%) and noise (18%).

Conclusions from the survey

The survey shows that the Project has strong local support amongst the local people, as further evidenced by the local government support letter. The main issues seem to be sight spoiling, equipment safety, noise. The wind turbine rotation presents the harmonious development of human and nature, and it will not spoil the sight there. The developer will focus on the equipment safety issue not only in the construction period but also in the operation period. The EIA shows that the noise levels would be within China national standards and no interference is expected. So all these concerns are maybe perceived problems rather than real ones. However the developer will enforce all measurements to keep a pleasant environment for local people and if any problem occurs, they will find a best way to solved it.

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

>>

The villagers and local government are all supportive of the Project and to date there has been no need to modify the project design according to the comments received.

The project developer has an overall environment- friendly plan to guarantee that the project has the minimum negative impact on the environment during the project construction and operation.

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

Developer	Hebei Hong-Song Wind Power Share Holding Ltd. No. 10, Xinhua Street North, Chengde city Hebei province People's Republic of China
Contact person	Mr He Zhiyuan Project Manager Tel +86 0314 8783579 Email onelook1982@sina.com
Credit buyer	Carbon Resource Management Ltd Technology House 16-18 Whiteladies Road Bristol BS8 2LG United Kingdom www.carbonresource.com
Contact person	Mr Nick Clarke Chief Executive Officer Tel +44 117 980 9441 Fax +44 117 980 9401 Email nac@carbonresource.com

Annex 2**INFORMATION REGARDING PUBLIC FUNDING**

There is no public funding for this windfarm project.

Annex 3**BASELINE INFORMATION****Low-cost/must run generation share in the North China Power Grid (2000-2004)**

Year	Total generation (TWh)	Low-cost/must run generation (TWh)	Share (%)	Source
2000	331.1	3.63	1.10%	China Electric Power Yearbook (2001), p667
2001	361.1	2.93	0.81%	China Electric Power Yearbook (2002), p617
2002	407.5	3.63	0.89%	China Electric Power Yearbook (2003), p585
2003	461.7	3.98	0.86%	China Electric Power Yearbook (2004), p709
2004	530.8	4.03	0.76%	China Electric Power Yearbook (2005), p474



Fuel emissions factors for the North China Power Grid

Fuel types	Unit	Net caloric value (MJ/unit)	Oxidation rate (%)	Carbon Emission Factor (tC/TJ)	COEF (tCO ₂ e/unit)
Raw coal	Mtonnes	20,908	98.0	25.80	1.94
Cleaned coal	Mtonnes	26,344	98.0	25.80	2.44
Coke	Mtonnes	28,435	98.0	29.50	3.01
Other washed coal	Mtonnes	8,363	98.0	25.80	0.78
Coke oven gas	Mm3	17	99.5	13.0	0.00
Other coal gas	Mm3	5	99.5	13.0	0.00
Crude oil	Mtonnes	41,816	99.0	20.0	3.04
Gasoline	Mtonnes	43,070	99.0	18.9	2.95
Diesel	Mtonnes	42,652	99.0	20.2	3.13
Fuel oil	Mtonnes	41,816	99.0	21.1	3.20
LPG	Mtonnes	50,179	99.5	17.2	3.15
Refinery gas	Mtonnes	46,055	99.5	18.2	3.06
Natural gas	Mm3	39	99.5	15.3	0.00
Other petroleum products	Mtonnes	41,816	99.0	27.5	4.17
Other coking product	Mtonnes	28,435	98.0	25.8	2.64
Other fuels*	Mtonnes (coal equivalent)				-

* not defined, conservative emission factor used: 0

Source:

Revised 1996 IPCC Guidelines

China Electric Power Yearbook

China Energy Statistics Yearbook

State Power Information Network

Fuel consumption and related CO₂ emissions in the North China Power Grid (2002)

Fuel types	Unit	Fuel consumption (million units)	CO ₂ emission coefficient (tCO ₂ e/unit)	CO ₂ emission (MtCO ₂ e)	Provinces: Beijing (millions) A	Tianjin (millions) B	Hebei (millions) C	Shanxi (millions) D	Inner Mongolia (millions) E	Shandong (million) F
Raw coal	Mtonnes	191.51	1.94	371.21		6.92	10.53	49.88	40.37	51.63
Cleaned coal	Mtonnes	0.81	2.44	1.97						0.81
Coke	Mtonnes		3.01							
Other washed coal	Mtonnes	3.11	0.78	2.41		0.03		0.65	1.36	1.06
Coke oven gas	Mm3	283.00	0.00	0.22		17.00	171.00		75.00	16.00
Other coal gas	Mm3	3,351.00	0.00	0.83		1,582.00		734.00		1,035.00
Crude oil	Mtonnes	0.15	3.04	0.45						0.15
Diesel	Mtonnes	0.18	3.13	0.57		0.00	0.02	0.04		0.10
Gasoline	Mtonnes	0.01	2.95	0.02					0.02	0.01
Fuel oil	Mtonnes	0.36	3.20	1.15		0.14	0.00	0.01		0.20
LPG	Mtonnes		3.15							
Refinery gas	Mtonnes	0.00	3.06	0.01				0.00		
Natural gas	Mm3	57.00	0.00	0.12			55.00			2.00
Other petroleum products	Mtonnes		4.17							
Other coking product	Mtonnes		2.64							
Other fuels*	Mtonnes (coal equivalent)	0.17							0.01	0.16
Total				378.97						
Generation	TWh			403.92						
Sources:	China Energy Statistical Yearbook (2000-2002) p220-251 China Energy Statistical Yearbook (2004) p301									
				403.92	Average (MWh):					
					17,886,000	27,263,000	100,970,000	82,256,000	51,382,000	124,162,000

Fuel consumption and related CO₂ emissions in the North China Power Grid (2003)

Fuel types	Unit	Fuel consumption (million units)	CO ₂ emission coefficient (tCO ₂ e/unit)	CO ₂ emission (MtCO ₂ e)	Provinces: Beijing (millions) A	Tianjin (millions) B	Hebei (millions) C	Shanxi (millions) D	Inner Mongolia (millions) E	Shandong (million) F
Raw coal	Mtonnes	225.36	1.94	436.82		7.15	10.53	54.83	45.29	68.08
Cleaned coal	Mtonnes	0.09	2.44	0.23						0.09
Coke	Mtonnes	0.03	3.01	0.08					0.03	
Other washed coal	Mtonnes	7.33	0.78	5.68		0.06		0.67	2.08	4.51
Coke oven gas	Mm3	308.00	0.00	0.24		24.00	171.00		90.00	21.00
Other coal gas	Mm3	3,943.00	0.00	0.98		1,692.00		1,063.00		1,032.00
Crude oil	Mtonnes	0.30	3.04	0.90						0.30
Gasoline	Mtonnes	0.00	2.95	0.00						0.00
Diesel	Mtonnes	0.14	3.13	0.44		0.00	0.01	0.04		0.03
Fuel oil	Mtonnes	0.26	3.20	0.83		0.14	0.00	0.01		0.10
LPG	Mtonnes		3.15							
Refinery gas	Mtonnes	0.01	3.06	0.03				0.00		0.01
Natural gas	Mm3	158.00	0.00	0.34			50.00			108.00
Other petroleum products	Mtonnes		4.17							
Other coking product	Mtonnes		2.64							
Other fuels*	Mtonnes (coal equivalent)	0.49				0.10				0.39
Total				446.58						
Generation	TWh			457.68						
Sources:	China Energy Statistical Yearbook (2000-2002) p220-251 China Energy Statistical Yearbook (2004) p301									
				457.68	Average (MWh):					
					18,608,000	32,191,000	108,261,000	93,962,000	65,106,000	139,547,000

**Fuel consumption and related CO₂ emissions in the North China Power Grid (2004)**

Fuel types	Unit	Fuel consumption (million units)	CO ₂ emission coefficient (tCO ₂ e/unit)	CO ₂ emission (MtCO ₂ e)	Provinces: Beijing (millions) A	Tianjin (millions) B	Hebei (millions) C	Shanxi (millions) D	Inner Mongolia (millions) E	Shandong (millions) F
Raw coal	Mtonnes	272.28	1.94	527.78	8.23	14.10	63.00	52.13	49.32	85.50
Cleaned coal	Mtonnes	0.40	2.44	0.98	-	-	-	-	-	0.40
Coke	Mtonnes	0.00	3.01	0.01	-	-	-	-	0.00	-
Other washed coal	Mtonnes	7.46	0.78	5.78	0.06	-	1.01	3.54	-	2.84
Crude oil	Mtonnes	-	3.04	-	-	-	-	-	-	-
Gasoline	Mtonnes	-	2.95	-	-	-	-	-	-	-
Diesel	Mtonnes	0.06	3.13	0.18	0.00	0.01	0.05	-	-	-
Fuel oil	Mtonnes	0.15	3.20	0.47	0.15	-	0.00	-	-	-
Other petroleum products	Mtonnes	-	4.17	-	-	-	-	-	-	-
Coke oven gas	Mm ³	1,554.00	0.00	1.23	55.00	-	54.00	532.00	40.00	873.00
Other coal gas	Mm ³	6,807.00	0.00	1.69	1,774.00	-	2,425.00	820.00	1,647.00	141.00
LPG	Mtonnes	-	3.15	-	-	-	-	-	-	-
Refinery gas	Mtonnes	0.02	3.06	0.06	-	0.01	0.01	-	-	-
Natural gas	Mm ³	56.00	0.00	0.12	-	37.00	-	19.00	-	-
Total				538.30						
Generation	TWh			526.77						
Sources:	China Energy Statistical Yearbook (2000-2002) p220-251 China Energy Statistical Yearbook (2004) p301									
				526.77	Average (MWh): 2004 Generation from power book, p617					
					18,579,000	33,952,000	124,970,000	104,926,000	80,427,000	163,918,000

Calculation of Operating Margin Emissions Factor for the North China Power Grid, including imports

	Unit	2002	2003	2004	2002-2004
Electricity generation from included sources	TWh	403.919	457.675	526.772	1,388.366
Emissions	MtCO ₂ e	378.973	446.581	538.304	1,363.858
Imports from Northeast grid	TWh	2.905	4.244	4.515	11.664
	%	0.7%	0.9%	0.9%	0.8%
Emissions factor Northeast grid	tCO ₂ e/MWh	1.116	1.114	1.152	1.129
Emissions from imports	MtCO ₂ e	3.242	4.729	5.201	13.172
Total generation	TWh	406.824	461.919	531.287	1,400.030
Total emissions	MtCO ₂ e	382.215	451.309	543.505	1,377.030
Calculated Operating Margin Emissions Factor	tCO ₂ e/MWh	0.940	0.977	1.023	0.984

Note: the emissions factor of the Northeast Grid is calculated as the average emissions factor

Determination of Build Margin year

Year	Installed capacity (MW)	Added capacity (MW)	Growth	Selected
2004	96,983.2	n/a	n/a	NO
2003	87,362.7	9,620.5	9.9%	NO
2002	78,955.2	18,028.0	18.6%	NO
2001	72,071.9	24,911.3	25.7%	YES

Source: China Electric Power Yearbook 2002- 2005.

Share of fuels in thermal generation (2004)

	2004 CO ₂ emissions	Share
Solids	534.54	99.3%
Liquids	0.72	0.1%
Gases	3.04	0.6%
Other	-	0.0%
Total	538.30	100.0%

To be conservative when calculating the weighted average emission factor of the best available commercial technology only emissions from the share of solid fuel is taken into account, with liquids and gases conservatively assumed to have zero emissions.

**Weighted emission factor of the best available commercial technology**

Fuel	Efficiency (gce/kWh)	NCV (GJ/tce)	EF (tC/TJ)	Oxid (%)	CEF (tCO ₂ e/MWh)	Share in 2004	Weighted average
Solid	320	29.27	25.8	98	0.868	99.3%	
Liquid					-	0.1%	
Gas					-	0.6%	
Total							0.862

Source: NCV of standard coal from the General Code for Comprehensive Energy Consumption Calculation (GB2589-81). Emission factors and oxidation factors from Revised 1996 IPCC Guidelines.

Note: The efficiency for thermal power generation from solids is taken from the National Study of China Climate Change by Tsinghua University Publication House, which states that the projected fuel consumption for new units will be 320 grammes of standard coal equivalents per kWh (gce/kWh) in 2010.

Calculation of Build Margin Emissions Factor

	2001 capacity (MW)	2004 capacity (MW)	Added (MW)	Share	CEF (tCO ₂ /MWh)	BM (tCO ₂ /MWh)
Hydro (MW)	3,224.0	3,250.7	26.7	0.11%	-	
Thermal (MW)	68,791.3	93,594.9	24,803.6	99.57%	0.862	
Nuclear (MW)	-	-	-	0%	-	
Wind(MW)	56.6	137.6	81.0	0.33%	-	
Total	72,071.9	96,983.2	24,911.3	100%		0.859

Note: Using the weighted average emissions factor for thermal generation as calculated above.

Annex 4**MONITORING PLAN****1. Introduction**

The Chengde Hongsong Windfarm Project adopts the Revision to the approved consolidated monitoring methodology ACM0002 “Consolidated monitoring methodology for zero-emissions grid-connected electricity generation from renewable sources” to determine the emission reductions from the net electricity generation from the windfarm. This plan describes in more detail the process as set out in Section D of the Project Design Document.

2. Responsibility

Overall responsibility for monitoring and carrying out the monitoring following this monitoring plan lies with Hebei Hong-Song Wind Power Share Holding Ltd.

Wang Jian, General Manager of Hebei Hong-Song Wind Power Share Holding Ltd., is responsible for the monitoring and reporting of the windfarm.

Hebei Hong-Song Wind Power Share Holding Ltd., in co-operation with the North China Power Grid Company, and existing windfarms experienced experts, and with the help of DOEs, will train the staff carrying out the monitoring work.

3. Installation of meters

Project net electricity generation will be monitored through the use of on site metering equipment at the substation.

The net electricity generation will base on the main meter installed in Shanwanzi substation, and the backup meter in Chengde Hongsong Windfarm is an assistant one. Every month Shanwanzi substation will report the electricity



generation to Chengde Electric Power Company, and the latter will report it to North China Power Grid Company. Both the main metering system equipment and the backup metering system equipment will be owned, operated and maintained by North China Power Grid.

Both meters will have the capability to be read remotely through a communication line. Both North China Power Grid and Chengde Hongsong Windfarm have the right to read either meter.

4. Calibration

The metering equipment are calibrated and checked annually for accuracy so that the metering equipment shall have sufficient accuracy. The net generation output registered by the meters alone will suffice for the purpose of billing and emission reduction verification as long as the error in the meters is within the agreed limits.

Calibration is carried out by North China Power Grid or Chengde Electric Power Company with the records being supplied to Chengde Hongsong Windfarm, and these records will be maintained by Chengde Hongsong Windfarm and the third party appointed by DOE.

Both meters shall be jointly inspected and sealed on behalf of the parties concerned and shall not be interfered with by either party except in the presence of the other party or its accredited representatives.

All the meters installed shall be tested by North China Power Grid within 10 days after: the detection of a difference larger than the allowable error in the readings of both meters; the repair of all or part of meter caused by the failure of one or more parts to operate in accordance with the specifications.

If any errors are detected the party owning the meter shall repair, recalibrate or replace the meter giving the other party sufficient notice to allow a representative to attend during any corrective activity.

Should any previous months reading of the main meter be inaccurate by more than the allowable error, or otherwise functioned improperly, the net generation output shall be determined by (a) first, by reading backup meter, unless a test by either party reveals it is inaccurate; (b) if the backup system is not with acceptable limits of accuracy or operation is performed improperly the Chengde Hongsong Windfarm and North China Power Grid shall jointly prepare an reasonable and conservative estimate of the correct reading, and provide sufficient evidence that this estimation is reasonable and conservative when DOE undertakes verification; and (c) if North China Power Grid and Chengde Hongsong Windfarm fail to agree then the matter will be referred for arbitration according to agreed procedures.

5. Monitored data

During the first seven operating years, the on-site net electricity generation (*EG*) will be monitored and recorded following the procedures above. Off site, further data that needs to be monitored refers to the displaced grid electricity just before the start of the second and the third crediting period. Data variables to be monitored are presented in Section D of the PDD. This data is required to accurately calculate the grid CO₂ emission factor using the combined operating and build margins.

6. Quality control

Monthly net generation data will be approved and signed off by Mr. Dai Wei before it is accepted and stored.

This audit will check compliance with operational procedures in this monitoring plan and Section D of the PDD.



This internal audit will also identify potential improvements to procedures to improve monitoring and reporting in future years. If such improvements are proposed these will be reported to the DOE and only operationalised after approval from the DOE.

7. Data management system

Physical document such as paper-based maps, diagrams and environmental assessments will be collated in a central place, together with this monitoring plan. In order to facilitate auditors' reference of relevant literature relating to Chengde Hongsong Windfarm project, the project material and monitoring results will be indexed. All paper-based information will be stored by the technology department of Chengde Hongsong Windfarm and all the material will have a copy for backup.

And all data including calibration records is kept until 2 years after the end of the total crediting period of the CDM project.

8. Reporting

The steps required to meet the requirements for emissions reduction monitoring include:

- Chengde Electric Power Company reads main meter and reports the result to North China Power Grid Company monthly.
- Chengde Electric Power Company supplies reading to Chengde Hongsong Windfarm monthly.
- Chengde Hongsong Windfarm records readings from the backup meter monthly.
- Chengde Hongsong Windfarm calculates emission reductions at the end of the year.
- Chengde Hongsong Windfarm carries out an internal audit on the readings and calculations.
- Chengde Hongsong Windfarm reports annually the readings and calculations to the DOE for verification, within 10 working days of the year end.

9. Verification

The contracted DOE will receive the annual emission reduction report 10 working days after year end.

Hebei Hong-Song Wind Power Share Holding Ltd. will facilitate the verification through providing the DOE with all required necessary information at any stage.