PROJECT DESIGN DOCUMENT FORM
FOR CDM PROJECT ACTIVITIES (F-CDM-PDD)
Version 04.1

PROJECT DESIGN DOCUMENT (PDD)

Title of the project activity	Shangyi Wanshigou 49.5MW Wind Farm Project
Version number of the PDD	1.2
Completion date of the PDD	17/09/2012
Project participant(s)	Shangyi County Chahaer Wind Power Co., Ltd.; Carbon Resource Management S.A.
Host Party(ies)	People’s Republic of China
Sectoral scope and selected methodology(ies)	01 Energy industries ACM0002, Version 12.3.0
Estimated amount of annual average GHG emission reductions	90,932 tCO_2e

SECTION A. Description of project activity
A.1. Purpose and general description of project activity
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The purpose of the proposed Shangyi Wanshigou 49.5MW Wind Farm Project (the Proposed Project Activity) is the generation of electricity from wind and the supply of this electricity to the North China Power Grid (NCPG). The Proposed Project Activity will install and operate 33 wind turbines with a capacity of 1,500 kW each. Therefore, the project scenario is the installation of 49.5 MW of renewable energy power generation capacity, and the supply to the Grid of 101,510 MWh of electricity generated from renewable energy once fully operational. In accordance with the methodology there are no project emissions.

The baseline scenario, which is the same as the scenario existing prior to the implementation of the Proposed Project Activity, is, according to the methodology, is the generation of electricity by grid-connected power plants as the following:

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

The spatial extent of the project boundary includes the project power plant and all power plants connected physically to the electricity system[1] that the CDM project power plant is connected to.

As the Grid (NCPG) is dominated by fossil fuel-fired power generation, the establishment of the Proposed Project Activity will lead to greenhouse gas (GHG) emission reductions. Following the methodology, the emission reductions are estimated to be on average 90,932 tonnes of CO_2 equivalent (tCO_2e) per year, and 636,524 tCO_2e over the chosen crediting period.

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; in particular it will stimulate and accelerate the commercialisation of grid-connected wind power technologies and markets, which are an important objective of the Chinese government.
- It will reduce GHG emissions in China compared to the high-growth, fossil fuel-dominated baseline/business-as-usual scenario.
- It will avoid the emissions of other pollutants associated with the operation of fossil fuel-fired thermal power plant, including SO2 and soot, thus improving air quality, as well as avoid thermal pollution from cooling water in the baseline/business-as-usual scenario.

A.2. Location of project activity
A.2.1. Host Party(ies)
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People's Republic of China

[1] Refer to the latest approved version of the "Tool to calculate the emission factor for an electricity system" for definition of an electricity system.

A.2.2. Region/State/Province etc.

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Hebei Province

A.2.3. City/Town/Community etc.

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Shangyi County, Zhangjiakou City

A.2.4. Physical/Geographical location

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According to the Feasibility Study Report, the location (center coordinates) of the Proposed Project Activity is:

Longitude	114°08′32″ East
Latitude	41°05′32″ North
Altitude	approximately 1490 - 1600m above sea level

Source: Feasibility Study Report.

Figure 1 Location of the Proposed Project Activity(p)

A.3. Technologies and/or measures

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The technologies employed by the Proposed Project Activity include 33 new wind turbines with a capacity of 1,500 kW each, i.e. an aggregate of 49.5 MW of renewable energy power generation capacity, and the transmission lines and substations required to supply the generated electricity to the Grid.[2]

The annual net supplied power of the proposed project activity to the grid will be monitored through the use of the main meter at the onsite substation.

Table 2 Technology specifications

Manufacturer	Sinovel Wind Co., Ltd.
Model	SL1500/82
Power rating	1500 kW
Rotor diameter	82.9 m
Hub height	70 m
Design life	20 years

The Proposed Project Activity is estimated to supply on average approximately 101,510 MWh of renewable electricity per year to the Grid once fully operational. The expected load factor of 23.4% is determined by an independent qualified design institute in the approved FSR using detailed onsite information and long-term local wind data, in accordance with the guidelines (EB48 Annex 11).

In the baseline scenario, which is the same as the scenario existing prior to the implementation of the Proposed Project Activity, the facilities, systems and equipment in operation are all power plants connected physically to the electricity system that the CDM project power plant is connected to.[3]

The equipment is manufactured in China by Sinovel Wind Co., Ltd. The technology is introduced from Annex I and produced under licence / jointly developed with an Annex I-based company.[4]The technology is considered good practice in China. Technology transfer is defined as ‘a broad set of processes covering the flows of know-how, experience and equipment for mitigating and adapting to climate change among different stakeholders’.[5] Therefore the establishment and operation of the proposed project activity will promote technology transfer and utilization of advanced technology in China.

A.4. Parties and project participants

Party involved (host) indicates a host Party	Private and/or public entity(ies) project participants (as applicable)	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
People’s Republic of China (host)	Shangyi County Chahaer Wind Power Co., Ltd.	No
United Kingdom of Great Britain and Northern Ireland	Carbon Resource Management S.A.	No

A.5. Public funding of project activity

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The Proposed Project Activity does not receive public funding from Parties included in Annex I.

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[2] Further detail on the technologies employed, technology specifications, etc. will be available to the DOE, but is not presented in this PDD as, in accordance with the guidelines, “information related to equipment, systems and measures that are auxiliary to the main scope of the project activity and do not affect directly or indirectly GHG emissions and/or mass and energy balances of the processes related to the project activity should not be included”.

[3] The project electricity system is determined in B.6.

[4] http://www.cwpc.cn/cwpc/en/node/6496, and http://event.ccidconsulting.com/en/insights/content.asp?Content_id=16757.

[5] http://unfccc.int/essential_background/glossary/items/3666.php.

SECTION B. Application of selected approved baseline and monitoring methodology

B.1. Reference of methodology

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(a) The selected methodology(ies):

- ACM0002 “Consolidated baseline methodology for grid-connected electricity generation from renewable sources” (Version 12.3.0).

(b) Any tools and other methodologies to which the selected methodology(ies) refer:

- “Tool for the demonstration and assessment of additionality” (Version 6.0.0);
- “Tool to calculate the emission factor for an electricity system” (Version 02.2.1).

B.2. Applicability of methodology

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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 (except for capacity addition projects for which the electricity generation of the existing power plant(s) or unit(s) is not affected): the existing plant started commercial operation prior to the start of a minimum historical reference period of five years, used for the calculation of baseline emissions and defined in the baseline emission section, and no capacity addition or retrofit of the plant	Not applicable. The Proposed Project Activity is a Greenfield plant and does not represent a capacity addition, retrofit or replacement.	OK

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:
• At least one of the following conditions must apply:
  o The project activity is implemented in an existing single or multiple reservoirs, with no change in any of the reservoirs; or
  o The project activity is implemented in an existing single or multiple reservoirs, where the volume of any of the reservoirs is increased and the power density of each reservoir, as per definitions given in the Project Emissions section, is greater than 4 W/m2 after the implementation of the project activity; or
  o The project activity results in new single or multiple reservoirs and the power density of each reservoir, as per definitions given in the Project Emissions section, is greater than 4 W/m2 after the implementation of the project activity.
	Not applicable. The Proposed Project Activity is a wind power plant.	OK

In case of hydro power plants using multiple reservoirs where the power density of any of the reservoirs is lower than 4 W/m2 after the implementation of the project activity all of the following conditions must apply: • The power density calculated for the entire project activity using equation 5 is greater than 4 W/m2; • All reservoirs and hydro power plants are located at the same river and where are	Not applicable. The Proposed Project Activity is a wind power plant.	OK

designed together to function as an integrated project[6] that collectively constitutes the generation capacity of the combined power plant; • The water flow between the multiple reservoirs is not used by any other hydropower unit which is not a part of the project activity; • The total installed capacity of the power units, which are driven using water from the reservoirs with a power density lower than 4 W/m2, is lower than 15 MW; • The total installed capacity of the power units, which are driven using water from reservoirs with a power density lower than 4 W/m2, is less than 10% of the total installed capacity of the project activity from multiple reservoirs.		

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;	Not applicable. 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

[6] This requirement can be demonstrated, for example, (i) by the fact that water flow from upstream power units spilling directly to the downstream reservoir, or (ii) through the analysis of the water balance. Water balance is the mass balance of water fed to power units, with all possible combinations of multiple reservoirs and without the construction of reservoirs. The purpose of such water balance is to demonstrate the requirement of specific combination of multiple reservoirs constructed under CDM project activity for the optimization of power output.This demonstration has to be carried out in the specific scenario of water availability in different seasons to optimize the water flow at the inlet of power units. Therefore this water balance will take into account seasonal flows from river, tributaries (if any), and rainfall for minimum three years prior to implementation of CDM project activity.

Hydro power plant[7] that result in the creation of a new single reservoir or in the increase in an existing single reservoir where the power density of the reservoir is less than 4 W/m^2.	Not applicable. The Proposed Project Activity is a wind power plant.	OK

In addition, the applicability conditions included in the tools applied and referred to above apply as follows:

Tool / Criteria	**Applicability**	**Conclusion**
"Tool for the demonstration and assessment of additionality" / Once the additionally tool is included in an approved methodology, its application by project participants using this methodology is mandatory.	The chosen methodology prescribes the use of this tool. There are no further applicability criteria for using the tool.	OK
"Tool to calculate the emission factor for an electricity system" / This tool may be applied to estimate the OM, BM and/or CM when calculating baseline emissions for a project activity that substitutes grid electricity, i.e. where a project activity supplies electricity to a grid or a project activity that results in savings of electricity that would have been provided by the grid (e.g. demand-side energy efficiency projects).	The Proposed Project Activity is the installation of a wind power plant supplying electricity to the Grid.	OK
"Tool to calculate the emission factor for an electricity system" / In case of CDM projects the tool is not applicable if the project electricity system is located partially or totally in an Annex-I country.	The project electricity system is located in a non-Annex I country.	OK

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 Proposed Project Activity is a Greenfield project, therefore the "Combined tool to identify the baseline scenario and demonstrate additionality" is not required to identify the baseline scenario of the Proposed Project Activity; and
- the Proposed Project Activity is a wind power project, therefore there are no fossil fuels used for electricity generation, so there are no CO_2 emissions and leakage from combustion of fossil fuels,

[7] Project participants wishing to undertake a hydroelectric project activity that result in a new reservoir or an increase in the existing reservoir, in particular where reservoirs have no significant vegetative biomass in the catchments area, may request a revision to the approved consolidated methodology.

and thus the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion" is not applicable to the Proposed Project Activity.

B.3. Project boundary

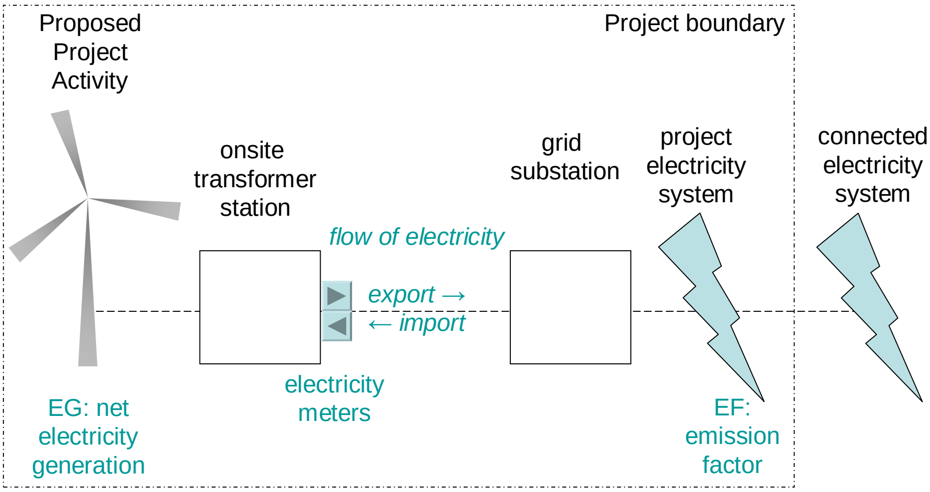
	Source	GHGs	Included?	Justification/Explanation
Baseline scenario	CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity.	CO_2	Yes	Main emissions source.
		CH_4	No	Minor emissions source.
		N_2O	No	Minor emissions source.
		Other	No	Not included in the methodology.
Project scenario	For geothermal power plants, fugitive emissions of CH4 and CO_2 from non-condensable gases contained in geothermal steam.	CO_2	No	Not applicable to wind.
		CH_4	No	Not applicable to wind.
		N_2O	No	Minor emissions source.
		Other	No	Not included in the methodology.
	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	No	Minor emissions source.
		N_2O	No	Minor emissions source.
		Other	No	Not included in the methodology.
	For hydro power plants, emissions of CH4 from the reservoir	CO_2	No	Minor emissions source.
		CH_4	No	Not applicable to wind.
		N_2O	No	Minor emissions source.
		Other	No	Not included in the methodology.

In addition to the table, a flow diagram of the project boundary is presented below, physically delineating the Proposed Project Activity, based on the description provided in section A.3 above. The spatial extent of the project boundary includes the project power plant and all power plants connected physically to the electricity system[8] that the CDM project power plant is connected to. The flow diagram includes the equipment, systems and flows of mass and energy, and in particular the emission sources (the plant connected to the project electricity system) and GHGs included (as determined by the applicable emission factor of the grid, indicated as $EF_{grid,CM,y}$ in the diagram) in the project boundary and the data

[8] Refer to the latest approved version of the "Tool to calculate the emission factor for an electricity system" for definition of an electricity system.

and parameters to be monitored (the generation and consumption of the Proposed Project Activity, monitored as the net electricity generation, indicated as $EG_{facility,y}$ in the diagram).

Figure 2 Flow diagram and the project boundary



B.4. Establishment and description of baseline scenario

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The Proposed 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. Therefore, the baseline scenario is prescribed in the methodology:

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 selected methodology prescribes the baseline scenario, which is the generation of electricity by grid-connected power plants, thus no further analysis is required.[9] The combined margin calculated in Section B.6 below.

B.5. Demonstration of additionality

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CDM consideration

The start date of the project activity is prior to the date of publication of the PDD for the global stakeholder consultation, but after 02 Aug 2008. Therefore, 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. These notifications were made within 180 days of the Proposed Project Activity start date in accordance with the Project Standard[10] and Project Cycle Procedure[11].

Table 3 Timeline of the implementation of the project

Time	Event
12/2010	EIA was completed

[9] Validation and Verification Standard (EB65 Annex 4), para 115.
[10] EB65 Annex 5, para 27.
[11] EB66 Annex 64, para 7.

12/2010	FSR was completed and CDM was considered
16/03/2011	EIA approved
23/05/2011	The developer held a meeting to decide to apply for CDM
15/08/2011	ERPA was signed
02/11/2011	FSR approved by the Hebei DRC
11/11/2011	Notification to UNFCCC of the CDM intention
25/11/2011	Purchase contract for turbines was signed (the project start date)
28/11/2011	First construction contract was signed
12/12/2011	Notification sent to China DNA of the CDM intention
27/12/2011	Notification to China DNA of the CDM intention was confirmed

Additionality

According to the selected methodology the additionality of the Proposed Project Activity shall be demonstrated and assessed using the "Tool for the demonstration and assessment of additionality"[12]. The Tool consists of the steps below.

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

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

The PDD shall identify credible alternatives to the project activity in order to determine the most realistic baseline scenario, unless the approved methodology that is selected by the proposed CDM project activity prescribes the baseline scenario and no further analysis is required.[13]

The Proposed 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. Therefore, the selected methodology prescribes the baseline scenario – 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".

In addition, the demonstration about the alternative that provides outputs or services comparable with the proposed CDM project activity may also be demonstrated 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) *Comparable capacity or electricity generation addition provided by the NCPG.*
- Scenario b) 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.

[12] Version of the tool given in B.1.
[13] Validation and Verification Standard (EB 65 Annex 4), para 113.

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

The alternative, i.e. the prescribed baseline scenario, is realistic and feasible and complies with applicable laws and regulations.

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, the following sub-steps are used and the guidelines provided by the Board on investment analysis[14] are taken into account:

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) can not be applied. According to EB guidelines[15], if the alternative to the Proposed 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 2003, the benchmark of total investment financial internal rate of return (project IRR) of electric power industry is 8% (post tax), and only if the project IRR of the Proposed Project Activity is higher than or equivalent to this benchmark, the Proposed Project Activity is financially feasible. This benchmark is commonly used in the electricity sector, and therefore appropriate in accordance with the EB guidelines[16].

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 (12/2010), and the FSR has been approved by Hebei Provincial DRC (11/2011). The period of time between the finalisation of the FSR and the project start date (11/2011) is less than one year, and

[14] ‘Guidelines on the Assessment of Investment Analysis’ (version 05), EB 62 Annex 5.
[15] ‘Guidelines on the Assessment of Investment Analysis’ (version 05), EB 62 Annex 5, para 19.
[16] ‘Guidelines on the Assessment of Investment Analysis’ (version 05), EB 62 Annex 5, para 12 and 13.

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.

As indicated as a preference in the EB guidelines[17], the period of assessment reflects the full period of expected operation of the Proposed Project Activity (technical lifetime, i.e. 20 years from commissioning). However, while the assessment period covers the full lifetime of the equipment, the 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.

The cost of long term loan interests is not included in the calculation of project IRR; however such costs are calculated to help estimate the level of taxes due.

Input values[18]

In accordance with the additionality tool, the investment analysis is presented in a transparent manner and with all the relevant assumptions provided in the IRR calculation spreadsheet. Therefore, only the most important parameters for the investment analysis of the Proposed Project Activity are listed below, with a detailed assessment of the accuracy and suitability of these parameters. All detailed input parameters, derived from the FSR which was completed by an independent third party, are given in the IRR calculation spreadsheet.

Table 4 Key data for the financial indicator calculation

Item	Value
Static investment	447.46 million RMB
Average annual O&M cost	11.75 million RMB
Average annual net supplied power	101,510 MWh
Tariff (incl. VAT)	0.54 RMB/kWh
Value Added Tax	17%
Operating life	20 years
Income tax	25%

Source: Feasibility Study Report, China Fulin Wind Power Engineering Co., Ltd., December2010.
Note: FSR approved by Hebei Provincial DRC on 2 November 2011.

Investment costs
The investment costs of the Proposed Project Activity were estimated by an experienced design institute which has been awarded the certificate of grade A. The estimated specific investment costs for the proposed project activity are 9,040 RMB/kW, which is comparable to the investment level of previous wind projects in China and is within the range of the other registered similar projects in Hebei Province, which is 7,640[19] to 12,700 RMB/kW[20].

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

Operation and maintenance costs
The O&M costs for the Proposed Project Activity were estimated by an experienced design institute which has been awarded the certificate of grade A. The total is based on detailed estimates of staff costs,

[17] 'Guidelines on the Assessment of Investment Analysis' (version 05), EB 62 Annex 5, para 3.
[18] Parameter values may be rounded in the text, but calculations are based on all non-rounded values.
[19] Project 1855 see http://cdm.unfccc.int/Projects/DB/BVQI1211950998.53/view
[20] Project 3312 see http://cdm.unfccc.int/Projects/DB/BVQI1264129691.43/view

maintenance and material costs, insurance costs and other (miscellaneous) costs. The estimated average O&M costs are 0.116 RMB/kWh, which is within the range of registered similar projects in Hebei Province, which is 0.053 RMB/kWh[21] to 0.197 RMB/kWh[22].

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

Generation / plant load factor

The expected power generation / plant load factor of the Proposed Project Activity is calculated by an independent qualified design institute with the highest grade (Grade A) in the approved FSR, based on onsite wind measurements, long-term wind assessment records for 1979 to 2008 and detailed information on the equipment. 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 Proposed Project Activity for implementation approval, and (b) determined by a third party contracted by the project participants.

Tariff

The expected on-grid tariff for the Proposed Project Activity used in the financial analysis in the FSR refers to the most recent official approved tariffs for wind farms in Hebei Province and installed on the Grid at the time of writing the FSR.

The FSR referred to the tariff notification issued by NDRC in July 2009 (Fa Gai Jia Ge [2009]1906)[23], which indicated that the applicable unified tariff for the Proposed Project Activity (i.e. wind resource region II within Hebei province) was 0.54 RMB/kWh (incl. VAT). 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 after this notification and the tariff was therefore automatically fixed at the estimated level in line with the NDRC notification. Thus the tariff was fixed at the estimated level of 0.54 RMB/kWh (incl. VAT) prior to the project start date, and is therefore correct.

Summary of historical tariffs

According to the Interim Measures for Renewable Energy Power Tariff and Cost-sharing[24], 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.[25] The table below lists the tariff notifications issued for projects in Hebei Province and connected to the Grid since the entry into force of the Renewable Energy Law, showing that the official approved tariffs for wind farms in Province and installed on the Grid have indeed been stable for several years.

Table 5 NDRC tariff notifications for wind farm projects in Hebei and connected to the Grid

Date	Document reference	Tariff (RMB/kWh, including VAT)
June 2006	Ji Jia Guan Zi [2006]57	0.60
9 June 2007	Fa Gai Jia Ge [2007] No. 1260	0.54[#]
3 December 2007	Fa Gai Jia Ge [2007] No. 3303	0.54
23 July 2008	Fa Gai Jia Ge [2008] No. 1876	0.54

[21] Project 4853 see http://cdm.unfccc.int/Projects/DB/TUEV-RHEIN1306303373.74/view
[22] Project 0842 see http://cdm.unfccc.int/Projects/DB/DNV-CUK1167911701.87/view
[23] Notification of electricity tariff for wind power projects issued by NDRC (Fa Gai Jia Ge [2009]1906), 20/07/2009.
[24] Fa Gai Jia Ge [2006] No. 7 (1 Jan 2006)
[25] Governor of NDRC at the International Summits for Alternative Energy and Power, 2007, see http://politics.people.com.cn/GB/5752740.html.

20 July 2009	Fa Gai Jia Ge [2009] No. 1906	0.54#

*Notes: * China Wind Power Report 2008, China Renewable Energy Institute Association (CREIA) and WWF, in October 2008*

 # Projects in the less-windy part of Hebei Province were awarded a higher tariff of 0.61 RMB/kWh (incl. VAT), however, all projects in wind resource region II in Hebei received this tariff and the higher tariff is not applicable to these projects. Nearly all projects are in the better wind resource area II, including the proposed project activity.

Therefore, given that 0.54 RMB/kWh was the most recent tariff notification at the time of writing the FSR, and that it has been maintained at this same level in four notifications over several years, it is appropriate and reasonable to use this value, and no other value could credibly be used. According to the notification the tariff is automatically fixed at this level, and thus the value in the FSR is appropriate.

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 02)"[26] the highest historical tariff in Hebei Province is 0.60 RMB/kWh (incl VAT). Therefore, the sensitivity analysis below shows that the tariff is appropriate and that the Proposed Project Activity is additional, even when taking the highest tariff into account.

Financing: depreciation, residual value, loan rates and debt-equity ratio
As indicated as a preference in the EB guidelines[27], the period of assessment reflects the full period of expected operation of the Proposed Project Activity (technical lifetime, i.e. 20 years from commissioning). However, while the assessment period covers the full lifetime of the equipment, the 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 was calculated in the FSR by an experienced design institute in accordance with local accounting regulations. The estimated rate of residual value is 3%, which is in compliance with relevant national and industrial regulation.[28] The impact of the residual value on the estimated project IRR is very limited.

The depreciation period of 15 years is in accordance with the FSR and the Enterprise Income Tax. The depreciation of fixed assets must be longer than 10 years for manufacturing and business operations (and less than the expected operating life of the fixed assets). Within the possible range, the impact of the depreciation period on the project IRR is very limited.

The loan repayment periods are taken from the FSR and in accordance with the National FSR guidelines[29]. The loan rate is in accordance with the loan benchmark rate list, published by the Chinese government, at the time of the starting date of The Project Activity. The impact of the loan rate and loan repayment period on the project IRR is very limited.

The debt-equity ratio is taken from the FSR and in accordance with normal practise. Within the possible range, the impact of the debt-equity ratio on the project IRR is limited.

Taxes

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[26] EB61, Para 78, 03 June 2011 (published 4 July 2011).
[27] 'Guidelines on the Assessment of Investment Analysis' (version 05), EB 62 Annex 5, para 3.
[28] http://www.gov.cn/zwgk/2007-12/11/content_830645.htm
[29] Codes on Compiling Feasibility Study Report of Wind Farms, NDRC, 25/05/2005, see http://www.windpower.org.cn/news/links/js_2005_0508.htm; Methodology and Calculation Standard of Budget Estimation on Feasibility Study Report on Wind Farm Projects, Document No. DRC Energy [2005]899, see http://www.windpower.org.cn/news/links/js_2005_0525_3.pdf; and Methodology of Wind Energy Resource Assessment for Wind Farms, GB/T 18710-2002, see http://www.cechina.cn/eletter/standard/wind/GBT18710-2002.pdf.

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

a) 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%[30].
b) Value Added Tax: According to the "Provisional Regulation of Value Added Tax in China" (Regulation No. 134 [1993], 13 Dec 1993) the VAT rate was 17%. The State Council "Provisional regulations of the People's Republic of China on Value Added Tax" (State Council No. 538 [2008], 5 Nov 2008) is the current regulation for VAT, confirming the VAT rate at 17%.
   i) The Value Added Tax rate on electricity sales revenue in the FSR is 17%, the normal VAT rate in China. 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, 9 Dec 2008).[31] The reduction in VAT on the electricity generated was first introduced after 11 November 2001[32], however, this policy is taken into account in the assessment. This is conservative.
   ii) The Value Added Tax on the purchase of the equipment for renewable energy projects can be recouped from the VAT on sales revenue in accordance with the "Notice about implementation of VAT reform in the whole country" issued by Ministry of Finance and State Administration of Taxation of People's Republic of China (Cai Shui [2008] 170, 19 Dec 2008). The possibility to recoup the VAT on the equipment purchase for wind farms was introduced after 11 November 2001, however, this policy is taken into account in the assessment. This is conservative.
c) Education Tax: According to the Interim Provision on Education Tax Law, the education rate is 3% of VAT[33] and the additional education fee is 2% of VAT[34].
d) City Building Tax: According to the National City Tax Law, the city building tax rate is 5% of VAT[35].

Comparison of the financial indicators

A comparison of the financial indicator for the Proposed Project Activity and the financial benchmark is presented in Table 6 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 6 Comparison of indicators

	Project IRR (Post tax)
Proposed Project Activity	5.87%
Benchmark	8%

Note: See IRR calculation spreadsheet.

Sub-step 2d. Sensitivity analysis

A sensitivity analysis is used to show whether the conclusion regarding the economic or financial

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30 http://www.gov.cn/flfg/2007-03/19/content_554243.htm.

31 http://www.js-n-tax.gov.cn/Page1/StatuteDetail.aspx?StatuteID=8931, State Administration of Taxation, 50%-off discount on VAT for wind power projects.

32 (Cai Shui [2008] 156, 9 Dec 2008) repeals "Notice of the Ministry of Finance and State Administration of Taxation about policies regarding the value added tax on comprehensive utilization of some recourses and other products" (Cai Shui [2001] 198, 1 Dec 2001).

33 http://www.law-lib.com/law/law_view1.asp?id=99771.

34 http://zhs.mof.gov.cn/zhengwuxinxi/zhengcefabu/201011/t20101116_349016.html

35 http://202.108.90.130/chinatax/jibenfa/jibenfa0401.htm.

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 the conclusion that the Proposed Project Activity is unlikely to be economically or financially attractive for a realistic range of assumptions.

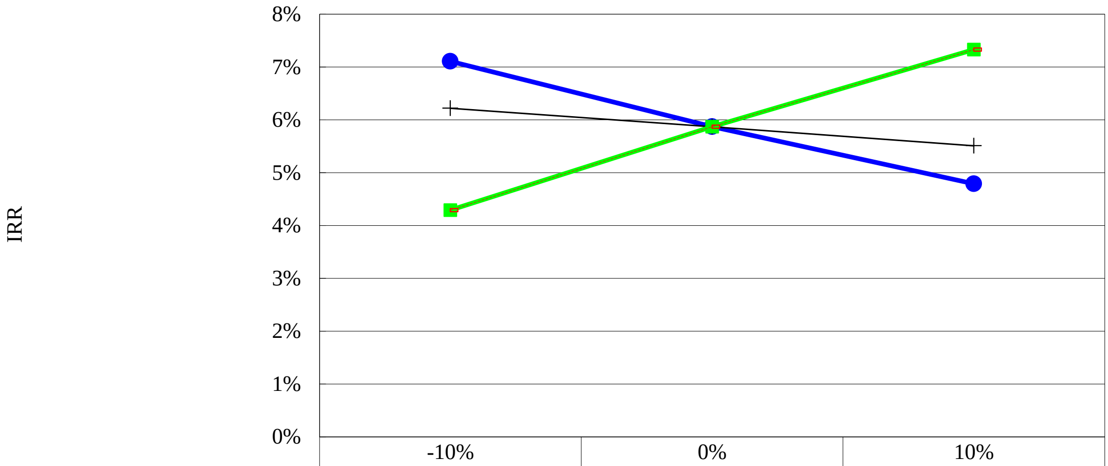
According to EB guidelines[36], only variables that constitute more than 20% of either total project costs or total project revenues should be subjected to reasonable variations. For the Proposed Project Activity, the key variables analysed, which constitute more than 20% of costs or revenues, are:

1) Investment costs;
2) Tariff;
3) Generation / plant load factor;
4) O&M costs;

In line with EB guidelines[37], the range of variations in the sensitivity analysis covers a range of +10% and –10%, which is also in line with the regulations in China[38]. 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.

In line with normal practice, the key parameters above are subjected to the range of variations in the sensitivity analysis independently of each other, i.e. the other main parameters remaining the same. Therefore, for example, when the investment costs are varied, the estimated O&M costs remains as per the FSR values. But the loan amount and VAT, which is not one of the main parameters, is varied to maintain the same financing structure.

Figure 3 Sensitivity analysis



	-10%	0%	10%
Investment costs	7.11%	5.87%	4.79%
O&M costs	6.22%	5.87%	5.51%
Tariff	4.29%	5.87%	7.33%
Generation / load factor	4.29%	5.87%	7.33%

Variation

[36] 'Guidelines on the Assessment of Investment Analysis' (version 05), EB 62 Annex 5, para 20.
[37] 'Guidelines on the Assessment of Investment Analysis' (version 05), EB 62 Annex 5, para 21.
[38] "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.cnwpem.com/webdata/down_list/2010-04/20100428094945545.pdf).

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.

Investment costs
For wind farm projects, the costs of turbines, engineering construction and related accessories comprise the main budget of static investment. As the price of the raw material and man power have been increasing, a significant decrease of the static investment costs is unlikely.[39] Therefore, it was not realistic for the Developer to assume that the investment costs of the Proposed Project Activity could be 16.4% lower than estimated in the FSR in order to reach the benchmark, which is outside the realistic range used in the sensitivity analysis.

Indeed, the starting date of the Proposed Project Activity, the time of the decision to go ahead with 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.

Tariff
The expected on-grid tariff used for the financial analysis in the FSR refers to the most recent tariffs for wind farms in the same region, as available at the time of writing the FSR. As shown above, the tariffs for wind projects have been relatively stable since the Renewable Energy Law, and therefore it was reasonable to assume in the FSR that the tariff would eventually be fixed at this level.

Indeed, the starting date of the Proposed Project Activity is after the latest NDRC tariff notification which clarified that future projects in these regions would automatically be awarded this tariff upon approval of their FSR.[40]

The tariff would need to be 14.9% higher than the assumed level in the FSR, at 0.62 RMB/kWh, for the Proposed Project Activity IRR to reach the benchmark. However, the tariff for the Proposed Project Activity was agreed and fixed prior to the project start date, and tariffs have been stable since the entry into force of the Renewable Energy Law, thus assuming an increase in the tariff is not credible.

As the tariff had already been fixed, prior to the start date of the project, any variation in tariff is not credible, but even when applying a 10% increase in the tariff the project would not reach the benchmark.

Highest historical tariff

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 02)”[41], the highest historical tariff in Hebei province is 0.60 RMB/kWh (incl VAT). However, the proposed project requires a tariff of 0.62 RMB/kWh for the project life to reach the benchmark 8% (see IRR spreadsheet), which is higher than the highest historical tariff awarded. Therefore, the tariff used in the investment analysis is appropriate when taking the highest historical tariff into account.

Generation / plant load factor
The expected power generation of the Proposed Project Activity is calculated by an independent qualified design institute with the highest grade (Grade A) in the approved FSR. Therefore, the

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[39] China Statistical Yearbook 2011, 9-16, see http://www.stats.gov.cn/tjsj/ndsj/2011/indexch.htm.
[40] Fa Gai Jia Ge [2009] No. 1906, 20 July 2009.
[41] EB61, Para 78, 03 June 2011 (published 4 July 2011).

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 Developer.

The electricity report in the FSR is based on onsite wind measurements, the wind assessment records for 1979 to 2008 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 and the wind speed. The calculations for the proposed project are carried out using professional software designed for the wind energy industry. 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 14.9% each year on average over the lifetime of the project in order the reach the benchmark 8%.

O&M costs
The operation and maintenance costs in the approved feasibility study were derived from the extensive experience of the design institute. Past trends show that costs have been rising: as all prices, including those of the requirement equipment, raw materials, staff costs and commodities, have been increasing in recent years[42], a significant reduction in the level of costs is particularly unlikely. As O&M costs would need to drop by more than half in order to reach the benchmark rate of 8%, this possibility can be ruled out.

Conclusion

The financial analysis shows that the Proposed Project Activity 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 Activity, and it will also improve the ability to hedge risks.

In conclusion, the Proposed Project Activity 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

[42] China Statistical Yearbook 2011, section 4 and 9, see http://www.stats.gov.cn/tjsj/ndsj/2011/indexch.htm.
http://www.stats.gov.cn/tjgb/ndtjgb/qgndtjgb/t20100225_402622945.htm
http://www.stats.gov.cn/tjgb/ndtjgb/qgndtjgb/t20110228_402705692.htm.

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.

In line with the tool, if the Proposed Project Activity is one of four types of measures listed in paragraph 6, the common practice analysis is carried out in four steps identified in paragraph 47 of the tool:

(a) Fuel and feedstock switch;
(b) Switch of technology with or without change of energy source (including energy efficiency improvement as well as use of renewable energies);
(c) Methane destruction;
(d) Methane formation avoidance.

As a newly-constructed wind farm project, the proposed project is a type (b) measure.

Therefore, the existing common practice is identified and analysed though the 4 steps below:

Step 1: Calculate applicable output range as +/-50% of the design output or capacity of the proposed project activity.

The total installed capacity of the Proposed Project Activity is 49.5 MW, therefore the applicable output range is 24.75 to 74.25 MW.

Step 2: In the applicable geographical area, identify all plants that deliver the same output or capacity, within the applicable output range calculate in Step 1, as the proposed project activity and have started commercial operation before the start date of the project. Note their number N_{all}. Registered CDM project activities and project activities undergoing validation shall not be included in this step.

The applicable geographical area covers the entire host country as a default; if the technology applied in the project is not country specific, then the applicable geographical area should be extended to other countries. Project participants may provide justification that the applicable geographical area is smaller than the host country for technologies that vary considerably from location to location depending on local conditions.

Grid connected power generation from wind varies considerably from location to location. In China, the regulatory framework and investment climate for grid-connected projects in the applicable output range are only similar and comparable for projects located in the same Province/Autonomous Region. Projects are approved by the provincial DRC, and the projects' EIAs by the provincial Environmental Protection Bureau. Therefore, any project located in a different Province/Autonomous Region would always be a different technology under step 3.

Therefore, the applicable geographical area is defined by projects located in Hebei province.

In April 2002, China implemented power sector reform to establish a more commercialized power market in China[43]. The reform was to divide the former single national power company into regional companies and to separate generation and distribution responsibilities and introduce marketing scheme. After the power sector reform, a more commercialized market in China was started. Therefore, the common practice analysis excludes projects prior to 2002, as these were not taking place in a comparable

[43] 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.

regulatory or investment climate.

The Proposed Project Activity started on 25/11/2011, therefore only projects which started commercial operation prior to 25/11/2011 are considered.

Other CDM projects activities (registered project activities and project activities which have been published on the UNFCCC website for global stakeholder consultation as part of the validation process) are not to be included in this analysis, according to the EB guidance on the additionality tool.

The number of all plants within the applicable output range and applicable geographical area, which started the commercial operation before the starting date of the Proposed Project Activity, can be found as follows:

$N_{all} = N_{all\ wind} + N_{other}$

Where
N_{all} is all plants within the applicable output range and applicable geographical area, which started the commercial operation before the starting date of the Proposed Project Activity;
$N_{all\ wind}$ is the number of all wind farm projects within the applicable output range and applicable geographical area, which started the commercial operation before the starting date of the Proposed Project Activity;
N_{other} is the number of all non-wind plants within the applicable output range and applicable geographical area, which started the commercial operation before the starting date of the Proposed Project Activity.

Because the data on power generation projects is not publicly available, no comprehensive assessment can be made of all projects in the applicable output range. However, in accordance with the approved clarification[44],it is conservative in Step 2 to use $N_{all,wind}$ for N_{all}, and in Step 3 $N_{diff,wind}$ for N_{diff}.

Using the latest statistics on wind farm installations[45], 2 projects can be identified within the applicable output range and applicable geographical area, which started the commercial operation before the starting date of the Proposed Project Activity (25/11/2011), which have not published a PDD on the UNFCCC website for global stakeholder consultation. Thus $N_{all\ wind}$ is 2.

For completeness, these projects are listed in Table 7 below.

Table 7 Wind project within the applicable output range and applicable geographical area, which started the commercial operation before the starting date of the Proposed Project Activity

Name	Commissioning Date	Capacity (MW)
Shangyi Manjing Windfarm Project	Jul 2005	34.5
Chengde Hongsong Windfarm Project	Dec 2005	51.3

Source: "Statistics of domestic wind farm installation capacity" Shi Pengfei and CWEA; http://cdm.unfccc.int/Projects/registered.html.

[44] CLA_Tool_0015, 15/06/2012, http://cdm.unfccc.int/methodologies/PAmethodologies/tools-clarifications/30494
[45] "Statistics of domestic wind farm installation capacity in 2007", Shi Pengfei, see http://www.cwea.org.cn/upload/20080324.pdf. "Statistics of domestic wind farm installation capacity in 2008", see http://www.cwea.org.cn/upload/20090305.pdf. Shi Pengfei. "Statistics of domestic wind farm installation capacity in 2009", CWEA see http://www.cwea.org.cn/upload/201006102.pdf. "Statistics of domestic wind farm installation capacity in 2010", CWEA, see http://www.cwea.org.cn/upload/2010%E5%B9%B4%E9%A3%8E%E7%94%B5%E8%A3%85%E6%9C%BA%E5%AE%B9%E9%87%8F%E7%BB%9F%E8%AE%A1.pdf. "Statistics of domestic wind farm installation capacity in 2011", CWEA, see http://www.cwea.org.cn/download/display_info.asp?id=44

Therefore, with the clarification to use $N_{all,wind}$, and $N_{diff,\ wind}$ to determine the common practice:

$N_{all} = N_{all\ windr} = 2$

Step 3: Within plants identified in Step 2, identify those that apply technologies different that the technology applied in the proposed project activity. Note their number N_{diff}.

Different technologies in the context of common practice are identified in paragraph 9 of the tool as technologies that deliver the same output and differ by at least one of the following (as appropriate in the context of the measure applied in the proposed CDM project and applicable geographical area):

- (a) Energy source/fuel;
- (b) Feed stock;
- (c) Size of installation (power capacity):
  - (i) Micro (as defined in paragraph 24 of Decision 2/CMP.5 and paragraph 39 of Decision 3/CMP.6);
  - (ii) Small (as defined in paragraph 28 of Decision 1/CMP.2);
  - (iii) Large;
- (d) Investment climate in the date of the investment decision, inter alia:
  - (i) Access to technology;
  - (ii) Subsidies or other financial flows;
  - (iii) Promotional policies;
  - (iv) Legal regulations;
- (e) Other features, inter alia:
  - (i) Unit cost of output (unit costs are considered different if they differ by at least 20 %);

The number of plants within the applicable output range and applicable geographical area, which started the commercial operation before the starting date of the Proposed Project Activity, that apply technologies different than the technology applied in the proposed project activity can be found as follows:

$N_{diff} = N_{diff\ wind} + N_{other}$

Where

N_{diff} is all plants within the applicable output range and applicable geographical area, which started the commercial operation before the starting date of the Proposed Project Activity, that apply technologies different than the technology applied in the proposed project activity;

$N_{diff\ wind}$ is the number of wind farm projects within the applicable output range and applicable geographical area, which started the commercial operation before the starting date of the Proposed Project Activity, that apply technologies different than the technology applied in the proposed project activity;

N_{other} is the number of all non-wind plants within the applicable output range and applicable geographical area, which started the commercial operation before the starting date of the Proposed Project Activity, because all non-wind plant apply technologies different than the technology applied in the proposed project activity.

Because the data on power generation projects other than wind are not publicly available, no comprehensive assessment can be made of any non-wind projects in the applicable output range. However, in accordance with the approved clarification[46], it is conservative in Step 2 to use $N_{all,wind}$ for N_{all}, and in Step 3 $N_{diff,wind}$ for N_{diff}.

[46] CLA_Tool_0015, 15/06/2012.

Other wind farm projects may be considered to apply technologies different than the technology applied in the Proposed Project Activity on the basis of size of installation (para 9 (c)), investment climate (para 9 (d)), or other features (para 9 (e)). However, all projects within the applicable output range are large projects in accordance with para 9 (c) (iii), thus size is not used to differentiate projects. Also, other features including the unit cost of output are not used to differentiate projects.

The IRR of the two plants identified in Table 7 above was lower than the benchmark 8%, so these two projects were also facing serious financial barriers during operating period and could not be implemented without carbon finance. Both projects agreed carbon funding to help overcome this serious barrier.[47] Therefore, using the conservative clarification to ignore non-wind projects above, both projects are considered to apply different technology. Thus: $N_{diff\ wind}$ is 2.

$N_{diff} = N_{diff\ wind} = 2$

Step 4: Calculate factor F=1-N_{diff}/N_{all} representing the share of plants using technology similar to the technology used in the proposed project activity ni all plants that deliver the same output or capacity as the proposed project activity.

$F = 1 – 2 / 2 = 0$

Conclusion

The proposed project activity is a common practice within a sector in the applicable geographical areas if both the following conditions are fulfilled:

(a) The factor F is greater than 0.2, and
(b) $N_{all} – N_{diff}$ is greater than 3.

Therefore, the Proposed Project Activity is not considered common practice within the sector in the applicable geographical area, because:

(a) F = 0, which is not greater than 0.2, and
(b) $N_{all} – N_{diff} = 2 – 2 = 0$, which is not greater than 3.

In conclusion, all the steps above are satisfied, the Proposed Project Activity is not the baseline scenario, and the Proposed Project Activity is additional in accordance with the Additionality Tool.

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:

$PE_y = 0$ (1)

Baseline emissions

[47] https://vcsprojectdatabase2.apx.com/myModule/Interactive.asp?Tab=Projects&a=1&t=1.

According to the methodology, 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. The methodology assumes that all project electricity generation above baseline levels would have been generated by existing grid-connected power plants and the addition of new grid-connected power plants. The baseline emissions are calculated as follows:

$$BE_y = EG_{PJ,y} \times EF_{grid,CM,y} \quad (2)$$

Where:
BE_y is the baseline emissions in year y (tCO_2).
$EG_{PJ,y}$ 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).
$EF_{grid,CM,y}$ is the combined margin CO_2 emission factor for grid connected power generation in year y calculated using the "Tool to calculate the emission factor for an electricity system"[48] (tCO_2/MWh).

Calculation of $EG_{PJ,y}$

(a) Greenfield renewable energy power plants

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:

$$EG_{PJ,y} = EG_{facility,y} \quad (3)$$

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

Baseline emission factor

In line with the methodology, the baseline emission factor is calculated as a combined margin ($EF_{grid,CM,y}$), consisting of the combination of operating margin ($EF_{grid,OM,y}$) and build margin ($EF_{grid,BM,y}$) factors according to the following steps defined in the "Tool to calculate the emission factor for an electricity system".

Details of the calculations and data follow the published data from the Chinese DNA[49] and official national statistics, and are presented in the enclosed EF calculation spreadsheet.

Step 1. Identify the relevant electricity systems

For determining the electricity emission factors, identify the relevant project electricity system. Similarly, identify any connected electricity system. If a connected electricity system is located partially or totally in Annex-I countries, then the emission factor of that connected electricity system should be considered zero. If the DNA of the host country has published a delineation of the project electricity system and connected electricity systems, these delineations should be used.

[48] Version of the tool given in B.1.
[49] http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File2708.pdf, Department of Climate Change, NDRC, 2011-10-20.

The DNA has published a delineation of the project electricity system and connected electricity systems, therefore these delineations are used in accordance with the Tool[50]:

- 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 systems are the Northeast Power Grid (NEPG), consisting of three provincial grids: Jilin, Liaoning and Heilongjiang, and the Central China Power Grid (CCPG), consisting of Jiangxi, Henan, Hubei, Hunan, Chongqing and Sichuan.

For the purpose of this tool, the reference system is the project electricity system. Hence electricity transfers from a connected electricity systems to the project electricity system are defined as electricity imports while electricity transfers from the project electricity system to connected electricity systems are defined as electricity exports.

For the purpose of determining the build margin emission factor, the spatial extent is limited to the project electricity system, except where recent or likely future additions to the transmission capacity enable significant increases in imported electricity. In such cases, the transmission capacity may be considered a build margin source.

- There are no recent or likely future additions to transmission capacity that would enable significant increases in imported electricity; the data in EF calculation shows that imports are relatively small and have not changed significantly in the period covered. Therefore, the transmission capacity is not considered a build margin source.

For the purpose of determining the operating margin emission factor, use one of the following options to determine the CO_2 emission factor(s) for net electricity imports from a connected electricity system:

0 tCO_2/MWh; or

(a) The weighted average operating margin (OM) emission rate of the exporting grid, determined as described in Step 4 (d) below; or

(b) The simple operating margin emission rate of the exporting grid, determined as described in Step 4 (a), if the conditions for this method, as described in Step 3 below, apply to the exporting grid; or

(c) The simple adjusted operating margin emission rate of the exporting grid, determined as described in Step 4 (b) below.

- As per "Tool to calculate the emission factor for an electricity system", and refer to the calculations of the DNA, the simple operating margin (option (b) is used to calculate the CO_2 emission factors for net electricity imports ($EF_{grid,import,y}$).

For imports from connected electricity systems located in Annex-I country(ies), the emission factor is 0 tonnes CO_2 per MWh.

- There are no imports from Annex-I country(ies).

Electricity exports should not be subtracted from electricity generation data used for calculating and monitoring the electricity emission factors.

- Electricity exports from the project electricity system to the connected electricity system are not subtracted from electricity generation data used for calculating and monitoring the electricity emission factors.

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

[50] http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File2708.pdf, Department of Climate Change, NDRC, 2011-10-20.

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, the calculation of the operating margin emission factor ($EF_{grid,OM,y}$) is based on one of the following methods:

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

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

- Low-cost/must-run resources constitute less than 50% of total grid generation in: 1) average of the five most recent years, or 2) based on long-term averages for hydroelectricity production (see enclosed EF calculation spreadsheet). Therefore, the project participants chose to use the simple OM method (option a).

The simple OM emissions factor can be calculated using either ex-ante or ex-post data vintages. The project participants 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: If the ex-ante option is chosen, the emission factor is determined once at the validation stage, thus no monitoring and recalculation of the emissions factor during the crediting period is required. For grid power plants, use 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.

The date of the submitted CDM-PDD for validation is 05/04/2012. The date of the publication of the most recent data for the calculation of the emission factor was 20/10/2011.[51]

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

<u>(a) Simple OM</u>

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 by one of the following options:

Option A: Based on the net electricity generation and a CO_2 emission factor of each power unit; or

[51] http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File2708.pdf, Department of Climate Change, NDRC, 2011-10-20.

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.

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:

$$EF_{grid,OMsimple,y} = \sum_i (FC_{i,y} \times NCV_{i,y} \times EF_{CO2,i,y}) / EG_y \quad (4)$$

Where:
$EF_{grid,OMsimple,y}$ is the simple operating margin 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 is the relevant year as per the data vintage chosen in Step 3

For this approach (simple OM) to calculate the operating margin, the subscript m refers to the power plants/units delivering electricity to the grid, not including low-cost/must-run power plants/units, and including electricity imports[52] to the grid. Electricity imports should be treated as one power plant m.

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

$EF_{grid,OMsimple,y}$ = 0.9803 tCO_2/MWh

Step 5. Calculate the build margin (BM) emission factor

In terms of vintage of data, the project participants chose the ex-ante option (as for the OM calculation), and $EF_{grid,BM,y}$ is fixed for the duration of the first crediting period:

Option 1: ex-ante. 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

[52] As described above, an import from a connected electricity system should be considered as one power source.

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.

Following the deviation[53], 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 statistical year. The added generation capacity is the sample group of power units m used to calculate the build margin. This option comprises larger annual generation than the five units built most recently.

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 electricity generation data is available, calculated as follows:

$$EF_{grid,BM,y} = \sum_m (EG_{m,y} \times EF_{EL,m,y}) / \sum_m EG_{m,y} \quad (5)$$

Where:
$EF_{grid,BM,y}$ is the build margin CO_2 emission factor in year y (tCO_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 electricity 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, using for y the most recent historical year for which electricity generation data is available, and using for m the power units included in the build margin.

Due to the limited availability of data on individual power units, the DNA uses the deviation above to calculate the build margin emission factor and the CO_2 emission factor of thermal power units as follows (with more detail presented in Annex 3 and the EF calculation spreadsheet):

- The added generation capacity is taken instead of generation in formula (5) above, as with the determination of the group of plant included in the build margin. Therefore, the calculation following the deviation is as follows:

$$EF_{grid,BM,y} = \sum_m (CAP_{m,y} \times EF_{EL,m,y}) / \sum_m CAP_{m,y} = \sum_m Share_{CAP,m,y} \times EF_{EL,m,y} \quad (5\text{-dev})$$

Where:
$EF_{grid,BM,y}$ is the build margin CO_2 emission factor in year y (tCO_2/MWh)
$CAP_{m,y}$ is the added generation capacity by plant type m in year y (MW)
$EF_{EL,m,y}$ is the CO_2 emission factor of plant type m in year y (tCO_2/MWh)
$Share_{CAP,m,y}$ is the share of added generation capacity by plant type m in year y (%)
m is the plant type included in the build margin (thermal, hydro, nuclear, other)
y is the most recent historical year for which electricity generation data is available

- The CO_2 emission factor of plant types other than thermal power plants is taken as zero.

[53] Deviation for projects in China (DNV, 7 Oct 05), M-DEV0004.

- The CO_2 emission factor of thermal power plants is the weighted average emission factor of the best thermal power plant technologies commercially available in China, as required by the approved deviation, using option A2.

Using the equation of option A2, the emission factor of advanced (best commercially available) power plants using fuel type i can be calculated as follows:

$$EF_{m,Adv,y} = EF_{CO2,m,y} \times 3.6 / \eta_{m,y}$$

Where:
$EF_{m,Adv,y}$ is the CO_2 emission factor of advanced power plants using fuel m in year y (tCO_2/MWh)
$EF_{CO2,m,y}$ is the average CO_2 emission factor of fuel type m in year y (tCO_2/GJ)
$\eta_{m,y}$ is the average net energy conversion efficiency of advanced power plants using fuel type m in year y (%)
m is the fuel type of thermal plant (coal/solid, oil/liquid, gas)
y is the relevant year as per the data vintage chosen

The weighted average CO_2 emission factor of thermal power plants is weighted on the basis of the emissions from each of these fuel types in the latest year for which data is available, and using the average net energy conversion efficiency for each fuel type of the best technologies commercially available in China.

$$EF_{thermal,y} = \sum_m (EF_{m,Adv,y} \times \lambda_{m,y})$$

Where:
$EF_{thermal,y}$ is the weighted average CO_2 emission factor of thermal power plants in year y (tCO_2/MWh)
$EF_{m,Adv,y}$ is the CO_2 emission factor of advanced power plants using fuel type m in year y (tCO_2/MWh)
$\lambda_{m,y}$ is the share of emissions of fuel type m in year y (%)
m is the fuel type of thermal plant (coal/solid, oil/liquid, gas)
y is the relevant year as per the data vintage chosen

The build margin emission factor is calculated using this methodology:

$$EF_{grid,BM,y} = 0.6426\ tCO_2/MWh$$

Step 6. Calculate the combined margin emission factor

The calculation of the combined margin (CM) emission factor ($EF_{grid,CM,y}$) is based on one of the following methods:

(a) Weighted average CM; or
(b) Simplified CM.

The weighted average CM method (option a) should be used as the preferred option.

The simplified CM method (option b) can only be used if:

- The project activity is located in a Least Developed Country (LDC) or in a country with less than 10 registered CDM projects at the starting date of validation; and
- The data requirements for the application of step 5 above cannot be met.

Option a is the preferred option. Option b can not be used as the proposed project activity does not take place in an LDC or in a country with less than 10 registered projects. Therefore option a is chosen.

(a) Weighted average CM

The combined margin emissions factor is calculated as follows:

$$EF_{grid,CM,y} = EF_{grid,OM,y} \times w_{OM} + EF_{grid,BM,y} \times w_{BM} \quad (6)$$

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

According to the Tool, the default values for w_{OM} and w_{BM} for the wind projects in the first crediting period and the subsequent crediting period are: w_{OM} = 0.75 and w_{BM} = 0.25 (owing to their intermittent and non-dispatchable nature).

On the basis of these weights for the first crediting period, the combined margin emission factor is calculated, and fixed ex-ante for the duration of the first crediting period (conservatively rounded down to the fourth digit) as given below and presented in the enclosed EF calculation spreadsheet.

	CO_2 emission factor (tCO_2/MWh)	Weighting (%)
Operating margin (see step 4)	0.9803	75%
Build margin (see step 5)	0.6426	25%
Combined margin	0.8958	-

These parameters will be recalculated at any renewal of the crediting period.

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

Leakage

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

Emission reductions

Emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y \quad (7)$$

Where
ER_y is the emission reductions in year y (tCO_2e)
BE_y is the baseline emissions in year y (tCO_2)
PE_y is the project emissions in year y (tCO_2e)

B.6.2. Data and parameters fixed ex ante

Data / Parameter	$FC_{i,y}$
Unit	Mass or volume.
Description	The amount of fossil fuel i consumed in the project/connected electricity system in year y.
Source of data	China Energy Statistical Yearbook.
Value(s) applied	See enclosed EF calculation spreadsheet.
Choice of data or Measurement methods and procedures	Data accepted and used by the DNA for the official emission factor calculations.
Purpose of data	Calculation of baseline emissions.
Additional comment	-

Data / Parameter	$NCV_{i,y}$
Unit	GJ/mass or volume unit
Description	Net caloric value of fossil fuel type i consumed in the project/connected electricity system in year y
Source of data	China Energy Statistical Yearbook
Value(s) applied	See enclosed EF calculation spreadsheet.
Choice of data or Measurement methods and procedures	National average default values, accepted and used by the DNA for the official emission factor calculations.
Purpose of data	Calculation of baseline emissions.
Additional comment	-

Data / Parameter	$EF_{CO2,i,y}$
Unit	tCO_2/GJ
Description	CO_2 emission factor of fossil fuel type i in year y
Source of data	2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value(s) applied	See enclosed EF calculation spreadsheet.
Choice of data or Measurement methods and procedures	The IPCC default values at the lower level of 95% confidence interval are accepted and used by the DNA for the official emission factor calculations, and are the default value in the tool.
Purpose of data	Calculation of baseline emissions.
Additional comment	-

Data / Parameter	EG_y
Unit	MWh
Description	Net electricity generated and delivered in the project electricity system in year y

Source of data	China Electric Power Yearbook
Value(s) applied	See enclosed EF calculation spreadsheet.
Choice of data or Measurement methods and procedures	Data accepted and used by the DNA for the official emission factor calculations
Purpose of data	Calculation of baseline emissions.
Additional comment	-

Data / Parameter	$\eta_{\text{fuel-type},y}$
Unit	%
Description	Average net energy conversion efficiency of the best technologies commercially available in China using solid, liquid and gas fuels
Source of data	Chinese DNA
Value(s) applied	See enclosed EF calculation spreadsheet.
Choice of data or Measurement methods and procedures	Data accepted and used by the DNA for the official emission factor calculations
Purpose of data	Calculation of baseline emissions.
Additional comment	-

Data / Parameter	$\text{Share}_{CAP,m,y}$
Unit	%
Description	Share of added generation capacity by plant type m in year y
Source of data	Chinese DNA
Value(s) applied	See enclosed EF calculation spreadsheet.
Choice of data or Measurement methods and procedures	Data accepted and used by the DNA for the official emission factor calculations
Purpose of data	Calculation of baseline emissions.
Additional comment	-

Following EB guidance, data that is calculated with equations provided in the methodology or default values specified in the methodology are not included in this compilation.

B.6.3. Ex ante calculation of emission reductions

>>

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

$ER_y = BE_y – PE_y$

Using the formulae presented in Section B.6.1., the baseline emissions are calculated from the net electricity supplied by the Proposed Project Activity to the grid and the combined margin emission factor of the grid. The annual net generation is estimated on the basis of long-term averages in the Feasibility Study Report; the combined margin emission factor is calculated in section B.6.1. above. The ex-ante calculations of baseline emissions and emission reductions, therefore, are as follows:

$BE_y = EG_{facility,y} \times EF_{grid,CM,y}$ = 101,510 MWh × 0.8958 tCO_2/MWh = 90,932 tCO_2
$ER_y = BE_y - PE_y$ = 90,932 – 0 = 90,932 tCO_2

The ex-ante calculations of estimated emission reductions are included in the ER calculation spreadsheet.

B.6.4. Summary of ex ante estimates of emission reductions

Year	Baseline emissions (t CO_2e)	Project emissions (t CO_2e)	Leakage (t CO_2e)	Emission reductions (t CO_2e)
15/11/2012-14/11/2013	90,932	0	0	90,932
15/11/2013-14/11/2014	90,932	0	0	90,932
15/11/2014-14/11/2015	90,932	0	0	90,932
15/11/2015-14/11/2016	90,932	0	0	90,932
15/11/2016-14/11/2017	90,932	0	0	90,932
15/11/2017-14/11/2018	90,932	0	0	90,932
15/11/2018-14/11/2019	90,932	0	0	90,932
Total	636,524	0	0	636,524
Total number of crediting years	7			
Annual average over the crediting period	90,932	0	0	90,932

B.7. Monitoring plan

B.7.1. Data and parameters to be monitored

Data / Parameter	$EG_{facility,y}$
Unit	MWh
Description	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y
Source of data	Electricity meters at onsite substation
Value(s) applied	101,510 MWh/y once fully operational
Measurement methods and procedures	Electricity meters recording supply and consumption at the onsite sub-station. Net generation calculated from supply to the Grid and import from the Grid. The accuracy of the meters meets the national standard, and the metering equipments shall have sufficient accuracy as at least 0.5 class.
Monitoring frequency	Continuous measurement and at least monthly recording

QA/QC procedures	Measurement results are cross-checked with records for sold and purchased electricity. The metering equipment is calibrated by a qualified third party in accordance with industry standards. As neither the selected methodology nor the Board's guidance specify any requirements for calibration frequency for measuring equipments, the frequency of calibrations is in accordance with the industry standards.
Purpose of data	Calculation of baseline emissions
Additional comment	-

B.7.2. Sampling plan

\>>

Not applicable. None of the data and parameters monitored in section B.7.1 above are to be determined by a sampling approach.

B.7.3. Other elements of monitoring plan

\>>

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

The CDM Manager of the CDM project office is responsible for the monitoring and reporting of the wind farm.

The output from this project is monitored and recorded using two meters installed at the onsite transformer station. One is main meter; the other is back up meter.

I. Responsibility

The responsibility for monitoring lies with the Developer, who operates the proposed project activity. The company has established a CDM project management office and assigned personnel to the monitoring and reporting tasks.

II. Training

The CDM project management office will assign and train the dedicated people carrying out the monitoring work. The CDM project manager will complete the monitoring personnel training before the registration.

III. Installation of meters

The annual net supplied power of the proposed project activity ($EG_{facility,y}$) to the grid will be monitored through the use of the main meter at the onsite substation, recording quantity of annual electricity exported to the grid ($EG_{export,y}$) and quantity of annual electricity imported from the grid ($EG_{import,y}$). Annual net generation is calculated as $EG_{export,y}$ minus $EG_{import,y}$. The backup meter will also be installed at the onsite substation. The accuracy of meters will be at least 0.5 class. The main meter monitors the electricity flow continuously and the values will be reported monthly.

The main and backup meter will be read by the qualified operating staff of the wind farm. A monthly report of the net on-grid electricity from the main meter installed at the onsite substation will be established on the basis of the data.

IV. Calibration

The main and back-up meters and separate meters (if applicable) will be calibrated annually and checked for accuracy in accordance with industry standards. The error resulting of the meters will not exceed 0.5%. The net generation output registered by the meter alone will suffice for the purpose of billing and emission reduction verification as long as the error in the meter is within the agreed limits.

The metering equipment 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 with the records being supplied to the Developer and these records will be maintained by the Developer.

The metering equipment installed shall be tested by qualified entity after: the detection of a difference larger than the allowable error in the readings of main meter; 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 system, 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, the Developer and the Grid Company 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 NCPG and the Developer fail to agree then the matter will be referred for arbitration according to agreed procedures.

V. Monitored data

Grid-connected electricity generated by the proposed project will be monitored through the main metering equipment. Every month the Developer will obtain the on-grid electricity generation from the substation.

VI. Quality control

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

The CDM manager also checks the validity of the calibration certificates of the electricity meters. If the data is correct and the meters calibrated, the data is approved, signed off and stored. If any errors are identified, such errors will be described and corrected, prior to approval, sign off and storage of the corrected data and error descriptions.

VII. Data management

All data collected as part of the monitoring are archived electronically and kept at least for 2 years after the end of the last crediting period or the last issuance of CERs for this project activity, whichever occurs later.

VIII. Reporting and verification

- The main meter will be recorded monthly and the measurement results are cross-checked with records for sold electricity.
- The Developer carries out an internal audit on and reports the readings to the DOE before the verification is requested.

IX. 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:

$$EG_{facility,y} = EG_{total,y} * Share_{project,y}$$

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 net generation of the proposed project activity in the total generation connected at this point.

$Share_{project,y}$ 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 supplied to the grid by the proposed project activity based on the data metered by the onsite meters;
$E_{additional\_capacity,y}$ is the electricity supplied to the grid 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 monitored data will be cross-checked with records of sold electricity.

SECTION C. Duration and crediting period
C.1. Duration of project activity
C.1.1. Start date of project activity
>>
25/11/2011

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 first contract.[54]

C.1.2. Expected operational lifetime of project activity
>>
20y-0m from commissioning.

C.2. Crediting period of project activity
C.2.1. Type of crediting period
>>
Renewable crediting period (first).

C.2.2. Start date of crediting period
>>
15/11/2012.

C.2.3. Length of crediting period
>>
7y-0m.

SECTION D. Environmental impacts
D.1. Analysis of environmental impacts
>>
Environmental Impact Assessment (EIA) for the proposed project has been completed by the Zhongkan Yejin Design and Research institute Co. Ltd in 12/2010. and approved by the Hebei Environmental Protection Bureau on16/03/2011 (Jihuanbiao [2011] No.22).

The main impacts identified in the EIA are summarised below.

Impacts during the construction period

- **Noise:** The noise from construction machines has some impact on the immediately surrounding area. However, there are no residential areas within 500m to the project site. Therefore, the negative impact is insignificant.
- **Waste water:** Both domestic waste water and process waste water will be produced from the project site. The main pollutant in the process waste water is suspended solids (SS), which is not harmful to the surrounding environment, the process waste water can be used directly for site sprinkling. Domestic waste water will be treated through a septic tank and discharged into the surrounding grassland as gardening water, which will not cause negative impact to the local environment.
- **Solid Wastes:** The industrial wastes produced onsite are mainly waste soil and rock and construction wastes, which will be used for backfilling. Domestic solid wastes produced by onsite

[54] Evidence of contracts signed will be available to the DOE.

workers will be collected and be transferred to landfill for final treatment. Therefore, the negative impact is insignificant.
- **Ecosystem:** After the construction period, the Developer will re-plant the area in order to restore the ecosystem as quickly as possible. It is expected that the vegetation in the project site will have recovered in 1 to 3 years.

Impacts during operational period

- **Noise:** The wind turbines and power substation will generate noise during operation period. Sound insulation measures will be implemented to reduce the noise to an acceptable level. However, there is no residential area within 500m to the project site; therefore, the negative impact is insignificant.
- **Domestic waste water and solid wastes:** Normal operation requires 16 onsite workers, who will produce an estimated total quantity of 1.28 m3 waste water per day. The waste water produced will be treated through a septic tank, and discharged into the grassland surrounded. Onsite domestic garbage will be collected and transferred to a landfill for final treatment. Therefore, the negative impact is insignificant.
- **Ecosystem:** During normal daily operation, vehicles will be prohibited from driving on the grassland onsite. Daily maintenance and inspections in the wind farm will be carried out to avoid any damage to the pasture land. The operating staff will monitor the condition of the grassland onsite and do vegetation recoveries work in time. On-site maintenance and inspection work shall be done in the daytime, and high noise levels will be avoided, so as to avoid impacts on normal activity of the animals in the area around the site. Therefore, the daily operation of the project will not make a significant impact on the living of the animals in the area.

Conclusion

Wind power is renewable energy and the impacts caused by wind farms on the surrounding ecosystem, water, noise, and atmosphere environment is insignificant.

D.2. Environmental impact assessment
>>
Environmental impacts are not considered significant. The Provincial Environmental Protection Bureau has approved the EIA.

SECTION E. Local stakeholder consultation
E.1. Solicitation of comments from local stakeholders
>>
During 22/10/2011, the staff from the project owner carried out a survey of the local villagers and residents near the area. Before the survey, the staff introduced the project information to the villagers with the loudspeaker and then 1-page questionnaires were distributed to the households at home. In total, 40 copies of the questionnaire were distributed; all questionnaires were returned to the project owner. As the project area is rural, far away from urban areas, and sparsely populated, the number of 40 stakeholders is representative for a large area. 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 comments received
>>
Stakeholders surveyed

Item	Content	Vote	Proportion
Gender	Male	25	63%
	Female	15	37%
Education	Elementary school	10	25%
	Junior high school	15	38%
	Senior high school	12	30%
	University or above	3	7%

Questions and responses

1. Will the project affect your environment of living, studying and working?	Yes	No	Not clear
	40	0	0
2. Will construction, operation or decommissioning of the project affect natural resources or ecosystems, such as water, habitats, etc?	Yes	No	Not clear
	0	40	0
3. Will the project cause noise, vibration or release of electromagnetic radiation that could adversely affect your health?	Yes	No	Not clear
	0	38	2
4. Do you think the proposed project will have a positive impact on local economic development?	Yes	No	Not clear
	40	0	0
5. Do you agree with the development of the Project?	Yes	No	Not clear
	40	0	0

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 consideration of 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.

SECTION F. Approval and authorization

>>

LoA from host Party was issued by NDRC on 15/06/2012, LoA from UK was issued by Environment Agency on 07/09/2012.

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Appendix 1: Contact information of project participants

Organization name	Shangyi County Chahaer Wind Power Co., Ltd.
Street/P.O. Box	Hanjiazhuang, Badaogou town, Shangyi County
Building	-
City	-
State/Region	Hebei Province
Postcode	-
Country	People's Republic of China
Telephone	+86 10 65505952
Fax	+86 10 65505952
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Website	-
Contact person	Huang Tianwei
Title	-
Salutation	Mr.
Last name	Huang
Middle name	-
First name	Tianwei
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Mobile	-
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Personal e-mail	DHLD0714@126.com

Organization name	Carbon Resource Management S.A.
Street/P.O. Box	Boulevard du Pont d'Arve 28 / P.O. Box 384
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State/Region	-
Postcode	1211
Country	Switzerland
Telephone	+41 22 322 1189
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E-mail	deliveries@carbonresource.com
Website	-
Contact person	-
Title	Chief Operating Officer
Salutation	Dr
Last name	Green
Middle name	-
First name	John
Department	-
Mobile	-
Direct fax	-
Direct tel.	-
Personal e-mail	jg@carbonresource.com

Appendix 2: Affirmation regarding public funding

Not applicable.

Appendix 3: Applicability of selected methodology

The applicability of the selected methodology is described in B.2.

Appendix 4: Further background information on ex ante calculation of emission reductions

Step 1. Identify the relevant electricity system

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 systems are the Northeast Power Grid (NEPG), consisting of three provincial grids: Jilin, Liaoning and Heilongjiang, and Central China Power Grid (CCPG), consisting of six grids: Jiangxi, Henan, Hubei, Hunan, Chongqing, Sichuan.

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 the North China Power Grid from 2005 to 2009

Year	Low-cost/must-run generation 10^8kWh	Total generation 10^8kWh	Share
2005	45.51	6077.82	0.7%
2006	48.04	6099.71	0.8%
2007	76.4	8457	0.9%
2008	91.1	7166.94	1.3%
2009	197.28	7656.52	2.6%
Total	458.3	35,458.0	1.3%
Average	152.8	11,819.3	1.3%

Source: China Power Year Book (2006/p568) (2007/p638) (2008/p733)(2009/p716)(2010/p732)

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 CO_2 emission factors of fuels

Fuel	Net Calorific Value		CO2 Emission Factor (kgCO2/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	72,200
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 2010, p285; 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 is presented in Table A3 below. The share of emissions from coal consumption is also given in the table.

Table A3 Fuel consumption in thermal power generation in NCPG, 2007-2009

Fuel	Unit	2007	2008	2009	Total
Raw coal	10^4 t	40,115.43	42,732.16	43,376.10	126,223.69
Clean coal	10^4 t	18.43	23.88	11.70	54.01
Other washed coal	10^4 t	1,446.87	1,479.37	1,806.41	4,732.65
Moulding coal	10^4 t	50.79	83.53	35.56	169.88
Coke	10^4 t	4.11	6.09	10.43	20.63
Coke oven gas	10^8 m^3	45.57	53.64	44.64	143.85
Other gas	10^8 m^3	238.39	307.10	373.43	918.92
Crude oil	10^4 t	-	0.02	0.13	0.15
Gasoline	10^4 t	0.01	-	0.01	0.02
Diesel	10^4 t	8.38	3.58	8.19	20.15
Fuel oil	10^4 t	7.27	2.81	3.66	13.74
LPG	10^4 t	-	-	-	-
Refinery gas	10^4 t	4.56	3.37	8.22	16.15
Natural gas	10^8 m^3	10.53	14.88	20.63	46.04
Other petroleum products	10^4 t	1.72	1.45	24.70	27.87
Other coking products	10^4 t	4.74	15.58	19.93	40.25
Other E (standard coal)	10^4 tce	643.68	739.69	862.86	2,246.23

Sources: DNA; and China Power Year Book (2008, 2009, 2010)

Emissions from fossil fuel consumption

The emissions from this fuel use are calculated using the following formulae in B.6., 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, 2007-2009

Fuel	2007	2008	2009	Total
Raw coal	732,214,267	779,976,613	791,730,246	2,303,921,127
Clean coal	423,859	549,200	269,080	1,242,139
Other washed coal	10,563,452	10,800,731	13,188,417	34,552,600
Moulding coal	927,054	1,524,647	649,065	3,100,766
Coke	111,843	165,723	283,824	561,390
Coke oven gas	2,843,020	3,346,491	2,784,999	8,974,511
Other gas	4,647,821	5,987,440	7,280,656	17,915,917
Crude oil	-	595	3,865	4,460
Gasoline	291	-	291	581
Diesel	259,490	110,856	253,606	623,952
Fuel oil	229,522	88,715	115,550	433,787
LPG	-	-	-	-
Refinery gas	101,225	74,809	182,472	358,506
Natural gas	2,225,993	3,145,563	4,361,086	9,732,641
Other petroleum products	51,929	43,777	745,721	841,427
Other coking products	128,986	423,968	542,341	1,095,295
Other E (standard coal)	-	-	-	-
Total	754,728,750	806,239,126	822,391,221	2,383,359,097

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

	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
	2008		
Region	Gross generation (10^8 kWh)	Own use (%)	Net generation (10^8 kWh)
Beijing	243.00	7.14	225.65
Tianjin	397.00	7.05	369.01
Hebei	1,580.00	6.90	1,470.98
Shanxi	1,762.00	8.22	1,617.16
Inner Mongolia	2,008.00	7.96	1,848.16
Shandong	2,689.00	7.14	2,497.01
NCPG			8,027.97
	2009		
Region	Gross generation (10^8 kWh)	Own use (%)	Net generation (10^8 kWh)
Beijing	241.00	6.55	225.21
Tianjin	413.00	6.80	384.92
Hebei	1,733.00	6.92	1,613.08
Shanxi	1,850.00	8.10	1,700.15
Inner Mongolia	2,135.00	7.82	1,968.04
Shandong	2,858.00	7.43	2,645.65
NCPG			8,537.05

Source: DNA; and China Power Year Book (2008,2009,2010)

Imports

The connected electricity systems are the Northeast Power Grid (NEPG), consisting of three provincial grids: Jilin, Liaoning and Heilongjiang and the Central China Power Grid (CCPG), consisting of six provincial grids: Jiangxi, Henan, Hubei, Hunan, Chongqing and Sichuan. There are electricity transfers from the connected electricity systems to the project electricity system, and therefore the emissions related to these imports should be accounted for.

Table A6 Electricity imports and origin

	2007	2008	2009
Origin (exporting grid)	10^8kWh	10^8kWh	10^8kWh
Northeast Power Grid (NEPG)	17.90	52.86	69.83
Central China Power Grid (CCPG)	8.03	0.00	0.00

Source: Electricity industry statistical document summary (2008, 2009, 2010)

Following the calculations of the DNA, the "simple operating margin (OM) emission rate of the exporting grid" is used. The simple 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 Simple operating margin emission factors of NEPG and CCPG

Exporting grid	2007	2008	2009
NEPG	1.0819	1.1049	1.0691
CCPG	1.1021	-	-

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:

$$EF_{grid,OMsimple,y} = \frac{\sum_i FC_{i,y} \times NCV_{i,y} \times \mathrm{E}F_{co_2,i,y}}{EG_y}$$

Table A8 Operating margin emission factor calculation

	2007	2008	2009	Total / 3-year average
CO2 emissions (tCO2)	754,728,750	806,239,126	822,391,221	2,383,359,097
Net generation (MWh)	776,346,330	802,797,350	853,705,050	2,432,848,730
Imports				
From NEPG (MWh)	*1,789,750*	*5,286,140*	*6,982,610*	*14,058,500*
Associated EF (tCO2/MWh)	*1.0819*	*1.1049*	*1.0691*	
Associated emissions (tCO2)	*1,936,260*	*5,840,581*	*7,465,423*	*15,242,264*
From CCPG (MWh)	*803,000*	-	-	*803,000*
Associated EF (tCO2/MWh)	*1.1021*	-	-	
Associated emissions (tCO2)	*884986.3*	*0*	-	*884,986*
Total CO2 emissions (tCO2)	757,549,996	812,079,707	829,856,644	2,399,486,347
Total supply (MWh)	778,939,080	808,083,490	860,687,660	2,447,710,230
EF OM (tCO2/MWh)	0.97254	1.00495	0.96418	0.9803

Based on above data, the simple OM emission factor of NCPG is calculated ex-ante using a 3-year generation-weighed average is 0.9803 tCO_2e/MWh.

Step 5. Calculate the build margin (BM) emission factor

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. This option is chosen as it comprises larger annual generation than the five units built most recently. Following the deviation, the latest statistical data available (from the China Power Yearbook 2010) 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 2009. The group does not include units that are built more than 10 years ago.The added generation capacity is the sample group of power units *m* used to calculate the build margin.

Table A7 Identify the year from which the added generation capacity is equal to or just exceeds 20% of the latest statistic year 2009

Plant type	Capacity 2007	Capacity 2008	Capacity 2009	Added 2007-2009	Added 2008-2009	Share of additions 2007-2009
Thermal	164,800	179,040	196,600	39,270	21,422	81.46%
Hydro	4,510	5,260	6,350	1,849	1,090	3.84%
Nuclear	-	0	-	-	-	0.00%
Other	1,719	3,370	8,810	7,091	5,440	14.71%
Total	171,029	187,670	211,760	48,210	27,952	100.00%
Share of recent additions				22.77%	13.20%	
Selected				Yes	No	

Because of the limited availability of publicly available data, the proposed project uses a substitute method accepted by EB to calculate $\mathbf{EF_{BM,y}}$

Sub-step 1: calculate the thermal emission factor

Calculate the different CO_2 emission percentage of solid, liquid and gas fuel in the total emission of the North China Power Grid in 2009 using new latest statistical data available from China Energy Statistical Year Book 2010.

Table A8 CO_2 emissions of each main fuel in NCPG in Year 2008

Fuel type	Emissions (tCO_2e)	Share λ
Solid	806,662,974	98.09%
Liquid	1,119,034	0.14%
Gas	14,609,213	1.78%
Total	822,391,221	100%

Sub-step 2:

Based the emission percentage (λ_i) of different kind fossil fuels and the corresponding emission factor (EF_i) according to the best technology commercially available in the China, the weighted emission factor of thermal power ($EF_{thermal}$) is calculated.

TableA9 Emission factor of the best technology commercially available in China, by fuel type

Plant type	Best efficiency η	Carbon Emission Factor (kgCO2/TJ)	EFi,Adv (tCO2e/MWh)
Coal/solid	39.45%	87,300	0.7967
Oil/liquid	51.77%	75,500	0.5250
Gas	51.77%	54,300	0.3776
http://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File2708.pdf			

So, emission factor of thermal plant is calculated as the weighted average of these technologies:

Table A10 Weighted average emission factor of the best commercially available thermal power plant in NCPG

Plant type	EFi,Adv (tCO2e/MWh)	Share λ	EFthermal (tCO2e/MWh)
Coal/solid	0.7967	98.09%	
Oil/liquid	0.5250	0.14%	
Gas	0.3776	1.78%	
Thermal			0.7888

Sub-step3:

Using the emission factor for thermal plant (Table A10), and the shares of thermal plant in capacity additions (Table A7), the build margin emission factor is determined.

Table A11 Build margin emission factor, NCPG

Plant type	Added capacity (%)	EFi (tCO2e/MWh)	EFBM (tCO2e/MWh)
Thermal	81.46%	0.7888	
Hydro	3.84%	-	
Nuclear	0.00%	-	
Other	14.71%	-	
Total	100.00%		0.6426

Step 6. Calculation of the combined margin emission factor

Option a – Weighted average CM

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

$EF_{grid,CM,y} = w_{OM} \times EF_{grid,OM,y} + w_{BM} \times EF_{grid,BM,y} = 0.75 \times 0.9803 + 0.25 \times 0.6426 = 0.8958$ tCO_2/MWh

Calculation of the combined margin emission factor

The baseline emissions factor ($EF_{grid,\ CM,y}$) is calculated as the weighted average of the operating margin emission factor and build margin emission factors. The default weights for this project type are w_{OM} = 0.75, w_{BM} = 0.25.

Table A12 Combined margin baseline emission factor calculation

	EF (tCO_2/MWh)	weight
OM	0.9803	75%
BM	0.6426	25%
Combined margin	0.8958	

Appendix 5: Further background information on monitoring plan

The information used in the development of the monitoring plan is described in B.7.

Appendix 6: Summary of post registration changes

Not applicable.

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History of the document

Version	Date	Nature of revision
04.1	11 April 2012	Editorial revision to change version 02 line in history box from Annex 06 to Annex 06b.
04.0	EB 66 13 March 2012	Revision required to ensure consistency with the “Guidelines for completing the project design document form for CDM project activities” (EB 66, Annex 8).
03	EB 25, Annex 15 26 July 2006	
02	EB 14, Annex 06 14 June 2004	
01	EB 05, Paragraph 12 03 August 2002	Initial adoption.
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