CLEAN DEVELOPMENT MECHANISM
PROJECT DESIGN DOCUMENT FORM (CDM-PDD)
Version 03 - in effect as of: 28 July 2006

CONTENTS

Annexes

SECTION A. General description of project activity

A.1. Title of the project activity:

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Inner Mongolia Wuchuan Yihemei Wind Farm 49.5 MW Project
Current version of the PDD: 2.0
Date of completion: 02/12/2010

PDD revision history

PDD version	Time	Note
Version 1.0	13/07/2010	Complete first draft (using ACM0002 v11)
Version 1.1	02/09/2010	Submission to DOE for GSP after internal QA (using ACM0002 v11)
Version 2.0	02/12/2010	Revision after DOE draft validation report (using ACM0002 v12)

A.2. Description of the project activity:

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Inner Mongolia Wuchuan Yihemei Wind Farm 49.5 MW Project (the proposed project activity) is located in Xiwulanbulang Town, Wuchuan County, Hohhot City, Inner Mongolia Autonomous Region, P. R. China. The proposed project activity is developed by Wuchuan County Yihe Wind Power Generation Co., Ltd.. The proposed project activity is to install and operate 33 wind turbines with a capacity of 1,500 kW each; the total installed capacity will be 49.5 MW. Once fully operational, the proposed project activity is expected to deliver on average approximately 114,580 MWh of electricity per year to the North China Power Grid (NCPG). The purpose of the proposed project activity is the generation of electricity from wind and the supply of this electricity to the NCPG.

The project scenario is the installation of 49.5 MW of renewable energy power generation capacity, and the supply to NCPG of 114,580 MWh of electricity generated from renewable energy.

The baseline scenario, which is the same as the scenario existing prior to the implementation of the proposed project activity, is the generation of electricity by grid-connected power plants.

As the NCPG is dominated by thermal power generation, the establishment of the proposed project activity will lead to greenhouse gas (GHG) emission reductions. Following the baseline methodology, the emission reductions are estimated to be approximately 108,873 tonnes of CO_2 equivalent (tCO_2e) per year once the proposed project activity is fully operational.

Sustainable development

The proposed project activity will help the local government to promote economic development and to improve the air quality. The project will assist China in stimulating and accelerating the commercialisation of grid-connected wind power technologies and markets which are 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. The project will improve air quality and local livelihoods, promote sustainable renewable energy industry development.

The proposed project activity will contribute to sustainable development in the following ways:

- It will promote local economic development by creating local employment opportunities during both the construction and operational phase of the proposed project activity.
- It will generate electricity from renewable sources.
- It will promote technology development, through the use of advanced technology.
- It will reduce GHG emissions in China compared to the baseline/business-as-usual scenario.
- It will reduce the emissions of other pollutants associated with the operation of fossil fuel-fired thermal power plant, including SO_2 and soot, as well as reducing thermal pollution from cooling water in the baseline/business-as-usual scenario.

A.3. Project participants:

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Name of Party involved ((host) indicates a host Party)	Private and/or public entity(ies) project participants (as applicable)	Party involved wishes to be considered as project participant (Yes/No)
P.R. China (host)	Wuchuan County Yihe Wind Power Generation Co., Ltd.	No
United Kingdom of Great Britain and Northern Ireland	Carbon Resource Management S.A.	No

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

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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Inner Mongolia Autonomous Region

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

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Xiwulanbulang Town, Wuchuan County, Hohhot City

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

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East Longitude: 110°54′59″～110°57′08″

North Latitude: 41°11′02″～41°13′11″

Altitude: 1500~1800m

The geographic location of the proposed project activity is shown in Figure 1 below.

Figure 1 Map showing the location of the Project

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

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Sectoral scope: 01 Energy industries

Category: Grid-connected electricity generation from renewable sources

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

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The project scenario is the installation of 33 wind turbines with a capacity of 1,500 kW each. The equipment is manufactured in China by Xinjiang Gold Wind Technology Co., Ltd.. The technology is considered good practice in China. The detailed parameters of the turbines are provided below.

Table 1 Technology specifications

Key Technology Parameter	Value[1]
Power rating	1500 kW
Output	690 V
Rotor diameter	77 m
Hub height	65 m
Cut-in wind speed	3 m/s
Rating wind speed	12 m/s
Cut-out wind speed	22 m/s
Design life	20 year

Every turbine will have a transformer from 690 V to 35 kV. All turbines are connected to the onsite 35 kV-110 kV substation. The onsite substation is connected via a 110 kV transmission line to the grid substation (110 kV-220 kV Substation), where it is transferred to the NCPG.

The electricity generated from the project will be transmitted to NCPG. The net electricity supplied by the proposed project activity to the grid will be monitored by the main meter, recording exports and imports electricity generation.

The proposed project activity is the installation of a wind farm with an installed capacity of 49.5 MW. The total net supplied power to the grid is expected to be 114,580MWh once fully operational, which is an expected average net load factor of 26.42%. The expected load factor is determined in the FSR by an independent qualified design institute with the highest grade, using scientific methods as applied internationally, based on detailed information available, including on the local wind speeds, in accordance with EB guidance on plant load factors (EB48 Annex 11). The power generation is monitored by the electronic control and monitoring system in the onsite office, as well as through the electricity meter at the sub-station where the project is connected to the grid.

Prior to the implementation of the project activity, the electricity was generated by grid-connected power plants. Without the implementation of the project, this scenario would have continued and is considered the baseline scenario.

As the NCPG is dominated by thermal power generation, the establishment of the proposed project activity will lead to greenhouse gas (GHG) emission reductions, estimated following the baseline methodology below.

[1] Item 3 Appendix 1 of The wind turbine purchase contract

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

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Applying the baseline methodology and estimated annual net electricity supply, the ex-ante estimated emission reductions over the chosen crediting period are presented below.

Table 2 Estimated amount of emission reductions over the chosen crediting period

Period*	Annual estimation of emission reductions in tonnes of CO_2e
1/5/2011-30/4/2012	108,873
1/5/2012-30/4/2013	108,873
1/5/2013-30/4/2014	108,873
1/5/2014-30/4/2015	108,873
1/5/2015-30/4/2016	108,873
1/5/2016-30/4/2017	108,873
1/5/2017-30/4/2018	108,873
Total estimated reductions (tonnes of CO_2e)	762,111
Total number of crediting years	7 years
Annual average over the crediting period of estimated reductions (tonnes of CO_2e)	108,873

*Note: * Using 12-monthly periods from the start of the crediting period*

A.4.5. Public funding of the project activity:

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There is no public funding from Parties included in Annex I involved in this project.

SECTION B. Application of a baseline and monitoring methodology

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

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Methodology

- ACM0002 version 12.1.0 “Consolidated methodology for grid-connected electricity generation from renewable sources” (valid from 17 Sep 10 onwards)

The methodology refers to the following tools

- AM_Tool_01 version 05.2 “Tool for the demonstration and assessment of additionality”
- AM_Tool_02 version 02.2 “Combined tool to identify the baseline scenario and demonstrate additionality” (this tool is not applicable to the project)
- AM_Tool_03 version 02 “Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion” (this tool is not applicable to the project)
- AM_Tool_07 version 02 “Tool to calculate the emission factor for an electricity system”

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

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This methodology is applicable to grid-connected renewable power generation project activities that (a) install a new power plant at a site where no renewable power plant was operated prior to the implementation of the project activity (Greenfield plant); (b) involve a capacity addition; (c) involve a retrofit of (an) existing plant(s); or (d) involve a replacement of (an) existing plant(s).

Therefore, the methodology is applicable as the proposed project activity is the installation of a Greenfield, grid-connected wind power plant (a).

The methodology is applicable under the following conditions:

Criteria	Applicability	Conclusion
The project activity is the installation, capacity addition, retrofit or replacement of a power plant/unit of one of the following types: hydro power plant/unit (either with a run-of-river reservoir or an accumulation reservoir), wind power plant/unit, geothermal power plant/unit, solar power plant/unit, wave power plant/unit or tidal power plant/unit	The proposed project activity is the installation of a wind power plant.	OK
In the case of capacity additions, retrofits or replacements: the existing plant started commercial operation prior to the start of a	The proposed project activity is a Greenfield plant and does not represent a capacity addition to an existing plant.	OK

minimum historical reference period of five years, used for the calculation of baseline emissions and defined in the baseline emission section, and no capacity expansion or retrofit of the plant has been undertaken between the start of this minimum historical reference period and the implementation of the project activity		
In case of hydro power plants, one of the following conditions must apply: • The project activity is implemented in an existing reservoir, with no change in the volume of reservoir; or • The project activity is implemented in an existing reservoir, where the volume of reservoir is increased and the power density of the project activity, as per definitions given in the Project Emissions section, is greater than 4 W/m^2; or • The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the Project Emissions section, is greater than 4 W/m^2.	Not applicable. The proposed project activity is a wind power plant.	OK

The methodology is not applicable to the following:

Criteria	**Applicability**	**Conclusion**
Project activities that involve switching from fossil fuels to renewable energy sources at the site of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site;	The proposed project activity does not involve switching from fossil fuels to renewable energy at the site of the project activity	OK
Biomass fired power plants	Not applicable. The proposed project activity is a wind power plant	OK

Hydro power plants that result in new reservoirs or in the increase in existing reservoirs where the power density of the power plant is less than $4W/m^2$	Not applicable. The proposed project activity is a wind power plant	OK

In addition, the applicability conditions included in the tools referred to above apply.[2]

Any conditions for the application of the tools are addressed in the sections below where the tools are used, sections B.5 and B.6, showing that the tools are applicable to the proposed project activity. In addition, it is noted that:

- the project is a Greenfield project, therefore the AM_Tool_02 "Combined tool to identify the baseline scenario and demonstrate additionality" is not required to identify the baseline scenario of the proposed project; and
- the project is a wind power project, there are no fossil fuels used for electricity generation, so there are no CO_2 emissions and leakage from combustion of fossil fuels, and thus the AM_Tool_03 "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion" is not applicable to the proposed project.

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

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Emission sources:

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

Following the methodology, only CO_2 emissions from electricity generation by fossil fuel fired power plant that is displaced due to the project activity are taken into account for determining the baseline emissions. According to the methodology, project emissions from geothermal, solar thermal and hydro power plants need to be taken into account; there are no project emissions for a wind power plant.

Spatial boundary:

The spatial extend of the project boundary includes the project site and all power plants connected to NCPG. NCPG is an electricity system which is defined by the spatial extent of the power plants that can be dispatched without significant transmission constrains.

Using the boundary definitions of the Chinese DNA[3], NCPG consists of Shandong, Beijing, Tianjin, Hebei, Shanxi, and Inner Mongolia power grids. The electricity transmission between different provinces in NCPG is very large and it is reasonable for the project to regard NCPG as the project boundary.

[2] The condition in the "Combined tool to identify the baseline scenario and demonstrate additionality" that all potential alternative scenarios to the proposed project activity must be available options to project participants does not apply to this methodology, as this methodology only refers to some steps of this tool.

[3] Chinese DNA designates it on 02/07/2009 at http://qhs.ndrc.gov.cn/qjfzjz/t20090703_289357.htm

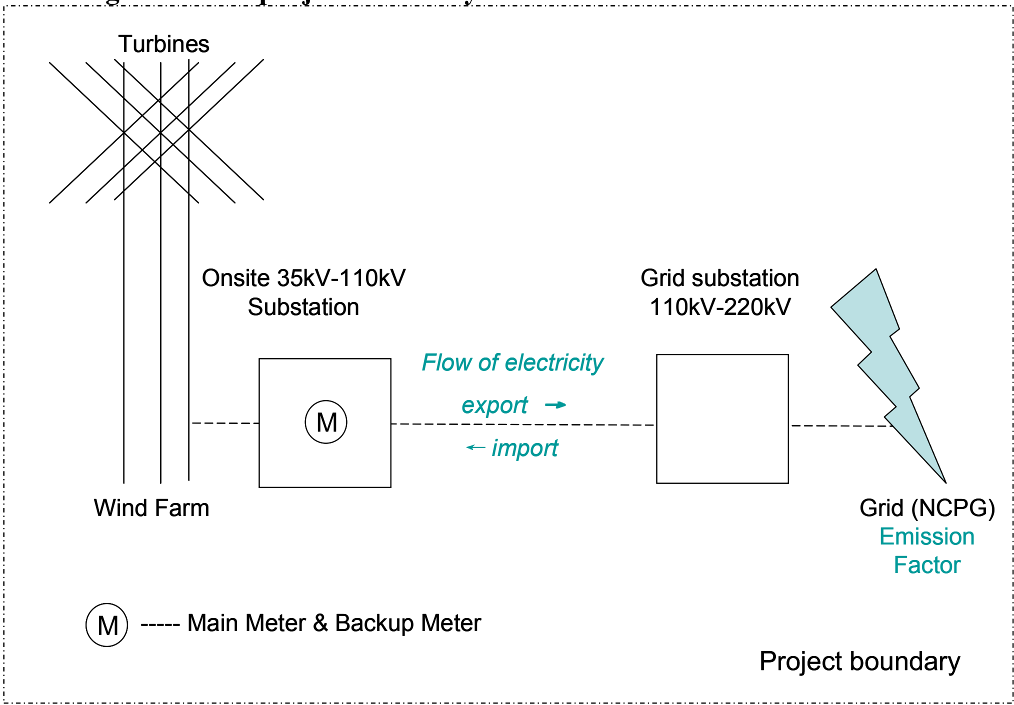
NCPG connects with Northeast Power Grid (NEPG) and Central China Power Grid (CCPG); the electricity transfers are from NEPG and CCPG to NCPG. Electricity transfer from NEPG and CCPG, therefore, are taken into account.

Table 3 Sources and gases in the project boundary

	Source	*Gas*	*Included?*	*Justification / Explanation*
Baseline	CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity.	CO_2	Yes	Main emission source.
		CH_4	No	Minor emission source.
		N_2O	No	Minor emission source.
Project Activity	For geothermal power plants, fugitive emissions of CH_4 and CO_2 from non-condensable gases contained in geothermal steam.	CO_2	No	Not applicable to wind.
		CH_4		
		N_2O		
	CO_2 emissions from combustion of fossil fuels for electricity generation in solar thermal power plants and geothermal power plants.	CO_2	No	Not applicable to wind.
		CH_4		
		N_2O		
	For hydro power plants, emissions of CH_4 from the reservoir.	CO_2	No	Not applicable to wind.
		CH_4		
		N_2O		

In line with the guidelines for completing the PDD (version 07), a flow diagram of the project boundary is presented in Figure 2 below. The flow diagram physically delineates the project boundary, includes the flow of electricity to the project grid (NCPG) and represents the emissions included (EF: emission factor) and the monitoring variable (EG: net electricity generation).

Figure 2 Flow diagram of the project boundary



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

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Because the project activity is the installation of a new grid-connected renewable power plant, and is not a capacity addition, retrofit or replacement of existing grid-connected renewable power plant/unit, the baseline scenario, according to the methodology, is the following:

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

The baseline is determined and the combined margin calculated in Section B.6 below.

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

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CDM consideration

Following EB guidelines (EB 49 Annex 22) the project participant informed the Host Party DNA and the UNFCCC secretariat in writing of the commencement of the project activity and of the intention to seek CDM status, as the starting date of the project activity is after 02 August 2008. This notification was made within six months of the project activity start date as shown in the timeline below.

In addition to this confirmation of serious prior consideration of the CDM by the project participants, the timeline below indicates continuing and real actions to secure CDM status for the project in parallel with its implementation.

Table 4 Timeline of the implementation of the project

Time	Milestone
18 March 2007	Environmental Impact Assessment (EIA) completed
23 April 2007	EIA approved
December 2008	Feasibility Study Report (FSR) completed, taking CER revenue into account
13 July 2009	FSR approved
6 October 2009	Board meeting decides to develop the proposed project as CDM
8 November 2009	Emission Reduction Purchase Agreement (ERPA) was signed with the buyer
10 March 2010	Equipment Purchase Agreement (starting date of the project)
20 March 2010	Construction Contract date
8 April 2010	Project starting construction date
15 April 2010	Main substation purchase contract date
19 April 2010	Box substation purchase contract date
05 May 2010	Notification of the intention to develop this project as CDM to DNA
10 May 2010	Notification of the intention to develop this project as CDM to UNFCCC

Additionality

The methodology requires the use of the latest version of the “Tool for the demonstration and assessment of additionality”. The Tool consists of the steps below.

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:

Because the project activity is the installation of a new grid-connected renewable power plant, and is not a capacity addition, retrofit or replacement of existing grid-connected renewable power plant/unit, the baseline scenario, according to the methodology, is the following:

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

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

a) *The proposed project activity undertaken without being registered as a CDM project activity.*

Alternative a) is in compliance with all applicable legal and regulatory requirements. But according to the detailed analysis in step 2, this scenario is less attractive with low IRR and is not realistic without CDM financing.

b) *A fossil fuel-fired power plant with the comparable capacity or electricity generation.*
Taking into account the required capacity for the same annual generation, according to the current laws and regulations, it is not a realistic alternative (please refer to the analysis in sub-step 1b).

c) *A power plant using other source of renewable energy with the comparable capacity or electricity generation, such as PV, biomass and hydro, etc.*
Besides wind energy, other kinds of renewable energy technologies, such as solar PV, geothermal, biomass and hydro are possible grid-connected sources that could be used in China. However, due to the technology development status and the high cost for power generation, solar PV[4], geothermal[5] and biomass[6] of similar installed capacity as the proposed project are not realistic alternatives in China. Biomass power generation also faces barriers and is difficult to be operated without policies & financial support, only hydropower projects can have an investment return rate that competes with that of wind power projects in China. However, due to dry climate and the lack of water resource in the project area[7], there is no commercially exploitable hydro power resource which can provide same electricity generation output of the proposed project activity. Therefore, this alternative is not realistic.

d) *Comparable capacity or electricity generation addition provided by the NCPG.*
Scenario d) is a realistic and feasible alternative which can provide outputs or services comparable with the proposed project and comply with applicable laws and regulations. Added capacity is dominated by thermal (coal-fired) power plants as determined in B.6.

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

For the alternative (b) described in sub-step1a, using comparable thermal power generation, both the installed capacity and the capacity that can generate the same annual electricity generation would be prohibited. According to Chinese regulations, coal-fired power plants of less than 135 MW are prohibited to be built in the areas covered by the large grids such as provincial grids[8]. For these reasons, the possible alternative baseline scenario of building a fuel-fired power plant conflicts with Chinese regulations. So, scenario b) is not feasible as an alternative scenario.

According to the analysis in sub-step 1a and 1b, alternative (a) and alternative (d) are the realistic and feasible alternatives which comply with applicable laws and regulations.

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[4] http://www.newenergy.org.cn/html/00711/3180816088.html

[5] http://www.newenergy.org.cn/Html/0098/870929050.Html

[6] http://www.sdpc.gov.cn/zjgx/t20071123_174054.htm

[7] http://amuseum.cdstm.cn/AMuseum/diqiuziyuan/wr0_4.html

[8] 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.
http://www.gov.cn/gongbao/content/2002/content_61480.htm

Step 2. Investment analysis

The purpose of this step is to determine whether the proposed project activity is not:
(a) The most economically or financially attractive; or
(b) Economically or financially feasible, without the revenue from the sale of certified emission reductions (CERs).

To conduct the investment analysis, use the following sub-steps:

Sub-step 2a. Determine appropriate analysis method

The purpose of this sub-step is to determine whether to apply the simple cost analysis, investment comparison analysis or benchmark analysis (sub-step 2b):

The proposed project activity generates financial benefits by the sales of electricity, so the simple cost analysis (Option I) should not be applied. Following the EB guidance on the assessment of investment analysis[9], if the alternative to the project activity is the supply of electricity from the grid, this is not considered an investment and a benchmark approach is considered appropriate. As the baseline alternative involves the continuation of current practices, supply of electricity from the grid, a benchmark analysis is used to identify whether the project is economically attractive (Option III). The use of a benchmark analysis is also in line with Chinese practice and is followed in the FSR.

Therefore, the benchmark analysis (Option III) is adopted.

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

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% (after tax), and only if the total investment IRR of the project is higher than or equivalent to this benchmark, the proposed project is financially feasible. This benchmark is commonly used in the electricity sector.

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

The investment estimation in the Feasibility Study Report (FSR) was carried out by an independent design institute. The analysis is based on the national regulation and the material and equipment price level. Therefore, each of the input parameters are valid and applicable at the time of writing the FSR (December 2008), and the FSR has been approved by the Provincial DRC (July 2009). The period of time between the approval of the FSR and the project start date is less than one year, and therefore it is not likely that the input values would have materially changed and the decision to proceed with the investment was based on the FSR.

Price levels in the analysis are in constant prices as required according to the national regulation. As grid tariffs are set and fixed at the start of the project, while costs are affected by inflation, this is conservative.

[9] Paragraph 16, 'Guidance on the Assessment of Investment Analysis' (version 03), EB 51 Annex 58.

As indicated as a preference in the EB guidance, the period of assessment reflects the full period of expected operation of the underlying project activity (technical lifetime, i.e. 20 years from commissioning). The fair value of the proposed project activity assets at the end of the assessment period has been included as a cash inflow in the final year and, as stated in the FSR, was calculated in accordance with local accounting regulations; as the assessment period covers the full lifetime of the equipment the fair value is taken as the scrap value.

The cost of financing expenditures is not included in the calculation of project IRR; however such costs must be calculated to help estimate the level of taxes due.

Input values

The key data for the investment analysis, all derived from the FSR, which was completed by an independent third party, are listed below, with more detail in the IRR calculation spreadsheet.

Table 5 Key data for the financial indicator calculation

Item	Value
Static investment	523.02 million RMB
Average annual operation cost	9.05 million RMB
Average annual net supplied power	114,580 MWh
On-grid tariff (incl. VAT)	0.51 RMB/kWh
Value Added Tax	17%[10]
Operating life	20 years
Depreciation period	15 years
Residual/scrap value	5%
Income tax	25%

Source: Feasibility Study Report, Independent Design Institute, December 2008.
Note: FSR approved by the DRC of Inner Mongolia Autonomous Region in July 2009.

Investment costs
The total investment was estimated by an experienced design institute which has been awarded the highest certificate (grade A), taking into account the experience of the developer, who have been involved in several earlier projects. The estimated total investment for the proposed project activity is 10,566 RMB/kW, which is comparable to the investment level of previous wind projects by the developer and in China in general[11] and in the range of the other similar projects in West Inner Mongolia, which is 7,809.4[12] to 11,806.67[13] RMB/kW.

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[10] According to National VAT Law issued by State Administration of Taxation (State council [2008]538), VAT policy on Comprehensive Utilization of Resource and Other Products (Cai Shui [2008] (156)) released by Ministry of Finance and State Administration of Taxation on 09/12/2008, normal VAT rate in China is 17%, and for wind projects, half VAT will be recovered as income annually. To keep consistent with the regulations, the 17% VAT rate was used and a recovery of half VAT has been taken into account in the income annually in the IRR calculation.
[11] The average investment level of the wind farm is 8,000 to 12,000 RMB/kW. see http://www.in-en.com/newenergy/html/newenergy-20072007042885858.html.

[12] Project 0870 see http://cdm.unfccc.int/Projects/DB/DNV-CUK1169451463.42/view

Therefore, it can be concluded that the estimated investment costs in the FSR are reasonable.

Feed-in Tariff
The expected on-grid tariff used for the financial analysis in the FSR refers to the most recent tariffs for wind farms in West Inner Mongolia and installed on the same grid at the time of writing the FSR (December 2008). Therefore, the tariff in the FSR is appropriate and reasonable.

According to the Interim Measures for Renewable Energy Power Tariff and Cost-sharing[14], issued by NDRC, and affective from 1 January 2006, all wind projects will receive the government guiding tariff. Additionally, NDRC stated in 2007 that the tariffs would remain stable[15]. Since June 2007, the tariff in West Inner Mongolia has indeed been maintained at 0.51 Yuan/kWh in four tariff notifications issued by NDRC. The tariff notifications issued for West Inner Mongolia since the entry into force of the Renewable Energy Law are presented in Table 7 below.

Table 6 NDRC tariff notifications for West Inner Mongolia

Date	Document reference	Tariff (RMB/kWh, including VAT)
22 December 2006	Fa Gai Jia Ge [2006] No. 2908	Average 0.5589 Three tariffs: 0.548, 0.5497, 0.579
9 June 2007	Fa Gai Jia Ge [2007] No. 1260	0.51*
3 December 2007	Fa Gai Jia Ge [2007] No. 3303	0.51*
23 July 2008	Fa Gai Jia Ge [2008] No. 1876	0.51*
20 July 2009	Fa Gai Jia Ge [2009] No. 1906	0.51

*Note: * The tariff is awarded for the first 30,000h only.*

The FSR referred to the tariff issued by NDRC in July 2008 (Fa Gai Jia Ge [2008]1876])[16], which indicated that the unified tariff was 0.51 RMB/kWh (incl. VAT). Therefore, given that 0.51 RMB/kWh was the most recent tariff approved at the time of writing the FSR, and that it has been maintained at this same level in four notifications, it is appropriate and reasonable to use this value, and no other value could credibly be used.

Indeed, this latest notification clarified that all future projects in these regions would automatically be awarded this tariff upon approval of their FSR. The FSR was approved on 13 July 2009 and the tariff was therefore automatically fixed at the estimated level in line with the NDRC notification at that time. Thus the tariff was fixed at the estimated level of 0.51 RMB/kWh (incl. VAT) prior to the project start date, 10 March 2010, and is therefore correct.

However, according to the "Information note on the highest tariffs applied by the Executive Board in its decisions on registration of projects in the People's Republic of China (version 01)", published on 24 June 2010, the highest historical tariff in Inner Mongolia is 0.54 RMB/kWh (incl VAT). Therefore, it is shown in the sensitivity analysis below (and detailed in the calculation spreadsheet) that the project does

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[13] Project 2135 see http://cdm.unfccc.int/Projects/DB/RWTUV1218614638.67/view
[14] Fa Gai Jia Ge [2006] No. 7 (1 Jan 2006)
[15] Governor of NDRC at the International Summits for Alternative Energy and Power, 2007, see http://politics.people.com.cn/GB/5752740.html.
[16] Notification of electricity tariff for wind power projects issued by NDRC (Fa Gai Jia Ge [2008]1876), 23/07/2008.

not cross the benchmark when applying this tariff.

Generation / load factor
The expected power generation / load factor of the proposed project is calculated by an independent qualified design institute with the highest grade (Grade A) in the FSR, based on wind assessment records for recent 30 years and one year onsite observation. Therefore, the generation and plant load factor determination are in line with both options of the EB Guidelines for the reporting and validation of plant load factors (EB 48 Annex 11): (a) provided to the government while applying the project activity for implementation approval, and (b) determined by a third party contracted by the project participants.

O&M costs
The O&M costs were estimated by an experienced design institute which has been awarded the highest certificate (grade A), taking into account the experience of Developer, who have been involved in several earlier projects. The estimated average annual O&M costs are 0.079 RMB/kWh, which is within the range of similar projects in West Inner Mongolia, which is 0.048[17] RMB/kWh to 0.123[18] RMB/kWh.

Therefore, it can be concluded that the estimated average annual O&M costs in the FSR are reasonable.

Residual value
The period of assessment reflects the full period of expected operation of the project activity. The fair value of the proposed project activity assets at the end of the assessment period has been included as a cash inflow in the final year and, as stated in the FSR, was calculated in accordance with local accounting regulations, by an experienced design institute. The estimated rate of residual value is 5%, which is in compliance with relevant national and industrial regulation[19].

Taxes
Each of the tax rates used in the FSR is in accordance with Chinese law as indicated below.

a) Value Added Tax: The VAT rate on electricity sales revenue in the FSR is 17%, the normal VAT rate in China. The State Council "Provisional regulations of the People's Republic of China on Value Added Tax" (State Council [2009] 538[20]) is the current regulation for VAT, confirming the VAT rate at 17%. However, as a subsidy for wind projects, half the VAT amount is returned to the developer in accordance with the "Notice of the Ministry of Finance and the State Administration of Taxation about policies regarding the value added tax on comprehensive utilization of resources and other products" (Cai Shui [2008] 156[21]). The reduction in VAT on the electricity generated was first introduced after 11 November 2001[22], but is taken into account in the assessment. This is conservative.

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[17] Project 2078 see http://cdm.unfccc.int/Projects/DB/TUEV-SUED1218478303.39/view

[18] Project 1815 see http://cdm.unfccc.int/Projects/DB/BVQI1207768950.28/view

[19] http://china.findlaw.cn/fagui/ms/23/35799_3.html

[20] http://www.360doc.com/content/10/1007/22/3766068_59184286.shtml, State Administration of Taxation, National VAT Law.

[21] http://wenku.baidu.com/view/ddc063d8d15abe23482f4d45.html, State Administration of Taxation, 50%-off discount on VAT for wind power projects.

[22] Halved VAT for wind power: "Notice of VAT Policy on Comprehensive Utilization of Some Recourses and Other Products" issued by Ministry of Finance and State Administration of Taxation on 1 December 2001.

b) Value Added Tax on equipment: The *Notice about implementation of VAT reform in the whole country (Cai Shui [2008]170)*[23], which allows for the VAT from the investment in wind projects to be recouped, has been in force from 1 January 2009. While the FSR was completed prior to this regulation coming into force, the project start date is more than a year after coming into force, therefore, the assessment in the PDD has conservatively taken this regulation into account. The possibility to recoup the VAT on the investment for wind farms was introduced after 11 November 2001, but is taken into account in the assessment. This is conservative.
c) Income Tax: According to People's Republic of China Enterprise Income Tax Provisional Regulations issued in March 2007, State Council No. 63, the income tax was approved as 25%[24].
d) Education Tax: According to the Interim Provision on Education Tax Law, the education rate is 3% of VAT[25], the additional regional education tax is 1% of VAT[26].
e) City Building Tax: According to the National City Tax Law, the city building tax rate is 7% of VAT[27].

Comparison of the financial indicators

A comparison of the financial indicator for the proposed project activity and the financial benchmark is presented in Table 7 below. It shows that the proposed project activity has a less favourable indicator (i.e. lower IRR) than the benchmark identified in sub-step 2b, and therefore the proposed project activity cannot be considered as financially attractive.

Table 7 Comparison of indicators

	Project IRR without CERs income	Project IRR with CERs income	Benchmark IRR
Proposed project activity	5.73%	8.84%	8%

Note: See calculation spreadsheet.

The revenue from the sale of CERs is expected to have a significant impact on the IRR. Although some uncertainties still exist, investors would gain reasonable financial return to reduce the risk. And as Table 7 displayed, the internal return rates with the CDM profit would appear more financially attractive for prospective investors.

Sub-step 2d. Sensitivity analysis

A sensitivity analysis is used to show whether the conclusion regarding the economic or financial attractiveness is robust to reasonable variations in the critical assumptions. The investment analysis above provides a valid argument in favour of additionality as the sensitivity analysis consistently supports (for a realistic range of assumptions) the conclusion that the project activity is unlikely to be economically or financially attractive.

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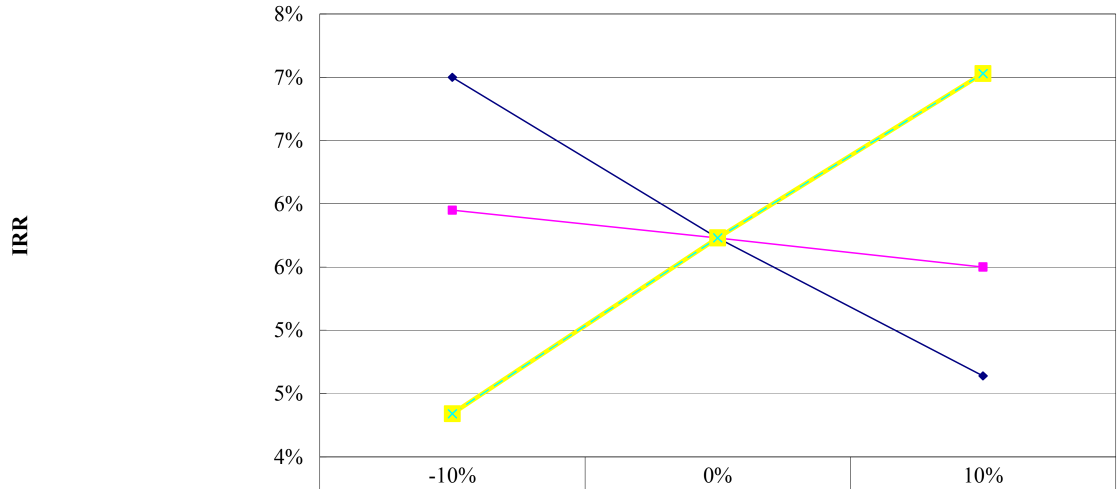
[23] http://wenku.baidu.com/view/cd6eb6eb172ded630b1cb6ac.html, State Administration of Taxation
[24] http://www.natrust.cn/images/Files/regulation_44.pdf
[25] http://www.law-lib.com/law/law_view1.asp?id=99771.
[26] http://www.chinaacc.com/new/63/159/183/2006/1/li176571829141600275 14-0.htm
[27] http://202.108.90.130/chinatax/jibenfa/jibenfa0401.htm.

According to EB guidance, only variables that constitute more than 20% of either total project costs or total project revenues should be subjected to reasonable variations. For the proposed project activity, the key variable analysed are:

1) Static Investment;
2) O&M costs;
3) Feed-in Tariff;
4) Generation / load factor;

In line with EB guidance, the range of variations in the sensitivity analysis covers a range of between –10% and +10%, which is also in line with the regulations in China[28]. Greater variations are unlikely, as discussed below, and in line with the regulations are not considered. The result of the sensitivity analysis is presented below, showing that the benchmark is not reached.

Figure 3 Sensitivity analysis



	-10%	0%	10%
Static Investment	7.00%	5.73%	4.64%
O&M costs	5.95%	5.73%	5.50%
Feed-in tariff	4.34%	5.73%	7.03%
Generation / load factor	4.34%	5.73%	7.03%

Variation

Variations of –10% to +10% from the original assumptions for each of the critical variables are used in line with normal practice in China.

The financial analysis shows that the project is not the most financially attractive alternative, and the sensitivity analysis shows that without CER revenue IRR of the project will not reach the benchmark 8% for any reasonable variation in the main parameters. The value to reach the benchmark is displayed in Table 8.

[28] "Codes on Compiling Feasibility Study Report of Wind Farms", issued by NDRC on 25/05/2005, prescribes the –10% to +10% variation range (http://www.windpower.org.cn/news/links/js_2005_0508.htm).

Table 8 the value of the main parameters when project IRR reach the 8%

	Value to reach benchmark 8%
Static Investment	-16.9%
O&M costs	-105.5%
Feed-in tariff	17.8%
Generation / load factor	17.8%

Static Investment
For wind farm projects, the costs of turbines, engineering construction and related accessories comprise the main budget of static investment. As the demand for the turbines and accessories exceeded the supply in the last 2 years, and the price of the raw material such as steel and cooper has been increasing, a decrease of the static investment is unlikely[29]. Therefore, it was not realistic for the developer to assume that investment costs could decrease by 16.9% to reach the benchmark, which is outside the realistic range used in the sensitivity analysis.

Indeed, the starting date of the project is the date of the equipment purchase contract. Therefore, as the wind turbines make up the majority of the total investment costs, the final price was largely known at the start of the project, and proved to be higher than that expected in the FSR. A reduction in the investment costs can therefore be ruled out as a credible possibility. The financial analysis in this document replicates the data from the FSR, being more conservative.

Feed-in Tariff
The on-grid tariff of 0.51 RMB/kWh used for the financial analysis in the FSR refers to the tariff documents issued by NDRC in June 2007 (Fa Gai Jia Ge [2007]1260)[30], December 2007(Fa Gai Jia Ge [2007]3303)[31] and July 2008 (Fa Gai Jia Ge [2008]1876)[32], the most recent available at the time of writing the FSR. Each of these notifications set the tariff for projects in West Inner Mongolia at 0.51 RMB/kWh for the first 30,000h only, after which the tariff would revert to the average grid price. The FSR conservatively assumed the tariff to be applicable for the project life. According to the tariff documents issued by NDRC since completion of the FSR (Fa Gai Jia Ge [2009]1906), the tariff of the wind farm projects covered by the NCPG in Inner Mongolia is still 0.51 RMB/kWh[33], and the tariff is fixed once approved by the government.

Indeed, this latest notification clarified that future projects in these regions would automatically be awarded this tariff upon approval of their FSR, unless a new notification was issued before the project approval date. As the starting date of the project is after the approval of the FSR, the tariff was fixed at the time of making the decision to go ahead with the project. Therefore, the tariff for the project activity is agreed and fixed at 0.51 RMB/kWh, the same as estimated in the FSR. Any variation from this original assumption, therefore, can not be considered credible, as the tariff has been fixed prior to the project start

[29] http://energy.people.com.cn/GB/5720709.html. In the last 2 years, the demands for the turbines and its accessories exceeded the supply. Moreover the price of the raw material such as steel and cooper is increasing, which results in the price of wind turbines and equipments increasing, as demonstrated in *The Development of Wind Power*, published by People's Daily.
[30] Notification of electricity tariff for wind power projects issued by NDRC (Fa Gai Jia Ge [2007]1260), 09/06/2007
[31] Notification of electricity tariff for wind power projects issued by NDRC (Fa Gai Jia Ge [2007]3303), 03/12/2007
[32] Notification of electricity tariff for wind power projects issued by NDRC (Fa Gai Jia Ge [2008]1876), 23/07/2008
[33] Notification of electricity tariff for wind power projects issued by NDRC (Fa Gai Jia Ge [2009]1906), 20/07/2009

date.

Therefore, it is not possible that the tariff would be more than 17.8% higher than other recent wind farm projects, in order to reach the benchmark 8%. Indeed, the tariff would need to increase to 0.60 RMB/kWh, which is higher than awarded to any previous commercial project.

According to the "Information note on the highest tariffs applied by the Executive Board in its decisions on registration of projects in the People's Republic of China (version 01)", published on 24 June 2010, the highest historical tariff in Inner Mongolia is 0.54 RMB/kWh (incl VAT). When applying this tariff, the project does not cross the benchmark.

Generation / load factor

The expected power generation of the proposed project is calculated by an independent qualified design institute with the highest grade (Grade A) in the FSR. Therefore, the generation and plant load factor determination are in line with both options of the EB Guidelines for the reporting and validation of plant load factors (EB 48 Annex 11): (a) provided to the government while applying the project activity for implementation approval, and (b) determined by a third party contracted by the project participants.

The electricity report in the FSR is based on wind assessment records for recent 30 years and the output characteristics of the turbines, using a scientific approach applied internationally. The volume of annual generation therefore is expected to accurately represent the long-term average power supply during the lifetime of the wind farm, taking into account yearly variations in power generation, and it is not credible to assume that generation would be significantly higher over the lifetime of the proposed project activity than that which can be expected from the long-term averages.

As per the FSR, the estimated net supplied power is calculated from the turbine availability, grid availability and the wind speed. The calculations for the proposed project are carried out using professional software designed for wind energy. The output is maximised through selection of the most suitable turbines, optimal turbine distribution in the wind farm, and considering the specific turbine characteristics, and the grid connection. The output calculations account for issues such as air density corrections, turbine efficiency, planned maintenance, contaminated rotors, and auxiliary power use, etc. The method of anticipating power generation is also approved by the government and is widely used in China for wind energy.

Therefore, it is not credible to assume that generation from the proposed project would increase by more than 17.8% each year on average over the lifetime of the project in order the reach the benchmark 8%.

O&M costs

The O&M costs in the approved feasibility study were derived from the extensive experience of the developer and the design institute, as well as quotes supplied to the developer. Past trends show that costs have been rising: as prices, including those of the requirement equipment and commodities, have been increasing in recent years[34], a significant reduction in the level of costs is particularly unlikely.[35] The IRR

[34] http://www.stats.gov.cn/tjfx/jdfx/t20080124_402460060.htm; http://www.custeel.com/Scripts/viewArticle.jsp?articleID=1285262

[35] *The Development of Wind Power*, People's Daily, http://www.nmgtj.gov.cn/Html/jjshfztjgb/2009-7/0/2385.shtml, as above.

of the proposed project will not reach the benchmark of 8% even if O&M costs decrease to zero, this possibility can be ruled out.

Conclusion

The financial analysis shows that the project is not the most financially attractive alternative, and the sensitivity analysis shows that it is unlikely to be financially attractive compared to the benchmark under any reasonable variations in the assumptions. However, the revenue from the CERs will greatly improve the financial feasibility of the proposed project, and it will also improve the ability to hedge risks.

In conclusion, the proposed project is not financially feasible without the revenue of CERs. Therefore, the analysis proceeds to step 4.

Step 3. Barrier analysis

Not applied.

Step 4. Common practice analysis

The proposed project activity is not a first-of-its kind project; therefore the above test is complemented with an analysis of the extent to which the proposed project type has already diffused in the relevant sector and region, acting as a credibility check to the analysis above. The existing common practice is identified and discussed through the following sub-steps:

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

In line with the EB guidance on the additionality tool, the common practice analysis is carried out on similar projects in the same region and taking place in a comparable environment with regards to regulatory framework, investment climate, access to technology, and access to financing, etc.

In China, the regulatory framework and investment climate for wind farm projects are only similar and comparable in the same Province/Autonomous Region. Wind farm project proposals are approved by the provincial DRC, and the projects' EIAs by the provincial Environmental Protection Bureau. The common practice analysis of the proposed project activity, therefore, covers projects in the Inner Mongolia Autonomous Region, and connected to the same grid.

In April 2002, China implemented power sector reform to establish a more commercialized power market in China[36]. Since market condition for wind power project development has changed significantly since 2002, the common practice analysis starts from 2002.

The analysis is restricted to large scale project (using the CDM definition of large scale: >15MW) as small scale projects are not comparable in scale to the 49.5MW installed by the proposed project activity.

[36] Chinese National Development and Reform Commission, Separate Power Plants from Network and Compete in Price to Enter Network, April 11, 2002, http://www.ndrc.gov.cn/xwfb/t20050708_28096.htm.

Using the statistics of installed capacity of wind power in China, by Professor Shi Pengfei[37], wind farm projects in the same region (Inner Mongolia) and of similar scale (large scale) are listed below. CDM projects are excluded as per the EB guidance for common practice.

Table 9. Wind farm project above 15MW located in west Inner Mongolia Province

Name	Commissioning date	Capacity (MW)	Note
Dali III	2004.4	30	Supported by national debt fund
Da Mao Qi Bailingmiao wind farm	2007.12	50	VER project under the Gold Standard

Source: http://www.cwea.org.cn/download/display_info.asp?cid=2&sid=&id=25; http://cdm.unfccc.int/Projects/registered.html; http://cdm.unfccc.int/Projects/Validation/index.html; http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File2301.pdf.

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

The existing wind farm projects do not call into question the claim that the project is financially unattractive as discussed in Step 2.

The Dali Wind Power Project Phase III belongs to "the fourth issue of national debt special fund project"[38], which is a demonstration project and enjoys favorable treatments which is not available for the proposed project.

Da Mao Qi Bailingmiao wind farm uses foreign capital and thus not eligible for CDM under the Chinese DNA rules. Therefore, the project had to be implemented as a Gold Standard VER project and registered on 15 May 2009[39], meeting the same additionality criteria[40].

Several wind farm projects in Inner Mongolia have been registered as CDM projects in the last few years, and many others are applying for CDM registration, because they are financially unattractive without the additional income from CER sales, and face barriers.

As already described in the statement above, currently there are no wind farm projects with similar capacity in Inner Mongolia Autonomous Region. Therefore it can be concluded that the proposed project is not common practice in Inner Mongolia Autonomous Region.

→ If Sub-steps 4a and 4b are satisfied, i.e. similar activities cannot be observed or similar activities are observed, but essential distinctions between the project activity and similar activities can reasonably be explained, then the project activity is additional.

In conclusion, all the steps above are satisfied, the proposed CDM project is not the baseline scenario,

[37] http://www.cwea.org.cn/download/display_info.asp?cid=&sid=&id=19 : Cumulative wind installation in China till 2006.

[38] http://www.chifeng.gov.cn/html/2008-11/3130.shtml

[39] https://gs1.apx.com/mymodule/ProjectDoc/EditProjectDoc.asp?id1=449

[40] See the PDD on http://www.sgsqualitynetwork.com/tradeassurance/ccp/projects/423/GS-VER(Retroactive)Honiton(1)-080111_GSP.pdf

and the project activity is additional.

B.6. Emission reductions:

B.6.1. Explanation of methodological choices:

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Project emissions

According to the methodology**,** for most renewable energy project activities, $PE_y = 0$. However, the methodology prescribes project emission calculations for geothermal, solar thermal and hydro power plant. As a wind power plant, therefore, there are no project emissions according to the methodology:

$PE_y = 0$

Baseline Emission Calculation

According to ACM0002**,** the baseline emissions include only CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity, calculated as follows:

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

Where:

BE_y is Baseline emissions in year y (tCO_2/yr).

$EG_{PJ,y}$ is The quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y (MWh/yr).

$EF_{grid,CM,y}$ is Combined margin CO_2 emission factor for grid connected power generation in year y calculated using the latest version of the "Tool to calculate the emission factor for an electricity system".

Calculation of $EG_{PJ,y}$

As the proposed project activity is the installation of a new grid-connected renewable power plant/unit at a site where no renewable power plant was operated prior to the implementation of the project activity, the following applies:

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

Where:

$EG_{PJ,y}$ is the quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y (MWh/yr).

$EG_{facility,y}$ is the quantity of net electricity generation supplied by the project plant/unit to the grid in year y (MWh/yr).

The baseline emission factor (EF_y) is calculated as a combined margin ($EF_{grid,CM,y}$), consisting of the combination of operating margin ($EF_{grid,OM,y}$) and build margin ($EF_{grid,BMy,}$) factors according to the following seven steps defined in the "Tool to calculate the emission factor for an electricity system". Data for the calculations are based on official national statistics books: *China Energy Statistical Yearbook* and *China Electric Power Yearbook*.

Step 1. Identify the relevant electricity systems

The power generated from the proposed project activity will be supplied to the grid. As the DNA has published a delineation of the project electricity system and connected electricity systems, these delineations are used.

Following the DNA delineation, the project electricity system is the North China Power Grid (NCPG), consisting of six provincial grids: Beijing, Tianjin, Hebei, Shanxi, Inner Mongolia and Shandong.

The connected electricity system is the Northeast Power Grid (NEPG), consisting of three provincial grids: Jilin, Liaoning and Heilongjiang, and Central China Power Grid (CCPG), consisting of Jiangxi, Henan, Hubei, Hunan, Chongqing and Sichuan. There is electricity transferring from the connected electricity systems to the project electricity system, so the CO_2 emission factor for net electricity imports ($EF_{grid,import,y}$) from the connected electricity system should be determined using one of the following options for the purpose of determining the operating margin emission factor:

(a) 0 tCO_2/MWh, or
(b) The weighted average operating margin (OM) emission rate of the exporting grid; or
(c) The simple operating margin emission rate of the exporting grid; or
(d) The simple adjusted operating margin emission rate of the exporting grid.

The option (c) is selected to calculated the CO_2 emission factor(s) for net electricity imports ($EF_{grid,import,y}$) according to the delineation.

The electricity imports from the Northeast Power Grid to the North China Power Grid has not changed significantly in recent years (see Annex 3), and the electricity from Central China Power Grid to North China Power Grid just started from 2006 and the imported electricity is negligible compared to the power generated from NCPG. So for the purpose of determining the build margin emission factor, the spatial extent is limited to the project electricity system according to the tool.

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

Project participants may choose between the following two options to calculate the operating margin and build margin emission factor:

Option I: Only grid power plants are included in the calculation.
Option II: Both grid power plants and off-grid power plants are included in the calculation.

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

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

According to the tool, four various methods are provided for calculating the operating margin emission factor ($EF_{grid,OM,y}$), including:

a) Simple OM;

b) Simple Adjusted OM;
c) Dispatch data analysis OM;
d) Average OM

According to the tool, the Simple OM method (a) is applicable to the project if the low-cost resources constitute less than 50% of total grid generation in: 1) average of the five most recent years, or 2) based on long-term averages for hydroelectricity production

Since generation from all sources (including hydro power) other than thermal plants were less than 1% of total generation in the North China Power Grid in 2007[41] and this percentage has not changed significantly in recent years, the Simple OM method is applicable to the proposed project.

The Simple OM emissions factor can be calculated using either ex-ante or ex-post data vintages. The project proponents have chosen to use the ex-ante option, and $EF_{grid,OM,y}$ is fixed for the duration of the first crediting period.

- Ex ante option: A 3-year generation-weighted average, based on the most recent data available at the time of submission of the CDM-PDD to the DOE for validation, without requirement to monitor and recalculate the emissions factor during the crediting period.

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

(a) Simple OM

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

The simple OM may be calculated:

Option A: Based on the net electricity generation and a CO_2 emission factor of each power unit; or
Option B: Based on the total net electricity generation of all power plants serving the system and the fuel types and total fuel consumption of the project electricity system.

Option B can only be used if:
(a) The necessary data for Option A is not available; and
(b) Only nuclear and renewable power generation are considered as low-cost / must-run power sources and the quantity of electricity supplied to the grid by these sources is known; and
(c) Off-grid power plants are not included in the calculation (i.e. if Option I has been chosen in Step 2).

The criteria for Option B are met, as (a) the necessary data for Option A is not available as indicated in the calculations of the DNA, (b) only nuclear and renewable power generation are considered as low-cost / must-run power sources and the quantity of electricity supplied to the grid by these sources is known, and (c) Option I is chosen in Step 2.

[41] See Annex 3.

Option B – Calculation based on total fuel consumption and electricity generation of the system

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

$$EF_{grid,OMsimple,y} = \frac{\sum_i FC_{i,y} \times NCV_{i,y} \times EF_{co_2,i,y}}{EG_y} \quad (2)$$

Where

$EF_{grid,OMsimple,y}$ is the simple operating margin CO_2 emission factor in year y (tCO_2/MWh)
$FC_{i,y}$ is the amount of fossil fuel type i consumed in the project electricity system in year y (mass or volume unit)
$NCV_{i,y}$ is the net calorific value (energy content) of fossil fuel type i in year y (GJ/mass or volume unit)
$EF_{CO2,i,y}$ is the CO_2 emission factor of fossil fuel type i in year y (tCO_2/GJ)
EG_y is the net electricity generated and delivered to the grid by all power sources serving the system, not including low-cost / must-run power plants / units, in year y (MWh)
i is all fossil fuel types combusted in power sources in the project electricity system in year y
y when using the ex-ante option, is the three most recent years for which data is available at the time of submission of the CDM-PDD to the DOE for validation

On the basis of the data available, the three-year average operating margin emission factor is calculated by the DNA as a full-generation-weighted average of the emission factors[42]:

$EF_{grid,OMsimlpe,y}$ = 1.0069 tCO_2/MWh

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

The sample group of power units *m* used to calculate the build margin consists of the set of power capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently[43]. This option is chosen as it comprises larger annual generation than the five units built most recently. Following the deviation[44], the latest statistical data available (from the China Power Yearbook) is used by the DNA to determine the most recent year from which the added generation capacity is equal to or just exceeds 20% of the latest statistic year 2007. The added generation capacity is the sample group of power units *m* used to calculate the build margin.

In terms of vintage of data, project participants can choose between option 1 ex-ante, and option 2 ex-post data vintages. The project proponents have chosen to use the ex-ante option, and $EF_{grid,BM,y}$ is fixed for the duration of the first crediting period.

[42] http://qhs.ndrc.gov.cn/qjfzjz/t20090703_289357.htm (date 2July2009)
[43] If 20% falls on part capacity of a unit, that unit is fully included in the calculation.
[44] Deviation for projects in China (DNV, 7 Oct 05), see http://cdm.unfccc.int/Projects/Deviations.

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

Step 6. Calculate the build margin emission factor

The build margin emissions factor is the generation-weighted average emission factor (tCO_2/MWh) of all power units *m* during the most recent year *y* for which power generation data is available, calculated as follows:

$$EF_{grid,BM,y} = \frac{\sum_{m} EG_{m,y} \times EF_{EL,m,y}}{\sum_{m} EG_{m,y}} \qquad (3)$$

$EF_{grid,BM,y}$ is the Build margin CO_2 emission factor in year *y*(t CO_2/MWh);
$EG_{m,y}$ is the Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh);
$EF_{EL,m,y}$ is the CO_2 emission factor of power unit *m* in year y (tCO_2/MWh);
m is the power units included in the build margin;
y is the most recent historical year for which power generation data is available.

The CO_2 emission factor of each power unit *m* ($EF_{EL,m,y}$) should be determined as per the guidance in Step 4 (a) for the simple OM, using options A1, A2 or A3. However, due to the limited availability of publicly available data, the DNA uses the accepted deviation mentioned above to calculate $EF_{BM,y}$, as follows:

- The CO_2 emission factor used is the weighted average emission factor for thermal power plant calculated from the average net energy conversion efficiency of the best technologies commercially available in China for solid, liquid and gas fuels, using option A2, weighted on the basis of the emissions from each of these fuel types in the latest year for which data is available.
- The added generation capacity is taken instead of generation, as with the determination of the cohort of plant included in the build margin.

And the $EF_{grid,BM,y}$ of North China Power Grid is 0.7802 tCO_2/MWh[45]. (see Annex 3 for more details)

Step 7. Calculation of the combined margin emission factor

The combined margin emission factor is calculated as follows:

[45] http://qhs.ndrc.gov.cn/qjfzjz/t20090703_289357.htm (date 3Jul2009)

$EF_{grid,CM,y} = w_{OM} \times EF_{grid,OM,y} + w_{BM} \times EF_{grid,BM,y}$ *(4)*

Where
$EF_{grid,BM,y}$ is the build margin CO_2 emission factor in year y (tCO_2/MWh)
$EF_{grid,OM,y}$ is the operating margin CO_2 emission factor in year y (tCO_2/MWh)
w_{OM} is the weighting of operating margin emissions factor (%)
w_{BM} is the weighting of build margin emissions factor (%).

The default weights are used, i.e. for the wind farm projects in the first crediting period and the subsequent crediting period, w_{OM} = 0.75 and w_{BM} = 0.25.

On the basis of these weights for the first crediting period, the combined margin emission factor is calculated, (rounded down,) and fixed ex-ante:

$EF_{grid,CM,y}$ = 0.9502 tCO_2/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.

Table 10. Values obtained when calculating the baseline emission factor

Variable	Value
Operating Margin Emissions Factor ($EF_{grid,OM,y}$ in tCO_2/MWh)	1.0069
Build Margin Emissions Factor ($EF_{grid, BM,y}$ in tCO_2/MWh)	0.7802
Baseline Emissions Factor ($EF_{grid,CM,y}$ in tCO_2/MWh)	0.9502

Baseline emissions (BE_y) now can be calculated as the combined margin CO_2 emission factor ($EF_{grid,CM,y}$)multiplied by the annual net generation of the Proposed Project ($EG_{PJ,y}$).

Leakage

According to the methodology, no leakage is considered for the proposed project.

Calculate Emission Reduction

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

$$ER_y = BE_y - PE_y \quad (5)$$

Where the baseline emissions (BE_y in tCO_2) are the product of the baseline emissions factor (EF_y in tCO_2/MWh) times the electricity supplied by the project activity to the grid ($EG_{PJ,y}$ in MWh). The calculation formula is as follows:

$$BE_y = EG_{PJ,y} \times EF_{grid,CM,y} \quad (6)$$

As the project activity is the installation of a new grid-connected renewable power plant/unit at a site where no renewable power plant was operated prior to the implementation of the project activity, then:

$EG_{PJ,y} = EG_{facility,y} = EG_{export,y} - EG_{import,y}$

Where:
$EG_{PJ,y}$ is the quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year *y* (MWh/yr)
$EG_{facility,y}$ is the quantity of net electricity generation supplied by the project plant/unit to the grid in year *y* (MWh/yr)
$EG_{export,y}$ is the quantity of annual electricity delivered to the grid by the proposed project(MWh);
$EG_{import,y}$ is the quantity of annual electricity purchased from the grid by the proposed project(MWh).

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

This section includes a compilation of information on the data and parameters that are not monitored throughout the crediting period but that are determined only once and thus remain fixed throughout the crediting period and that are available when validation is undertaken. Following EB guidance, data that is calculated with equations provided in the methodology or default values specified in the methodology are not included in the compilation.

Data / Parameter:	$FC_{i,y}$
Data unit:	Mass or volume
Description:	the amount of the fossil fuel *i* consumed in the project electricity system in year *y*
Source of data used:	China Energy Statistical Yearbook
Value applied:	See Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Based on official national statistics
Any comment:	

Data / Parameter:	$EG_{grid,y}$ *and* $EG_{m,y}$
Data unit:	MWh
Description:	Electricity supplied to power grid by included sources in year y
Source of data used:	China Electric Power Yearbook
Value applied:	See Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Based on official national statistics

Any comment:	

Data / Parameter:	NCV_i
Data unit:	GJ/mass or volume unit
Description:	Net caloric value of fossil fuel type i consumed in the project electricity system in year y
Source of data used:	China Energy Statistic Yearbook
Value applied:	See Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Based on official national statistics
Any comment:	

Data / Parameter:	$EF_{CO2,i,y}$ *and* $EF_{CO2,m,y}$
Data unit:	tCO_2/GJ
Description:	CO_2 emission factor of fossil fuel type *i* in year *y*
Source of data used:	2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value applied:	See Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	The IPCC default values from the 2006 IPCC Guidelines for National Greenhouse gas Inventories, Volume 2, Energy, at 95% confidence interval can be taken according to the methodology
Any comment:	

Data / Parameter:	Efficiency of the best technology commercially
Data unit:	%
Description:	Best commercial available efficiency of coal, gas, oil fuel power plant
Source of data used:	http://qhs.ndrc.gov.cn/qjfzjz/t20090703_289357.htm
Value applied:	Best efficiency for coal plant is 38.10%; Best efficiency for oil plant is 49.99% Best efficiency for gas plant is 49.99%
Justification of the choice of data or description of measurement methods and procedures actually applied :	Based on official national statistics
Any comment:	

Data / Parameter:	Installed Capacity
Data unit:	MW

Description:	Installed capacity of the NCPG in year *y*
Source of data used:	China Electric Power Yearbook(2006,2007,2008)
Value applied:	See Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Based on official national statistics
Any comment:	

Data / Parameter:	Import Electricity
Data unit:	MWh
Description:	Net import electricity from NEPG to the NCPG
Source of data used:	China Electric Power Yearbook
Value applied:	See Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Based on official national statistics
Any comment:	

Data / Parameter:	Import Electricity
Data unit:	MWh
Description:	Net import electricity from CCPG to the NCPG
Source of data used:	China Electric Power Yearbook
Value applied:	See Annex 3
Justification of the choice of data or description of measurement methods and procedures actually applied :	Based on official national statistics
Any comment:	

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

>>

Based on the Feasible Study Report, the proposed project will generate 114,580MWh electricity to the NCPG annually. The emission reduction ER_y by the project activity during a giving year y is calculated as follows:

$$BE_y = EG_{PJ,y} \times EF_{grid,CM,y} = 114{,}580\text{MWh} \times 0.9502\ tCO_2/\text{MWh} = 108{,}873\ tCO_2$$

$$ER_y = BE_y - PE_y = 108{,}873 - 0 = 108{,}873\ tCO_2$$

The emission reduction ER_y by the project activity during a giving year y is 108,873 tCO_2 and the total emission reduction in the first crediting period is 762,111 tCO_2.

The ex-ante calculations are included in the ER calculation spreadsheet.

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

>>

Table 11 Summary of the ex-ante estimation of emission reductions

Period*	Estimation of the project activity emissions (tCO_2e)	Estimation of the baseline emissions (tCO_2e)	Estimation of leakage (tCO_2e)	Estimation of overall emission reductions (tCO_2e)
1/5/2011-30/4/2012	0	108,873	0	108,873
1/5/2012-30/4/2013	0	108,873	0	108,873
1/5/2013-30/4/2014	0	108,873	0	108,873
1/5/2014-30/4/2015	0	108,873	0	108,873
1/5/2015-30/4/2016	0	108,873	0	108,873
1/5/2016-30/4/2017	0	108,873	0	108,873
1/5/2017-30/4/2018	0	108,873		108,873
Total (tCO_2e)	0	762,111	0	762,111

*Note: * Using 12-monthly periods from the start of the crediting period*

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

>>

The following baseline and monitoring methodology is used:

- ACM0002 version 12.1.0 "Consolidated methodology for grid-connected electricity generation from renewable sources" (valid from 17 Sep 10 onwards)

B.7.1 Data and parameters monitored:

All data collected as part of the monitoring are archived electronic and paper documents and kept at least for 2 years after the end of the last crediting period. 100% of the data are monitored if not indicated otherwise in the tables below. All measurements are conducted with calibrated measurement equipment according to relevant industry standards.

Data / Parameter:	$EG_{facility,y}$
Data unit:	MWh
Description:	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y
Source of data to be used::	Calculated as export of electricity ($EG_{export,y}$) minus import of electricity ($EG_{import,y}$).
Value of data applied for the purpose of calculating expected emission reductions in section B.5	114,580 MWh/year once fully operational.

Description of measurement methods and procedures to be applied:	Net electricity generated by the proposed project activity will be monitored continuously through the metering equipments at the onsite substation, recording exports to the grid and imports from the grid. Net generation is calculated as exports minus imports. $EG_{facility,y} = EG_{export,y} - EG_{import,y}$
QA/QC procedures to be applied:	The metering equipment are calibrated and checked annually for accuracy by the qualified third party in accordance with relevant industry standards. The error resulting of the meters will not exceed 0.5%. Monthly net generation data will be approved and signed off by CDM manager before it is accepted and stored.
Any comment:	

Data / Parameter:	$EG_{export,y}$
Data unit:	MWh
Description:	The quantity of annual electricity exported to the grid by the proposed project in year *y*
Source of data to be used:	Electricity meter
Value of data applied for the purpose of calculating expected emission reductions in section B.5	114,580 MWh/year once fully operational.
Description of measurement methods and procedures to be applied:	Continuous measurement and at least monthly recording. Main meter and back-up meter are installed in the on-site substation. Any error resulting from the meter shall not exceed 0.5%. Designated person record the readings of the main meter at least each month. The meters are bidirectional, which can record the import and export electricity generation.
QA/QC procedures to be applied:	1. The export electricity supply to the grid is checked by measurement results with records for sold electricity. 2. When the main meter fails to work normally, the readings of the back-up meter will be adopted. 3. All data collected as part of monitoring should be archived electronic and paper documents and be kept at least for 2 years after the end of the last crediting period. 4. The main meter will be calibrated once per year by a qualified calibration organization in accordance with industry standards.
Any comment:	

Data / Parameter:	$EG_{import,y}$
Data unit:	MWh
Description:	The quantity of annual electricity imported from the grid by the proposed project
Source of data to be used:	Electricity meter

Value of data applied for the purpose of calculating expected emission reductions in section B.5	Supposed to be Zero
Description of measurement methods and procedures to be applied:	Continuous measurement and at least monthly recording. Main meter and back-up meter are installed in the on-site substation. Any error resulting from the meter shall not exceed 0.5%. Designated person record the readings of the main meter at least each month. The meters are bidirectional, which can record the import and export electricity generation.
QA/QC procedures to be applied:	1. The import electricity supply to the grid is checked by results with records for sold electricity. 2. When the main meter fails to work normally, the readings of the back-up meter will be adopted. 3. All data collected as part of monitoring should be archived electronic and paper documents and be kept at least for 2 years after the end of the last crediting period. 4. The main meter will be calibrated once per year by a qualified calibration organization in accordance with industry standards.
Any comment:	

B.7.2. Description of the monitoring plan:

>>

The proposed project adopts the approved monitoring methodology of ACM0002 (version 12.1.0) to determine the emission reductions from the electricity generation from the wind farm. This plan describes in more detail the process. The detailed information about the monitoring plan is as follows:

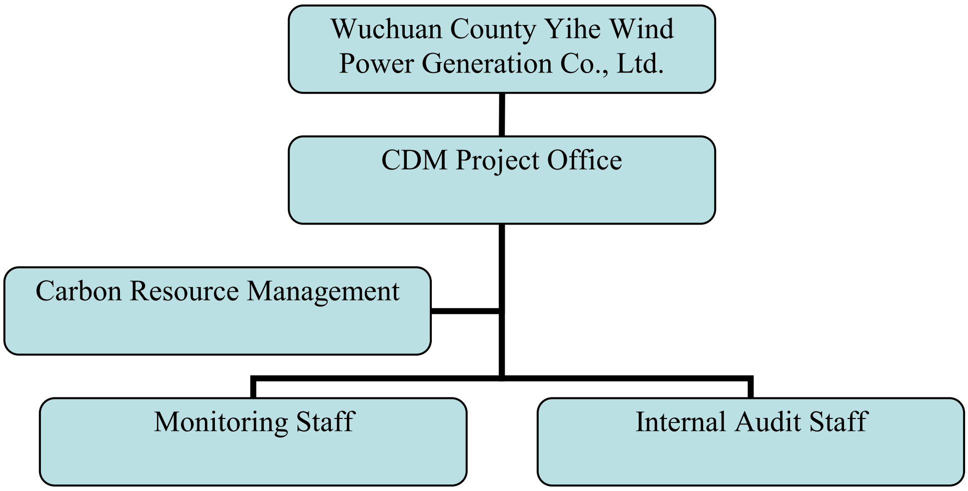
1. Monitoring and responsibility

Overall responsibility for monitoring and carrying out the monitoring following this monitoring plan lies with Wuchuan County Yihe Wind Power Generation Co., Ltd.

CDM manager is responsible for the monitoring and reporting of the wind farm.

The project owner will train the staff carrying out the monitoring work.

The operating and management structure is illustrated as follows:



2. The monitored data

The net electricity supplied by the proposed project activity to the grid ($EG_{facility,y}$) will be monitored through the main meter installed in the project on-site substation, recording exports to the grid ($EG_{export,y}$) and imports from the grid ($EG_{import,y}$). The net electricity supplied by the proposed project activity to the grid ($EG_{facility,,y}$) is the difference of exports to the grid and imports from the grid ($EG_{export,y}$ - $EG_{import,y}$). The electricity meters measure continuously and accumulatively. The data is recorded monthly. A back-up meter is also installed at the on-site substation. When the main meter fails to work normally, the readings of the back-up meter will be adopted.

3. Installation of meters

The net electricity supplied by the proposed project activity to the grid will be monitored through the main meter installed in the project on-site substation, recording exports to the grid ($EG_{export,y}$) and imports from the grid ($EG_{import,y}$). Net electricity supplied to the grid by the project is calculated as exports minus imports ($EG_{export,y}$ - $EG_{import,y}$). The backup meters will also be installed at the project on-site substation. The metering equipments shall have sufficient accuracy so that any error resulting from such equipment shall not exceed 0.5%. The electricity meters monitor the flow continuously and are reported monthly.

The net supplied power monitored by these meters will suffice for the purpose of billing and emission reductions, as long as the error in the meters is within the agreed limits. The main meter used for billing will also be the primary meter used for emission reduction calculations.

4. Calibration

The metering equipments are calibrated and checked for accuracy in accordance with industry standards. The metering equipments shall have sufficient accuracy so that any error resulting from such equipment shall not exceed 0.5%. 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. The meter of the project will be calibrated once a year.

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.

Calibration is carried out by the qualified entity, and these records will be maintained by the developer.

All the meters installed shall be tested by qualified entity 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 within acceptable limits of accuracy or operation is performed improperly Wuchuan County Yihe Wind Power Generation Co., Ltd. and the 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 the North China Power Grid and Wuchuan County Yihe Wind Power Generation Co., Ltd. fail to agree then the matter will be referred for arbitration according to agreed procedures.

5. Quality control

Monthly net generation data will be approved and signed off by CDM manager before it is accepted and stored.

This audit will check compliance with operational procedures in this monitoring plan.

This internal audit will also identify potential improvements to procedures to improve monitoring and reporting in future years.

6. Reporting

The Monitoring Report will describe the monitoring procedures and the approved and signed off metering data, corrected errors, and the emission reduction calculations.

With the Monitoring Report, the calibration records are presented for verification.

7. Data management

All monitoring data and records will be archived in electronic format as well as on paper. The electronic documents will be backed up on compact disc or hard disc. The project developer will also keep copies of sale receipts and prepare a monitoring report at the end of each year, which includes the net electricity generation, the monitoring data summary, the calibration records, and the emission reductions calculation.

All the electronic and paper documents will be kept at least for 2 years after the end of the last crediting

period.

8. Dealing with potential future additional installed capacity

Additional capacity, which could be either an additional wind farm(s) or expansion of the existing wind farm, may in future be added to the grid at the same point as the proposed project activity. Such additional capacity may share transmission facilities in order to reduce costs.

If in the future, such additional capacity shares the same transformer, substation or transmission line and metering equipment at the substation with the proposed project activity, net generation recorded by the main meter at the substation will be allocated between the proposed project activity and any such added capacity on the basis of records of the meters onsite or appropriate additional meters.

If such additional capacity is installed, the data from the onsite or additional meters are used to calculate the share of the project in the overall net output, and the net electricity supplied by the project activity ($EG_{facility,y}$) will be calculated as follows:

$$EG_{facility,y} = EG_{total,y} \times Share_{project,y}$$

Where:
$EG_{total,y}$ is the total net electricity supplied to the grid based on the data metered by the main meter and calculated as export minus import;
$Share_{project,y}$ is the share of generation of the proposed project activity in the total generation connected at this point.
$Share_{project}$ is calculated on the basis of the electricity generated by the proposed project activity and the additional installed capacity as metered by the onsite meters as follows:

$$Share_{project,y} = E_{facility,y} / (E_{facility,y} + E_{additional\ capacity,y})$$

Where:
$E_{facility,y}$ is the electricity generated by the proposed project activity based on the data metered by the onsite meter;
$E_{additional\_capacity,y}$ is the electricity generated by the additional installed capacity based on the data metered by the onsite meter(s) for the additional capacity.

If such additional capacity is installed and does share the transmission facilities, then this is described in the Monitoring Report. The method of attribution will be described clearly in the Monitoring Report.

The attributed supply and imports are cross-checked with sales measurement results with records for sold electricity and the data from the onsite meter, with the most conservative value chosen for the emission reduction calculation.

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

>>

Date of completion of the baseline study and monitoring methodology: 02/12/2010.

Contact information of the entity and persons responsible:

- Carbon Resource Management Ltd. prepared the PDD. CRM Ltd. is not a project participant.
- The persons preparing the documentation were:
  - Ms Li Xia, Mr. Shi Xiangfeng, lx@carbonresource.com, Tel: +86 10 8447 5246/8
  - Mr. Christiaan Vrolijk, cv@carbonresource.com, Tel: +44 20 7016 1420.

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:

>>
10/03/2010 (date of the equipment purchase agreement)

The starting date of a CDM project activity is the earliest of the date(s) on which the implementation or construction or real action of a project activity begins/has begun. The starting date of the proposed project activity is the date of the equipment purchase contract, as this is the earliest date as indicated in the timeline in Section B.5.

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

>>
20y-0m from commissioning

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

C.2.1. Renewable crediting period:

A renewable crediting period is chosen.

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

>>
01/05/2011 or the date of registration, whichever is later

C.2.1.2. Length of the first crediting period:

>>
7y-0m

C.2.2. Fixed crediting period:

Not chosen

C.2.2.1. Starting date:

>>
n/a

C.2.2.2. Length:

>>
n/a

SECTION D. Environmental impacts

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

>>
Environmental Impact Assessment (EIA) for the proposed project has been completed by the Environment Science Research Institute of Inner Mongolia Autonomous Region and approved by the Environmental Protection Bureau of Inner Mongolia Autonomous Region.

The main impacts identified in the EIA are summarised below.

1. The analysis of the environment impact in the construction period

- Construction machinery and construction activity will generate noise. However, since the nearest local residential area is far away from the windfarm site and local atmosphere environment capacity is very large, and the noise will be decrease to 55dB at the distance of 250m, which satisfies the requirement of *Standard of Environmental Noise of Urban Area (GB 3096-1993)*. Thus the impact of construction noise to the local region is minimal.
- The solid wastes in the construction period include the waste soil, construction wastes and household garbage. The waste soil will be used to backfill the road and the surrounding area of the wind farm. And it is required that the household garbage wastes are collected and will be moved to the local dump to be disposed properly. So the solid wastes will not have the impact on the environment.
- The waste water from construction is mainly sewage from construction workers. This small quantity of waste water will be treated by deposition in a septic tank near the wind farm, and therefore it will not have a significant impact on the environment. A new sewage system will be built for long term use during operations. All the waste water from construction work is used for eliminating dust. So the water during construction period will have no impact on the local environment.
- The air pollution from the proposed project is mainly dust emitted by the construction activity with emission source in a low position and the diameter of the particulate is relative large, so the impact by the dust emitted is limited within the construction site. Major measures for dust control are spreading water on the construction site and setting temporary covering on the construction materials.
- The project temporarily disturbs some grass cover for construction use. The occupied land will be restored after construction. Overall, land use impact on the local residents arising from the project is considered to be insignificant.

2. The analysis of the environment impact in operation period

- The noise from blades of wind power machine rotating during project construction is avoided mainly by selecting low noise equipment. Furthermore the residential regions are far away from the windfarm, so the noise does not influence the residential districts nearest to the site.
- Solid waste and liquid waste will be produced by operation staff during operation period. The emitted waste quantity is very small and will have no significant impact on the environment after treatment.
- The major concern of the impact to the ecological environment by the operation of the wind farm is the potential damage to birds, especially to the birds migrating during night time. From the research focused on this issue, it is stated that the chance of crashing by birds with wind generating sets are

relative low. Moreover, the places with large number of night-migrating birds are excluded during project site selection process, which indicates minimal chance of collision between the birds and generators. The impact to local birds by the operation of the proposed project is very small.

- Birds are rarely seen around the site because the site has been selected with due consideration for avoiding migratory bird routes. The probability of birds colliding with the turbine is very low. Therefore the impacts on birds are considered negligible.

3. Conclusion

The wind farm does not put much pressure on the local environment when generating renewable power. However it will bring great environmental benefit as well as the social benefit.

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

>>

Environmental impacts are not considered significant. The Provincial Environmental Protection Bureau has approved the EIA.

SECTION E. Stakeholders' comments

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

>>

In November 2009, staff from the Developer carried out a survey of the local villagers and residents near the area. Questionnaires were sent to 40 stakeholders and the survey had a 100% response rate. The result of the survey indicated the support to the project.

The questionnaire was designed to be understandable and easy to fill in for the local stakeholders. The questionnaire included a short summary of the proposed project activity, questions about the responding stakeholder and a number of specific questions and the opportunity for further comments.

E.2. Summary of the comments received:

>>

Stakeholders surveyed

Item	Content	Vote	Proportion
Gender	Male	23	57.5%
	Female	17	42.5%
Education	Elementary school	8	20%
	Junior high school	18	45%
	Senior high school	10	25%
	University or above	4	10%

Responses

1. Will the project affect your environment of living, studying and working?	Yes	No	Not Sure
	0	100%	0%
2. Will construction, operation or decommissioning of the project affect natural resources or ecosystems, such as water, habitats, etc?	Yes	No	Not Sure
	0	97.5%	2.5%
3. Will the project cause noise, vibration or release of electromagnetic radiation that could adversely affect your health?	Yes	No	Not Sure
	0	100%	0
4. Will the project help to reduce GHG emissions, comparing to conventional thermal power plant?	Yes	No	Not Sure
	97.5%	0	2.5%
5. Do you think the proposed project will have a positive impact on local economic development?	Yes	No	Unclear
	100%	0	0
6. Do you agree with the development of the Project?	Yes	No	No Concern
	100%	0	0
7. What is your suggestion about this project?	No negative feedback		

No further comments were given.

Conclusions from the survey

The survey shows that the proposed project has strong support among the local stakeholders. They all believe the proposed project will promote the local economic development and agree the project construction.

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

>>

The local stakeholders are supportive of the proposed project activity, and there have been no comments to be taken in account that could affect the project design.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

There is no public funding from Annex I used for the financing of the proposed project activity.

Annex 3

BASELINE INFORMATION

Step 1. Identify the relevant electricity systems

See B.6. The project electricity system is NCPG. The connected electricity systems are NEPG and CCPG.

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

See B.6. Option I is chosen: only grid power plants are included in the calculation.

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

Table A1 Power generation in NCPG (2003-2007)

Year	Low-cost/must-run generation 10^8kWh	Total generation 10^8kWh	Share
2003	39.79	4616.53	0.9%
2004	40.32	5308.04	0.8%
2005	45.51	6077.82	0.7%
2006	48.04	6099.71	0.8%
2007	76.40	8457.00	0.9%
Total	250.06	30,559.10	0.8%
Average	50.01	6,111.82	0.8%

Source: China Power Year Book (2004/p709) (2005/p474) (2006/p568) (2007/p638) (2008/p733)

Note: Only nuclear/renewables are considered low-cost/must-run

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

Option B – Calculation based on total fuel consumption and electricity generation of the system

Table A2 Net calorific value and CO_2 emission factor of fossil fuels

Fuel	Net Calorific Value		CO2 Emission Factor * ($kgCO_2/TJ$)
Solids			
Raw coal	20,908	kJ/kg	87,300
Clean coal	26,344	kJ/kg	87,300
Other washed coal	8,363	kJ/kg	87,300
Moulding coal	20,908	kJ/kg	87,300
Coke	28,435	kJ/kg	95,700
Liquids			
Crude oil	41,816	kJ/kg	71,100

Gasoline	43,070	kJ/kg	67,500
Diesel	42,652	kJ/kg	72,600
Fuel oil	41,816	kJ/kg	75,500
Other petroleum products	41,816	kJ/kg	75,500
Other coking products	28,435	kJ/kg	95,700
Gases			
Natural gas	38,931	kJ/m3	54,300
Coke oven gas	16,726	kJ/m3	37,300
Other gas	5,227	kJ/m3	37,300
LPG	50,179	kJ/kg	61,600
Refinery gas	46,055	kJ/kg	48,200
Other energy	0		0

Sources: LCV from China Energy Statistical Year Book 2008, p284; CO2 emission factor from the Chinese DNA (also 2006 IPCC Guidenlines for National Greenhouse Gas Inventories, Vol 2 (Energy), Chapter 1, Tables 1.3 and 1.4)

*Note: * Using IPCC default values at the lower limit of the uncertainty at a 95% confidence interval as provided in table 1.4 of Chapter1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories*

Fossil fuel consumption

Fuel consumption is taken from the latest China Energy Statistical Yearbook editions. The yearbooks present a range of more than 10 fuels for each province. Data for fuel use is presented in Table A3.

Table A3 Fuel consumption in thermal power generation in NCPG, 2005-2007

Fuel	Unit	2005	2006	2007	Total
Raw coal	10^4 t	32,158.53	35,607.41	40,115.43	107,881.37
Clean coal	10^4 t	42.18	39.77	18.43	100.38
Other washed coal	10^4 t	656.36	1,198.00	1,446.87	3,301.23
Moulding coal	10^4 t	-	35.74	50.79	86.53
Coke	10^4 t	0.32	3.23	4.11	7.66
Coke oven gas	10^8 m^3	23.48	35.56	45.57	104.61
Other gas	10^8 m^3	91.03	140.73	238.39	470.15
Crude oil	10^4 t	0.73	0.74	-	1.47
Gasoline	10^4 t	0.01	0.01	0.01	0.03
Diesel	10^4 t	4.14	9.61	8.38	22.13
Fuel oil	10^4 t	12.54	10.56	7.27	30.37
LPG	10^4 t	-	0.01	-	0.01
Refinery gas	10^4 t	9.02	4.75	4.56	18.33

Natural gas	10^8 m^3	3.12	4.67	10.53	18.32
Other petroleum products	10^4 t	-	0.28	1.72	2.00
Other coking products	10^4 t	-	-	4.74	4.74
Other E (standard coal)	10^4 tce	236.41	429.50	643.68	1,309.59

Sources: DNA; and China Power Year Book (2006, 2007, 2008)

Emissions from fossil fuel consumption

The emissions from this fuel use are calculated using the following formula, and are presented in Table A4:

$CO_2\ emissions = \sum i\ (FC_{i,y} \times NCV_{i,y} \times EF_{CO2,i,y})$

Table A4 Emissions from thermal generation in NCPG, 2005-2007

Fuel	2005	2006	2007	Total
Raw coal	586,979,486	649,930,803	732,214,267	1,969,124,556
Clean coal	970,069	914,643	423,859	2,308,571
Other washed coal	4,792,018	8,746,477	10,563,452	24,101,947
Moulding coal	-	652,351	927,054	1,579,405
Coke	8,708	87,896	111,843	208,446
Coke oven gas	1,464,870	2,218,517	2,843,020	6,526,407
Other gas	1,774,786	2,743,772	4,647,821	9,166,378
Crude oil	21,704	22,001	-	43,705
Gasoline	291	291	291	872
Diesel	128,197	297,577	259,490	685,263
Fuel oil	395,901	333,391	229,522	958,814
LPG	-	309	-	309
Refinery gas	200,231	105,443	101,225	406,899
Natural gas	659,553	987,216	2,225,993	3,872,762
Other petroleum products	-	8,840	54,302	63,142
Other coking products	-	-	128,986	128,986
Other E (standard coal)	-	-	-	-
Total	597,395,812	667,049,525	754,731,124	2,019,176,462

Calculation of net generation from included sources

Gross generation for each province is presented in the yearbooks. The data is also broken down into three categories: thermal, hydro and other sources. For the OM calculations, only thermal generation is included. Gross generation and own consumption are used to calculate net generation from included sources. The calculations are presented in Table A5 below.

Table A5 Thermal generation, own consumption rate, and net supply in NCPG

	2005		
Region	Gross generation (10^8 kWh)	Own use (%)	Net generation (10^8 kWh)
Beijing	208.80	7.73	192.66
Tianjin	369.93	6.63	345.40
Hebei	1,343.48	6.57	1,255.21
Shanxi	1,287.85	7.42	1,192.29
Inner Mongolia	923.45	7.01	858.72
Shandong	1,898.80	7.14	1,763.23
NCPG			5,607.51
	2006		
Region	Gross generation (10^8 kWh)	Own use (%)	Net generation (10^8 kWh)
Beijing	207.05	7.51	191.50
Tianjin	359.24	6.86	334.60
Hebei	1,438.88	6.63	1,343.48
Shanxi	1,502.50	7.45	1,390.56
Inner Mongolia	1,395.93	7.58	1,290.12
Shandong	2,309.22	7.12	2,144.80
NCPG			6,695.06
	2007		
Region	Gross generation (10^8 kWh)	Own use (%)	Net generation (10^8 kWh)
Beijing	223.00	7.51	206.25
Tianjin	399.00	6.53	372.95
Hebei	1,633.00	6.67	1,524.08
Shanxi	1,734.00	7.99	1,595.45
Inner Mongolia	1,801.00	7.77	1,661.06
Shandong	2,591.00	7.23	2,403.67
NCPG			7,763.46

Source: DNA, China Power Year Book (2006, 2007, 2008).

Imports

The imports from the connected electricity systems are taken into account in the calculation of the grid emission factor. The imports from the two connected systems are given in Table A6.

Table A6 Electricity imports into the NCPG

	2005	2006	2007
Origin (exporting grid)	10^8kWh	10^8kWh	10^8kWh
Northeast Power Grid (NEPG)	39.29	26.18	17.90
Central China Power Grid (CCPG)	0	4.97	8.03

Source: Electricity Industry Statistical Document Summary (2006, 2007, 2008)

Following the calculations of the DNA, the "weighted average operating margin (OM) emission rate of the exporting grid" is used. The weighted average operating margin for the two connected systems is calculated in detail in the calculations spreadsheet, and the resulting emission factors given in Table A7.

Table A7 Weighted average emission factors of the exporting grids (tCO_2/MWh)

Exporting grid	2005	2006	2007
NEPG	1.1649	1.1497	1.0819
CCPG	n/a	1.1216	1.1020

Note: For detailed calculations see the calculation spreadsheet.

Calculation of the simple OM

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

$EF_{grid,OMsimple,y} = \sum i\ (FC_{i,y} \times NCV_{i,y} \times EF_{CO2,i,y}) / EG_y$

Table A8 Operating margin emission factor calculation

	2005	2006	2007	Total / 3-year average
CO_2 emissions (tCO_2)	597,395,812	667,049,525	754,731,124	2,019,176,462
Net generation (MWh)	560,751,013	669,506,473	776,346,330	2,006,603,816
Imports				
From NEPG (MWh)	*3,929,000*	*2,618,060*	*1,789,750*	*8,336,810*
Associated EF (tCO2/MWh)	*1.1649*	*1.1497*	*1.0819*	
Associated emissions (tCO_2)	*4,576,870*	*3,010,025*	*1,936,260*	*9,523,155*
From CCPG (MWh)		*497,060*	*803,000*	*1,300,060*
Associated EF (tCO_2/MWh)		*1.1216*	*1.1020*	
Associated emissions (tCO_2)		*557,486*	*884,885*	*1,442,371*

Total CO_2 emissions (tCO_2)	601,972,682	670,617,037	757,552,268	2,030,141,988
Total supply (MWh)	564,680,013	672,621,593	778,939,080	2,016,240,686
EF_{OM} (tCO_2/MWh)	1.0660	0.9970	0.9725	1.0069

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

Using the latest statistical data available (from the China Electric Power Yearbook) determine the year from which the added generation capacity is exceeds 20% of the latest statistic year 2007. The group does not include units that are built more than 10 years ago.

Table A9 Identify the year from which the added generation capacity is exceeds 20% of the latest statistic year 2007

Plant type	Capacity 2005	Capacity 2006	Capacity 2007	Added 2005-2007	Share of additions 2005-2007
Thermal	111,069	141,538	164,800	53,731	95.25%
Hydro	3,216	4,004	4510	1,294	2.29%
Nuclear	-	-	0	-	0.00%
Other	336	937	1719.2	1,384	2.45%
Total	114,620	146,479	171029.2	56,409	100.00%
Share of recent additions				33%	

Source: China Power Year Book (2006, 2007, 2008).

Step 6. Calculate the build margin emission factor

Due to the limited availability of data on individual power units, the DNA uses the deviation described to calculate the CO_2 emission factor of thermal power units and the build margin emission factor.

First, the CO_2 emission factor used is the weighted average emission factor for thermal power plant calculated from the average net energy conversion efficiency of the best technologies commercially available in China for solid, liquid and gas fuels, weighted on the basis of the emissions from each of these fuel types in the latest year for which data is available.

Table A10 Calculation of CO_2 Emission Factor of Coal, Oil and Gas Fuel Power Plant with the Best Commercial Efficiency in China

Plant type	Best efficiency η	Carbon Emission Factor ($kgCO_2$/TJ)	$EF_{i,Adv}$ (tCO_2e/MWh)
Coal/solid	38.10%	87,300	0.8249
Oil/liquid	49.99%	75,500	0.5437
Gas	49.99%	54,300	0.3910

Source: http://qhs.ndrc.gov.cn/qjfzjz/t20090703_289357.htm

The fuel emission shares in the latest year are calculated from the emissions presented in Table A4 above.

Table A11 Fuel shares in NCPG in 2007

Fuel type	Emissions (tCO_2e)	Share λ
Solid	744,369,461	98.63%
Liquid	543,604	0.07%
Gas	9,818,059	1.30%
Total	754,731,124	100%

Table A12 Weighted average emission factor for thermal power plant in the build margin

Plant type	$EF_{i,Adv}$ (tCO_2e/MWh)	Share λ	$EF_{thermal}$ (tCO_2e/MWh)
Coal/solid	0.8249	98.63%	
Oil/liquid	0.5437	0.07%	
Gas	0.3910	1.30%	
Thermal			0.8190

Secondly, the added generation capacity is taken instead of generation, as with the determination of the cohort of plant included in the build margin.

Table A11 Build margin calculation

Plant type	Added capacity (%)	EF_i (tCO_2e/MWh)	EF_{BM} (tCO_2e/MWh)
Thermal	95.25%	0.8190	
Hydro	2.29%	-	
Nuclear	0.00%	-	
Other	2.45%	-	
Total	100.00%		0.7802

Step 7. Calculation of the combined margin emission factor

The combined margin emission factor is calculated using the weights as specified, and rounded to the fourth digit.

Table A12 Build margin calculation

EF (NCPG)	Value	Weight
OM	1.0069	75%
BM	0.7802	25%
CM	0.9502	

Note: Rounded to the 4th digit

Annex 4

MONITORING INFORMATION

No additional information.