Project design document form for CDM project activities

(Version 06.0)

Complete this form in accordance with the Attachment "Instructions for filling out the project design document form for CDM project activities" at the end of this form.

PROJECT DESIGN DOCUMENT (PDD)	
Title of the project activity	Ningxia Shapotou Hydropower Project of Yellow River
Version number of the PDD	Version 04
Completion date of the PDD	21/04/2016
Project participant(s)	Ningxia Shapotou Water Control Co., Ltd. Carbon Asset Management Sweden AB
Host Party	P. R. China
Sectoral scope and selected methodology(ies), and where applicable, selected standardized baseline(s)	Sectoral scope 1: Energy industries(renewable / non-renewable sources) Methodology: ACM0002 "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" (Version16.0)
Estimated amount of annual average GHG emission reductions	334,010 tCO_2e

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

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Ningxia Shapotou Hydropower Project of Yellow River (hereinafter referred to as the project) is a run-of- river hydro power project located in Ningxia of western China. The Project Owner is Ningxia Shapotou Water Control Co., Ltd. Ningxia is a poverty-stricken minority region with a total population of 5.78 million in 2004, 819,000 of which are living in poverty. Ningxia is droughty and rainless, and its annual average precipitation is only 200mm.

The project is located in Yellow River, Zhongwei City, Ningxia. The total installed capacity is 120.3MW and the electricity supplied to the power grid is 578.022GWh/yr[1]. The power density is 29.48W/m^2. The electricity is connected to the Northwest Power Grid (NWPG) via Ningxia Power Grid.

The hydropower station of the project consists of riverbed power station, two canal head power stations on the north and south main canal respectively.

The riverbed power station uses four bulb tubular turbine units. The unit capacity of the turbines which lie in riverbed is 29MW.

The canal head power station on the north main canal adopts bulb tubular turbine units and the power station on the south main canal adopts tube type water turbine-generator units, and the total installed capacity of these two stations is 4.3MW (i.e. 3.1MW+1.2MW).

The project is could replace partial electricity of NWPG and reduce GHG emission of NWPG which is dominated by fossil fuel power generation. The estimated annual emission reductions of the project are 334,010 tCO_2e.

The project makes use of clean and renewable energy for power generation, which is beneficial to both the environment and society. Especially, it reduces poverty in Ningxia, and contributes to the local sustainable development in following aspects:

·The electricity generated by the project replaces a part of the electricity originally generated by coal-fired generating units and thus the local environmental pollutions is mitigated;
·About 2,800 jobs are provided due to the project construction and 120 due to the project operation;
·Harmonious development of the population, resources, environment and economy in the project area is achieved;
·The project is a pilot CDM project aiming at reducing poverty, which is very important in Ningxia, a poverty-stricken minority region. Thus it fully tallies with the Millennium Development Goals (MDGs).

A.2. Location of project activity

A.2.1. Host Party

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The People's Republic of China

A.2.2. Region/State/Province etc.

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Ningxia Hui Autonomous Region

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[1] The Feasibility Study Report of the project

A.2.3. City/Town/Community etc.

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Zhongwei City

A.2.4. Physical/Geographical location

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The project is located in Zhongwei City, Ningxia Hui Autonomous Region in the northwest of China. It is 200 km away from Yinchuan, the capital of Ningxia. The coordinates of the project location are 104°17′ - 105°37′ east longitude, 36°59′-37°43′ north latitude. The site is 1,245-1,460 m above the sea level. Figure A2.1 is the geographic location of the project.

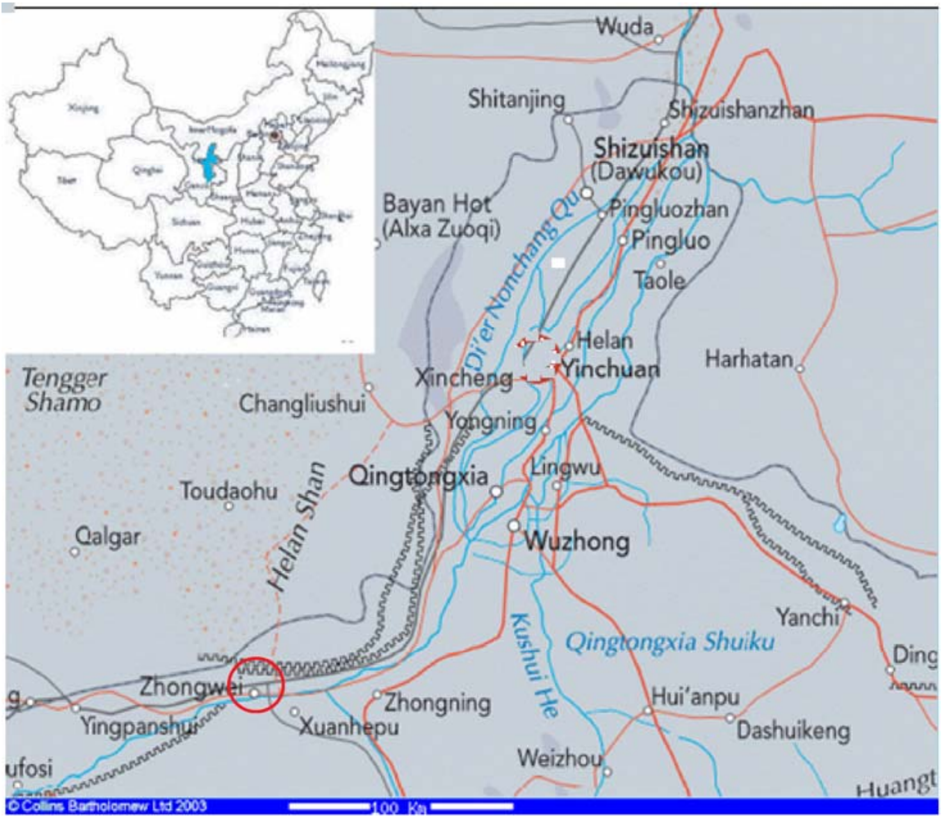

Figure A2.1 The geographic location of the project

A.3. Technologies and/or measures

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The key technical data for the project are summarized in the following table.

Table A3-1 Main Features of Shapotou Hydropower Station

Items	Features
Installed capacity	120.3MW
Expected annual electricity supplied to the grid	578.022GW
Normal water level	1240.5m
Hydraulic head	8.9m
Bulb tubular turbine units	
Generator	
Module	SFWG29-80/7650
Manufacturer	Dongfang Electric Corporation Limited
Rated Power	29MW
Rated Voltage	10500V
Rated Current	1772A
Number	4Sets
Turbine	

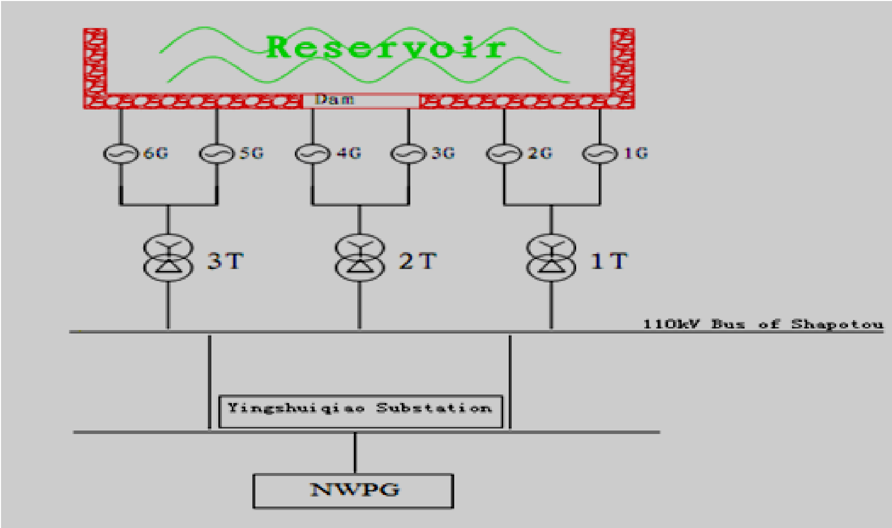
Module	GZ(868)-WP-685
Manufacturer	Dongfang Electric Corporation Limited
Rated Head	8.7m
Rated Flow	373.7m^3/s
Rated Speed	75r/min
Bube type water turbine-generator units	
Turbine	
Module	GZA684-WP-300
Manufacturer	Sichuan Dongfeng Electric Corporation Limited
Rated Power	3100KW
Rated Head	7.2m
Rated Flow	46.82m^3/s
Rated Speed	150r/min
Generator	
Module	SFWG3100-40/3300
Manufacturer	Sichuan Dongfeng Electric Corporation Limited
Rated Voltage	6300V
Rated Current	315.7A
Number	1Set
Turbine	
Module	GD006-WZ-225
Manufacturer	Sichuan Dongfeng Electric Corporation Limited
Rated Power	1200KW
Rated Head	6.31m
Rated Flow	23.415m^3/s
Rated Speed	187.5r/min
Generator	
Module	SFW1200-32/2600
Manufacturer	Sichuan Dongfeng Electric Corporation Limited
Rated Voltage	6300V
Rated Current	122.2A
Number	1Set

The project is a run-of-river project. The total installed capacity is 120.3MW and the designed operation life is 30 years.

Domestic technology is adopted by the project, and there is no technology transfer.

The electricity delivered to the grid by the project can be accurately measured by the main meters (bidirectional) in the Yingshuiqiao Substation.

The technical process can be illustrated as following:



A.4. Parties and project participants

Table A4-1 Project participants

Party involved (host) indicates 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)
China (host)	Ningxia Shapotou Water Control Co., Ltd.	No
Netherlands &Sweden & Switzerland	Carbon Asset Management Sweden AB.	No

A.5. Public funding of project activity

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

SECTION B. Application of selected approved baseline and monitoring methodology and standardized baseline

B.1. Reference of methodology and standardized baseline

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The approved Large-scale Consolidated Methodology applied in the project is ACM0002 "Grid-connected electricity generation from renewable sources" (Version 16.0, EB81, 2014).

The project activity also refers to:

"Tool to calculate the emission factor for an electricity system " (Version 05.0, EB87, 2015).

Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period" (Version 3.0.1, EB66)

More information on the methodology and tools listed above is available at the following website: http://cdm.unfccc.int/methodologies/PAmethodologies/approved.html

B.2. Applicability of methodology and standardized baseline

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The methodology ACM0002 (Version 16.0) is applicable to the project, because the project meets all the applicability criteria stated in the methodology:

Criteria	Justification/explanation	Criteria Justification/explanation Is the applicability condition satisfied?
The methodology is applicable to grid-connected renewable energy power generation project activities that: (a)Install a Greenfield power plant; (b)Involve a capacity addition to (an) existing plant(s); (c)Involve a retrofit of (an) existing operating plants/units; (d)Involve a rehabilitation of (an) existing plant(s)/unit(s);or (e)Involve a replacement of (an) existing plant(s)/unit(s).	The project is the installation of Greenfield power plant, i.e. the project is a new grid-connected Greenfield hydropower plant.	Yes
The project activity may include renewable energy power plant/unit of one of the following types: hydro power plant/unit with or without reservoir, wind power plant/unit, geothermal power plant/unit, solar power plant/unit, wave power plant/unit or tidal power plant/unit.	The project is the installation of a new grid-connected hydropower plant.	Yes
The methodology is not applicable to: (a)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; (b)Biomass fired power plants/units.	The project is the installation of a new grid-connected hydropower plant, which doesn't involve either switching from fossil fuels to renewable energy source at the site of the project activity or biomass fired power generation.	Yes
The methodology is not applicable to the following: ·Project activities that involve switching form 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; ·Biomass fired power plants; ·A hydro power plant that results in the creation of a new single reservoir or in the increase in an existing single reservoir where the power density of the power plant is less than 4W/m^2.	The project is the installation of a new grid connected hydropower plant, which doesn't involve either switching from fossil fuels to renewable energy source at the site of the project activity or biomass fired power generation. The total installed capacity of the project is 120.3MW; the surface area at full reservoir level is 4.081km^2 [2] and the power density is 29.48W/m^2. The power density is greater than 4W/m^2.	Yes

[2] According to the Feasibility Study Report of the project, the power density = total installed capacity / surface area.

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

Applied	Tool	Criteria	Justification / explanation
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 project is the installation of a new hydropower plant delivering the electricity to the grid.	Yes
	In case of CDM projects that tool is not applicable if the project electricity system is located partially or totally in an Annex-I country.	As indicated below, the project electricity system is identified as the NWPG, which covers Shaanxi Power Grid, Gansu Power Grid, Qinghai Power Grid, Ningxia Power Grid and Xinjiang Power Grid. Therefore, the electricity system of the project isn't located partially or totally in any Annex-I country.	Yes

Therefore, the project is in accordance with the applicability of methodology ACM0002 (Version 16.0).

B.3. Project boundary

The power generated by the project is finally connected to Northwest China Power Grid (NWPG). According to the rules on project boundary of ACM0002 (Version 16.0), the spatial extent of the project boundary includes the project site and all power plants connected physically to the NWPG. The areas covered by NWPG include Shaanxi Province, Gansu Province, Qinghai Province, Ningxia Hui Autonomous Region and Xinjiang Uyghur Autonomous Region.

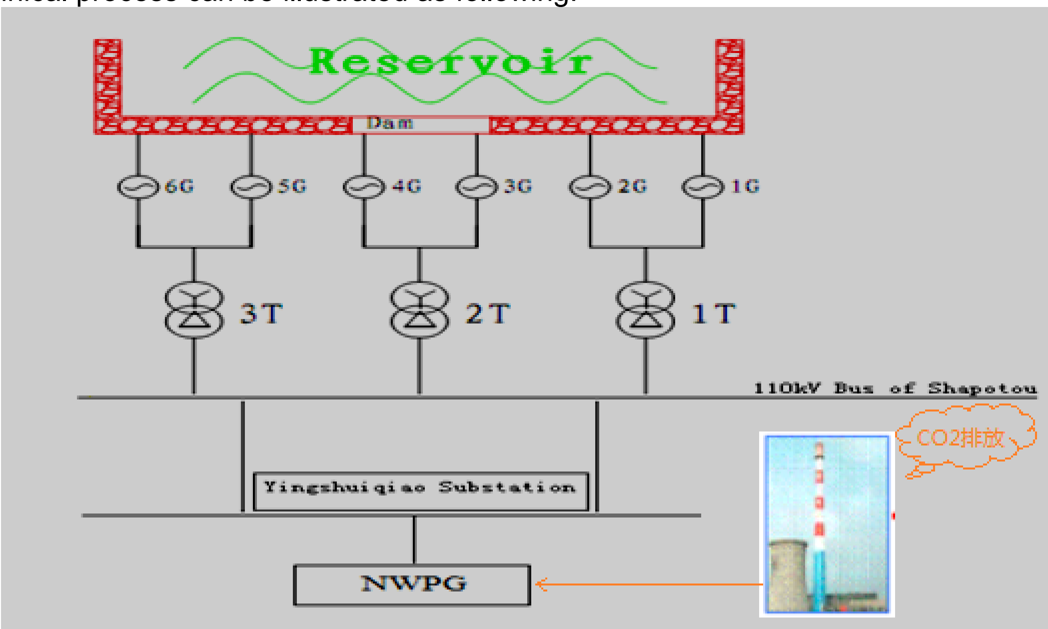
The sources and types of GHG included in the project boundary are listed in Table B3-1.

Table B3-1: The sources and types of GHG included in the project boundary

Source		GHGs	Included?	Justification/Explanation
Baseline scenario	The emission from the fossil- fired power station of NWPG	CO_2	Included	Main emission source.
		CH_4	Excluded	Excluded for simplification. This is conservative.
		N_2O	Excluded	Excluded for simplification. This is conservative.

Project scenario	CO_2 emissions from the project Activity	CO_2	Excluded	Excluded for simplification.
		CH_4	Excluded	Excluded for simplification.
		N_2O	Excluded	Excluded for simplification.

The technical process can be illustrated as following:



B.4. Establishment and description of baseline scenario

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For the first crediting period, the baseline scenario as follow:

NWPG as the provider for the same electricity output as the project is the baseline scenario of the proposed project.

For the second crediting period, the continued validity of the original baseline should be assessed.

According to the “Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period” (Version 3.0.1, EB66), the stepwise procedure as follows should be adopted to assess the continued validity of the baseline and to update the baseline:

Step 1: Assess the validity of the current baseline for the next crediting period

Step 1.1: Assess compliance of the current baseline with relevant mandatory national and/or sectoral policies

There are no new national and/or sectoral policies that could affect the baseline scenario during the renewal of the crediting period. Although national policies are in favor of the development of renewable energy sources, total renewable resource based power generation accounts for only 24.31% of total grid generating output in NWPG in 2012[3]. Hence in the absence of the project

[3] Page 620, China Electric Power Yearbook, 2013

activity electricity would still have been generated in the existing fossil fuel power plants or by the addition of new fossil fuel power plants connected to the NWPG.

Step 1.2: Assess the impact of circumstances

This sub-step is to assess the impact of circumstances existing at the time of requesting renewal of the crediting period on the current baseline emissions, without reassessing the baseline scenario. In the situation where the baseline scenario identified at the validation of the project activity was the continuation of the current practice without any investment, an assessment of the changes in market characteristics is required for the renewal of the crediting period.

At the time of requesting renewal of the crediting period, the market characteristics have not changed, and there is no known circumstances that make a continued validity of the current baseline not plausible.

Step 1.3: Assess whether the continuation of use of current baseline equipment(s) or an investment is the most likely scenario for the crediting period for which renewal is requested.

This step is applicable to the project activity since the baseline is the continuation of the current practice, i.e. the electricity would be supplied by the power grid in the absence of the project activity. It is clear that the power grid as an electricity system would maintain its technical possibility for a much longer time than the crediting period of the project activity.

Step 1.4: Assessment of the validity of the data and parameters

There are some parameters, which were determined at the start of the first crediting period and not monitored during the first crediting period, are not valid anymore. So the current baseline needs to be updated for the second crediting period according to the tool. This update includes Grid Emission Factor and all values used in its calculation (including OM, BM and emission factors from fuels etc).

Application of Steps 1.1, 1.2, 1.3 and 1.4 confirmed that the current baseline is valid for the second crediting period but data and parameters needs to be updated. Therefore step 2 is used.

Step 2: Update the current baseline and the data and parameters

Step 2.1: Update the current baseline

The baseline emissions for the second crediting period has been updated, without reassessing the baseline scenario, based on the latest approved version of the methodology ACM0002 (Version 16.0). This update was applied in the context of the sectoral policies and circumstances that is applicable at the time of requesting for renewal of the crediting period. More details for the updated baseline emissions for the second crediting period can be seen in section B.6.

Step 2.2: Update the data and parameters

As mentioned in step 1.4 above, all parameters regarding the grid emission factor calculation is updated for this second crediting period. More details can be seen in section B.6 and B.7 (updated monitoring parameters).

B.5. Demonstration of additionality

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For the first crediting period, the additionality of the project has been determined by application of

the tool for demonstration of additionality (CDM-PDD, version 02, April 20, 2007).

In accordance with the procedures for renewal of the crediting period of a registered CDM project activity and the applied methodology, it does not require a reassessment of the baseline scenario or additionality, it is only required to assess whether the original project baseline is still valid or has been updated taking account of new data where applicable.

B.6. Emission reductions

B.6.1. Explanation of methodological choices

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The power generation of the project is connected to NWPG via Ningxia Power Grid, so the NWPG is selected as the project boundary. According to the delineation of grid boundaries provided by the Chinese DNA[4], the NWPG includes Shaanxi Power Grid, Gansu Power Grid, Qinghai Power Grid, Ningxia Power Grid and Xinjiang Power Grid.

According to ACM0002 (Version 16.0), “Tool to calculate the emission factor for an electricity system” (Version 05.0) is adopted to calculate the baseline emission factor of the project, applying the following steps:

Step 1. Identify the relevant electricity systems.
Step 2. Choose whether to include off-grid power plants in the project electricity system (optional).
Step 3. Select a method to determine the operating margin (OM).
Step 4. Calculate the operating margin emission factor according to the selected method.
Step 5. Calculate the build margin (BM) emission factor.
Step 6. Calculate the combined margin (CM) emissions factor.

The detailed calculated processes are as follows:

STEP 1. Identify the relevant electricity systems

According to “Tool to calculate the emission factor for an electricity system” (Version 05.0) and the delineation of electricity system given by Chinese DNA, the project belongs to NWPG. Areas covered by NWPG include Shaanxi Power Grid, Gansu Power Grid, Qinghai Power Grid, Ningxia Power Grid and Xinjiang Power Grid. There is electricity exported from NWPG to CCPG (Central China Power Grid), but there is no net electricity imported to NWPG.

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

According to the “Tool to calculate the emission factor for an electricity system” (Version 05.0), 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.
Option I is chosen for the project.

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

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

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[4] The low-cost/must run resources include hydro power, geothermal sources, wind power, solar sources etc.

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

Among methods above, Method (a) can only be used where low-cost/must run resources [5]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.

During 2008-2012, the low-cost/must run resources constitute less than 50% of total amount grid generating output in NWPG where the project is connected, which is in compliance with the applicability of Method (a). The detailed information could be seen in Table B6-1.

Table B6-1 Annual electricity generation of NWPG 2008-2012

No.	Year	Electricity generation （10^8kWh）						Proportion of power of low operating cost
		Total generation	Fuel-fired power	Hydro power	Nuclear Power	Nuclear Power	Nuclear Power	
1	2008[6]	2720.00	2127.00	577.00	/	16.5	/	21.82%
2	2009[7]	2940.00	2221.00	687.00	/	30.5	/	24.40%
3	2010[8]	3643.00	2769.00	822.00	/	52.0	/	23.99%
4	2011[9]	4611.00	3612.00	882.00	/	113.03	3.9	21.66%
5	2012[10]	5133.00	3885.00	1042.00	/	178.8	26.9	24.31%

Method (b) needs the annual load duration curve of the grid. As the detailed data of dispatch of NWPG and power plants are not publicly available, it is difficult to adopt Method (b) for the calculation of the baseline emission factor of operating margin ($EF_{grid,OM,y}$).

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

So, method (a) is selected for the calculation of OM emission factor ($EF_{grid,OM,y}$).
The Simple OM emission factor is calculated ex-ante, and it uses the available data in NWPG for the most recent 3 years (2010-2012).

STEP 4. Calculate the operating margin emission factor ($EF_{grid,OM,y}$) according to the selected method

The Simple *OM* emission factor is calculated as the generation-weighted average emissions per electricity unit (tCO_2/MWh) of all generating sources serving the system, excluding those low-operating cost and must-run power plants. The following two options can be selected to calculate the simple OM:

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

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[5] The low-cost/must run resources include hydro power, geothermal sources, wind power, solar sources etc.

[6] Page 695, China Electric Power Yearbook, 2009
[7] Page 705, China Electric Power Yearbook, 2010
[8] Page 725, China Electric Power Yearbook, 2011
[9] Page 631, China Electric Power Yearbook, 2012
[10] Page 620, China Electric Power Yearbook, 2013

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 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 data of each power plant /unit in the NWPG where the project connected is not available publicly, thus Option A is not applicable. The low-cost/must run power resources in NWPG include only renewable power generation, and the quantity of electricity supplied to the grid by these sources is known. Besides, off grid power plants are not included in the calculation (i.e. if Option I has been chosen in Step 2).

Therefore, Option B is selected for calculating the Simple *OM* emission factor 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.

The calculation is as follows:

$$EF_{grid,OMsimple,y} = \frac{\sum_i \left(FC_{i,y} \times NCV_{i,y} \times EF_{CO2,i,y}\right)}{EG_y} \tag{B.1}$$

Where:

$EF_{grid,OMsimple,y}$ =Simple operating margin CO_2 emission factor in year y (tCO_2/MWh)
$FC_{i,y}$ =Amount of fuel type *i* consumed in the project electricity system in year y (mass or volume unit)
$NCV_{i,y}$ =Net calorific value (energy content) of fuel type *i* in year y (GJ/mass or volume unit)
$EF_{CO2,i,y}$ =CO_2 emission factor of fuel type *i* in year y (tCO_2/GJ)
EG_y =Net electricity generated and delivered to the grid by all power sources serving the system, not including low-cost/must-run power plants/units, in year y (MWh)
i =All fuel types combusted in power sources in the project electricity system in year *y*
y = The relevant year as per the data vintage chosen in Step 3

Based on the emission factor published by the DNA of China[11], the details of the calculations are provided in Appendix 4. For each of the most recent years for which data are available (2010, 2011 and 2012), firstly determine the emissions, then the total electricity generation. Then determine the Simple Operating Margin Emissions Factor as the total emissions over these three years divided by the total generation over the same period. The OM emission factor is calculated ex-ante as a 3-year average (2010-2012):

$EF_{grid,OM,y}$ =0.9578 tCO_2/MWh (see Appendix 4 for details).

STEP 5. Calculate the build margin (BM) emission factor ($EF_{grid,BM,y}$)

The build margin emission factor $EF_{grid,BM,y}$ is calculated ex-ante based on the most recent information available on plants already built for sample group m at the time of PDD submission.

11 http://cdm.ccchina.gov.cn/archiver/cdmcn/UpFile/Files/Default/20150204155537627092.pdf

The sample group of power units m used to calculate the build margin should be determined as per the following procedure, consistent with the data vintage selected above:

(a) Identify the set of five power units, excluding power units registered as CDM project activities, that started to supply electricity to the grid most recently ($SET_{5\text{-units}}$) and determine their annual electricity generation ($AEG_{SET\text{-}5\text{-units}}$, in MWh);
(b) Determine the annual electricity generation of the project electricity system, excluding power units registered as CDM project activities (AEG_{total}, in MWh). Identify the set of power units, excluding power units registered as CDM project activities, that started to supply electricity to the grid most recently and that comprise 20% of AEG_{total} (if 20% falls on part of the generation of a unit, the generation of that unit is fully included in the calculation) ($SET_{\geq 20\%}$) and determine their annual electricity generation ($AEG_{SET\text{-}\geq 20\%}$, in MWh);
(c) From $SET_{5\text{-units}}$ and $SET_{\geq 20\%}$ select the set of power units that comprises the larger annual electricity generation (SET_{sample});

It is very difficult to obtain the data of the five power units started to supply electricity to the grid most recently because these data are considered as confidential business matter in China. So, $SET_{\geq 20\%}$ is selected as SET_{sample}. Based on relevant data released by Chinese DNA, none of the power units in the selected SET_{sample} started to supply electricity to the grid more than 10 years ago. Hence the selected SET_{sample} is used to calculate the build margin.

The Build Margin Emission Factor ($EF_{grid,BM,y}$) is calculated as follows:

$$EF_{grid,BM,y} = \frac{\sum_m EG_{m,y} \times EF_{EL,m,y}}{\sum_m EG_{m,y}} \qquad \text{(B.2)}$$

Where:

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

Due to the data's unavailability, the BM calculation in this PDD follows the guidance provided by the EB in the deviation[12]. Calculate first the newly installed capacity and its power generation technology mix, then the weights of different power technologies in the newly installed capacity, and finally the BM emission factor based on the emissions factors of different types of most advanced commercial generation technologies.

Because the capacity of the coal-fired, oil-fired and gas-fired power plants can not be separated in the publicly available statistical data, the BM calculation in this PDD adopts the following method. First, use the available data in the energy balance sheets of the most recent year to calculate the proportions of the CO_2 emission from solid, liquid and gaseous fuels in the total CO_2 emissions related to power generation. Second, calculate the emissions factor of the fossil fuel-fired power generation in the NWPG using the above proportions as the weights and the emission factors of the most advanced commercial generation technologies as the reference. Finally, the BM emission factor is the product of this emission factor of fossil fuel-fired power generation and the proportion

12 http://cdm.unfccc.int/UserManagement/FileStorage/AM_CLAR_QEJWJEF3CFBP1OZAK6V5YXPQKK7WYJ

of fossil fuel-fired power plants in the newly installed 20% capacity. The detailed steps and the related formulas are as follows:

$$\lambda_{Coal,y} = \frac{\sum_{i \in Coal,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,j,y}}{\sum_{i,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,j,y}} \quad (B.3)$$

$$\lambda_{Oil,y} = \frac{\sum_{i \in Oil,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,j,y}}{\sum_{i,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,j,y}} \quad (B.4)$$

$$\lambda_{Gas,y} = \frac{\sum_{i \in Gas,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,j,y}}{\sum_{i,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,j,y}} \quad (B.5)$$

Where:

$F_{i,j,y}$ = The amount of fuel *i* consumed (mass or volume unit, t for solid and liquid, m^3 for gas) by relevant provincial sub-grids *j* in year *y*
$NCV_{i,y}$ =The net calorific value of fuel *i* (mass or volume unit, GJ/t for solid and liquid, GJ/m^3 for gas) in year *y*;
$EF_{CO2,i,j,y}$ = CO_2 emission factor of fuel *i* in year *y* (t CO_2/ GJ);
*COAL,OIL,*and *GAS* refer to all forms of coal, oil and gas.

Sub-step 5b. **Calculating the Emission Factor of fuel-fired power technology**

$$EF_{Thermal,y} = \lambda_{Coal,y} \times EF_{Coal,Adv,y} + \lambda_{Oil,y} \times EF_{Oil,Adv,y} + \lambda_{Gas,y} \times EF_{Gas,Adv,y} \quad (B.6)$$

Where:

$EF_{Coal,Adv,y}$, $EF_{Oil,Adv,y}$ and $EF_{Gas,Adv,y}$ represent the related Emission Factor of the most advanced coal, oil and gas fired power technologies available commercially, please refer to Appendix 4 for more details.

Sub-step 5c. **Calculating the $EF_{grid,BM,y}$ of the NWPG**

$$EF_{grid,BM,y} = \frac{CAP_{Thermal,y}}{CAP_{Total,y}} \times EF_{Thermal,y} \quad (B.7)$$

Where:
$CAP_{Total,y}$ =The newly increment of total installed capacity exceed 20% of current installed capacity
$CAP_{Therma,yl}$ =The newly increment of fuel-fired installed capacity

Based on the emission factor published by the DNA of China, we know that the BM Emission Factor of NWPG is calculated ex-ante as the value 0.4512 tCO_2/MWh (see Appendix 4 for details).

The $EF_{grid,OM,y}$ and $EF_{grid,BM,y}$ of the project for the second crediting period are calculated ex-ante and will not change during the second crediting period, but will be updated once the second crediting period is over.

STEP6. Calculate the combined margin (CM) emissions factor ($EF_{grid,CM,y}$)

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 combined margin (CM) emission factor ($EF_{grid,CM,y}$) was calculated as the weighted average of the Operating Margin emission factor ($EF_{grid,OM,y}$) and the Build Margin emission factor ($EF_{grid,BM,y}$)for the project is calculated as follows:

$$EF_{grid,CM,y} = w_{OM} * EF_{grid,OM,y} + w_{BM} * EF_{grid,BM,y} \quad \text{(B.8)}$$

Where:

$EF_{grid,BM,y}$ = Build margin CO_2 emission factor in year *y* (tCO_2/MWh)
$EF_{grid,OM,y}$ = Operating margin CO_2 emission factor in year *y* (tCO_2/MWh)
w_{OM} = Weighting of operating margin emissions factor (per cent)
w_{BM} = Weighting of build margin emissions factor (per cent)

According to *"Tool to calculate the emission factor for an electricity system" (Version 05.0)*, the following default values should be used for W_{OM} and W_{BM}:

"All other projects: w_{OM} = 0.5 and w_{BM} = 0.5 for the first crediting period, and w_{OM} = 0.25 and w_{BM} = 0.75 for the second and third crediting period".

As indicated in the Tool, W_{OM}=0.25 and W_{BM}=0.75 are used for this hydropower project during the second crediting period.

Using these values and the values of Operating Margin and Build Margin emission factors, the Combined Margin Emission Factor can be calculated as 0.57785tCO_2/MWh. The detail information refer to Appendix 4.

1. Calculation of the Baseline Emissions (BE_y)

According to ACM0002 (Version 16.0), the baseline emissions (BE_y) are calculated as:

$$BE_y = EG_{PJ,y} \times EF_{grid,CM,y} \quad \text{(B.9)}$$

Where:
BE_y = Baseline emissions in year *y* (tCO_2/yr)
$EG_{PJ,y}$ = Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year *y*(MWh/yr) .
$EF_{grid,CM,y}$ = Combined margin CO_2 emission factor for grid connected power generation in year *y* calculated using the latest version of the "Tool to calculate the emission factor for an electricity system"(tCO_2/MWh)

- Calculation of $EG_{PJ,y}$

The project is the installation of a new grid-connected Greenfield power plant, then:

$$EG_{PJ,y} = EG_{facility,y} \quad \text{(B.10)}$$

Where:

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

And then:

$$BE_y = EG_{facility,y} * EF_{grid,CM,y} \quad \text{(B.11)}$$

The project might import electricity from the grid. To be conservative, $EG_{facility,y}$ is calculated as follows:

$$EG_{facility,y} = EG_{out,y} - EG_{im,y} \quad \text{(B.12)}$$

Where:

$EG_{out,y}$ =The quantity of electricity supplied by the project plant/unit to the NWPG in year y (MWh/yr)

$EG_{im,y}$ =The quantity of electricity delivered to the project plant/unit from the NWPG and is expected to be 0 for the purpose of ex-ante calculation(MWh/yr).

2. Project emissions (*PE_y*)

According to ACM0002 (Version 16.0), #

$$PE_y = PE_{FF,y} + PE_{GP,y} + PE_{HP,y} \quad \text{(B.13)}$$

Where:

PE_y = Project emissions in year y (t CO_2e/yr)

$PE_{FF,y}$ = Project emissions from fossil fuel consumption in year y (t CO_2/yr)

$PE_{GP,y}$ = Project emissions from the operation of geothermal power plants due to the release of non-condensable gases in year y (t CO_2e/yr)

$PE_{HP,y}$ = Project emissions from water reservoirs of hydro power plants in year y (t CO_2e/yr)

In accordance with the requirements of the methodology, the surface area at full reservoir level of the project has been measured at the start of the project. It is 4.081 million m^2, based on which the power density is calculated as 29.48W/m^2, greater than 10W/m^2. According to the methodology:

$PE_y = 0$

3. Leakage（*LE_y*）

According to ACM0002 (Version 16.0), no leakage emissions are considered.

4. Emission Reductions (*ER_y*)

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

$$ER_y = BE_y - PE_y - LE_y = BE_y - 0 - 0 = BE_y \quad \text{(B.14)}$$

Where:

ER_y = Emission reductions in year y (tCO_2e/yr)

BE_y = Baseline emissions in year y (tCO_2/yr)

PE_y = Project emissions in year *y* (tCO_2e/yr)
LE_y = leakage emissions in year *y* (tCO_2e/yr)

Since the project emission and the leakage are both taken as zero, the emission reduction is calculatedas:

$$ER_y=BE_y=EG_{PJ,y}*EF_{grid,CM,y}=EG_{facility,y}*EF_{grid,CM,y}=(EG_{out,y}-EG_{im,y})*EF_{grid,CM,y} \quad (B.15)$$

B.6.2. Data and parameters fixed ex ante

Data / Parameter	EG_y
Unit	MWh/yr
Description	Power Generation in each province of the NWPG
Source of data	China Electric Power Yearbook 2011-2013
Value(s) applied	See Appendix 4
Choice of data or Measurement methods and procedures	China Electric Power Yearbook is published by the editorial board of China Electric Power Yearbook, which is authorized.
Purpose of data	To calculate the baseline emissions
Additional comment	Uncertainty level of data is low.

Data / Parameter	Self- consumption rate of electricity
Unit	%
Description	Self- consumption rate of electricity in each province of NWPG
Source of data	China Electric Power Yearbook2011-2013
Value(s) applied	See Appendix 4
Choice of data or Measurement methods and procedures	China Electric Power Yearbook is published by the editorial board of China Electric Power Yearbook, it is authorized.
Purpose of data	To calculate the baseline emissions
Additional comment	Uncertainty level of data is low.

Data / Parameter	Installed Capacity
Unit	MW
Description	Installed capacity in each province of the NWPG
Source of data	China Electric Power Yearbook2011-2013
Value(s) applied	See Appendix 4
Choice of data or Measurement methods and procedures	China Electric Power Yearbook is published by the editorial board of China Electric Power Yearbook, which is authorized.
Purpose of data	To calculate the baseline emissions
Additional comment	Uncertainty level of data is low.

Data / Parameter	$CAP_{total,y}$
Unit	MW
Description	The increased capacityof more than 20% of existing capacity
Source of data	China Electric Power Yearbook2011-2013

Value(s) applied	See Appendix 4
Choice of data or Measurement methods and procedures	China Electric Power Yearbook is published by the editorial board of China Electric Power Yearbook, which is authorized.
Purpose of data	To calculate the baseline emissions.
Additional comment	Uncertainty level of data is low.

Data / Parameter	$CAP_{thermal,y}$
Unit	MW
Description	The increased capacity of thermal capacity
Source of data	China Electric Power Yearbook2011-2013
Value(s) applied	See Appendix 4
Choice of data or Measurement methods and procedures	China Electric Power Yearbook is published by the editorial board of China Electric Power Yearbook, which is authorized.
Purpose of data	To calculate the baseline emissions.
Additional comment	Uncertainty level of data is low.

Data / Parameter	$EF_{Coal,Adv,y}$
Unit	%
Description	Electricity supply efficiency of the most efficient, commercially available coal-fired generation technology.
Source of data	2014 baseline emission factors for regional power grids in China published by China DNA
Value(s) applied	See Appendix 4
Choice of data or Measurement methods and procedures	The data obtained from the China DNA, satisfying the requirement of latest version of Tool to calculate the emission factor for an electricity system version 05.0.
Purpose of data	To calculate the baseline emissions
Additional comment	Uncertainty level of data is low.

Data / Parameter	$EF_{Oil,Adv,y}$, $EF_{Gas,Adv,y}$
Unit	%
Description	The efficiency of power supply with the best oil and gas fired power plant technology commercially available.
Source of data	2014 baseline emission factors for regional power grids in China published by China DNA
Value(s) applied	See Appendix 4
Choice of data or Measurement methods and procedures	The data obtained from the China DNA, satisfying the requirement of latest version of Tool to calculate the emission factor for an electricity system version 05.0.
Purpose of data	To calculate the baseline emissions
Additional comment	Uncertainty level of data is low.

Data / Parameter	$FC_{i,y}$
Unit	Mass or volume unit

Description	Amount of fuel type I consumed in the project electricity system in year y
Source of data	China Energy Statistics Yearbook,2011-2013
Value(s) applied	See Appendix 4
Choice of data or Measurement methods and procedures	The data obtained from the official publication China energy statistical yearbook, satisfying the requirement of latest version of Tool to calculate the emission factor for an electricity system version 05.0.
Purpose of data	To calculate the baseline emissions
Additional comment	Uncertainty level of data is low.

Data / Parameter	$NCV_{i,y}$
Unit	GJ/mass or volume unit of a fuel
Description	The net calorific value per mass or volume unit of the fuel i in year y
Source of data	China Energy Statistics Yearbook, 2011-2013
Value(s) applied	See Appendix 4
Choice of data or Measurement methods and procedures	The data obtained from the official publication China energy statistical yearbook, satisfying the requirement of latest version of Tool to calculate the emission factor for an electricity system version 05.0.
Purpose of data	To calculate the baseline emissions
Additional comment	Uncertainty level of data is low.

Data / Parameter	$EF_{CO2,i,y}$
Unit	tCO_2/GJ
Description	The Carbon Emission Factor of fuel *I* in year *y*
Source of data	2006 IPCC Guidelines for National Greenhouse Gas Inventories (Volume 2, Energy, Chapter 1, p1.21-p1.24,Table 1.3and Table 1.4)
Value(s) applied	See Appendix 4
Choice of data or Measurement methods and procedures	Regional or national average default values are unavailable, so IPCC default values at the lower limit of the uncertainty at a 95% confidence interval are used, satisfying the requirement of latest version of Tool to calculate the emission factor for an electricity system version 05.0.
Purpose of data	To calculate the baseline emissions.
Additional comment	Uncertainty level of data is low.

Data / Parameter	$EF_{grid,OM,y}$
Unit	tCO_2/MWh
Description	Operating margin CO_2emission factor for the project electricity system in year y
Source of data	Bulletin about determining the Emission factors of Chinese Power Grids in 2014 http://cdm.ccchina.gov.cn/archiver/cdmcn/UpFile/Files/Default/20150317120351621130.pdf
Value(s) applied	0.9578
Choice of data or Measurement methods and procedures	Official public data
Purpose of data	To calculate the baseline emissions.
Additional comment	Uncertainty level of data is low.

Data / Parameter	$EF_{grid,BM,y}$
Unit	tCO_2/MWh
Description	Build margin CO_2emission factor for the project electricity system in year y
Source of data	Bulletin about determining the Emission factors of Chinese Power Grids in 2014 http://cdm.ccchina.gov.cn/archiver/cdmcn/UpFile/Files/Default/20150511145355964897.pdf
Value(s) applied	0.4512
Choice of data or Measurement methods and procedures	Official public data
Purpose of data	To calculate the baseline emissions.
Additional comment	Uncertainty level of data is low.

Data / Parameter	$EF_{grid,CM,y}$
Unit	tCO_2/MWh
Description	Combined margin CO_2 emission factor for grid connected power generation in year y
Source of data	Bulletin about determining the Emission factors of Chinese Power Grids in 2014 http://cdm.ccchina.gov.cn/archiver/cdmcn/UpFile/Files/Default/20150204155537627092.pdf
Value(s) applied	0.57785
Choice of data or Measurement methods and procedures	Official public data
Purpose of data	To calculate the baseline emissions.
Additional comment	Uncertainty level of data is low.

B.6.3. Ex ante calculation of emission reductions

>>

According to baseline emission factor calculation published by Chinese DNA (the details could be seen in Annex 4), the weighted average OM emission factors of the NWPG from year 2010 to 2012 is:

$EF_{grid,OM,y}$=0.9578 tCO_2/MWh

The calculated build margin emission factor of the NWPG is:

$EF_{grid,BM,y}$=0.4512tCO_2/MWh

Hence: $EF_{grid,\ CM,\ y} = 0.25*EF_{grid,\ OM,\ y} + 0.75*EF_{grid,\ BM,\ y}$
$= 0.25*0.9578+0.75*0.4512$
$= 0.57785 tCO_2e/MWh$

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)
04/11/2014-31/12/2014	53,076[13]	0	0	57,076
01/01/2015-31/12/2015	334,010	0	0	334,010
01/01/2016-31/12/2016	334,010	0	0	334,010
01/01/2017-31/12/2017	334,010	0	0	334,010
01/01/2018-31/12/2018	334,010	0	0	334,010
01/01/2019-31/12/2019	334,010	0	0	334,010
01/01/2020-31/12/2020	334,010	0	0	334,010
01/01/2021-03/11/2021	280,934	0	0	280,934
Total	2,338,070	0	0	2,338,070
Total number of crediting years	7			
Annual average over the crediting period	334,010	0	0	334,010

B.7. Monitoring plan

B.7.1. Data and parameters to be monitored

Data / Parameter	$EG_{facility,y}$
Unit	MWh/yr
Description	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y
Source of data	Meter
Value(s) applied	578,022
Measurement methods and procedures	Calculated based on the data of $EG_{out,y}$ and $EG_{im,y}$ $EG_{facility,y} = EG_{out,y} - EG_{im,y}$
Monitoring frequency	Hourly measurement and monthly recording

[13] 334,010/365*58=57,076

QA/QC procedures	The meter used for measuring the power delivered to the grid is calibrated according to The Technical Administration Specification for Energy Measurement DL/T-448-2000. The measurement data could be double checked based on invoice of power sales. The records of measurement data are archived in electronic/paper and archived data are kept during the crediting period or the CERs issued in the last time and two years after(subject to the latter one)
Purpose of data	To calculate the baseline emissions.
Additional comment	Uncertainty level of the data is low

B.7.2. Sampling plan

>>

Not applicable.

B.7.3. Other elements of monitoring plan

>>

Ningxia Shapotou Water Control Co., Ltd., the project owner is the user of this monitoring plan and is responsible for this monitoring plan.

The project owner must maintain credible, transparent, and adequate data estimation, measurement, collection, and tracking systems to maintain the information required for an audit of an emission reduction project. These records and monitoring systems are needed to allow the selected DOE to verify project performance as part of the verification and certification process. This process also reinforces that CO_2 reductions are real and credible to the buyers of the Certified Emissions Reductions (CERs).

Emission reduction is achieved through avoided power generation of fossil fuel electricity due to the power generated by the project. The grid-connected output is therefore defined as the key data to monitor. The surface area at full reservoir level was measured at the start of the project by the project owner.

In order to better record these data, the project entity has established a CDM QC team to do the monitor work. The organizational structure is as follows:

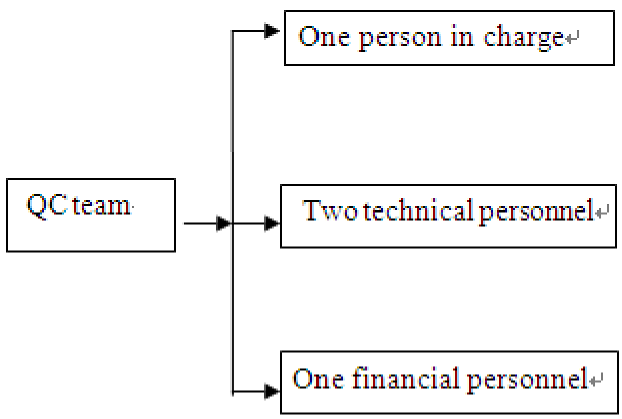

Figure B7.1 The structure of the CDM QC team

For more details, please refer to Appendix 5.

B.8. Date of completion of application of methodology and standardized baseline and contact information of responsible persons/ entities

>>

Date of completion: 21/04/2016
Name of person determining the baseline and monitoring: Zhang Jisheng / Ningxia CDM Service Centre(CDM project developer)

Tel：0951-6193562
Fax：0951-6193563
Email: zjscdm@kejicc.com

Affiliated institution: Ningxia CDM Service Centre is not a project participant

Contributors:
Li Yan Ningxia CDM Service Centre
Tan Yao Ningxia CDM Service Centre
Yun Fu Ningxia CDM Service Centre
He Yongfei Ningxia CDM Service Centre
Li Yongxue Ningxia Shapotou Water Control Co., Ltd.

Ningxia Shapotou Water Control Co., Ltd. is a project participant.

SECTION C. Duration and crediting period

C.1. Duration of project activity

C.1.1. Start date of project activity

>>
03/06/2005 (the date on which all the generating units were put into test run)

C.1.2. Expected operational lifetime of project activity

>>
The lifetime of the project is 30y-0m

C.2. Crediting period of project activity

C.2.1. Type of crediting period

>>
A renewable crediting period is used.

C.2.2. Start date of crediting period

>>
04/11/2014. This is the starting date of the second crediting period.

C.2.3. Length of crediting period

>>
7y-0m

SECTION D. Environmental impacts

D.1. Analysis of environmental impacts

>>
The environmental impacts have been finished during the first crediting period, and it is also suitable for the second crediting period.The detail information is as follows:

In accordance with relevant laws and regulations on environmental protection, an Environmental Impact Assessment (EIA) of the project was completed by Ningxia Environmental Protection Institute and Ningxia Water Conservancy and Hydroelectric Power Survey and Design Institute. These two institutes were approved by the State Environmental Protection Administration and they are qualified with Grade A and Grade B respectively for environmental project appraisal. The results of the EIA were positive and approved by the State Environmental Protection Administration (Document No. [2001]105).

The main environmental impacts of the project are summarised as follows:

1. Ecological Impact

The site of the project belongs to desert and semi-desert grassland ecosystem. During the implementation of the project, the farmland shelter belt, economic forest, man-made grassland, is built in the site of the project and thus a green belt for wind-break and sand-fixing is formed, which is good for the improvement and protection of the ecological environment of the site of the project, the regulation of the local climate, the defence against desertification, the mitigation of water loss and soil erosion. Consequently, the vulnerable desert grassland ecosystem will develop into artificial oasis ecosystem. A small number of people need to resettle due to the construction of the project and they have been well placed and compensated, which can be proved by the relevant Reply from Water Resources Department of Ningxia (No.[2006]26).

2. The Impact on the Water Environment

Both domestic sewage and sewage from the worksite is treated up to the standards before being discharged.

3. The Impact on the Air

The dust and soot is strictly controlled through regular watering and measures of reducing smoke and dust. During the construction phase, the air quality is monitored and the waste residue and refuse produced by the project construction is piled up in a certain place and earthed up.

4. The Impact of Noises

The transport vehicles is forbidden to hoot and ordered to speed down when passing the project site. Meanwhile, tasks with loud noises is carried out during daytime and the speed of those transport vehicles is limited when passing residential area.

5. During the construction and operation phases, environmental monitoring is carried out to verify the project's actual impacts on the environment, identify unexpected environmental problems at an early stage, and adjust environmental measures as appropriate. The effect on the environment is further supervised and evaluated by Ningxia Water Conservancy and Hydroelectric Power Survey and Design Institute and Ningxia Center of Environmental Monitoring (national second grade).

D.2. Environmental impact assessment

>>
Impacts are considered not significant and Ningxia Environmental Protection Bureau has approved the project[19].

SECTION E. Local stakeholder consultation

E.1. Solicitation of comments from local stakeholders

>>

The local stakeholder consultation has been finished during the first crediting period, and it is also suitable for the second crediting period. The detail information is as follows:

The project owner, together with Ningxia Environmental Protection Institute and Ningxia Water Conservancy and Hydroelectric Power Investigation Institute has carried out investigation on the public's comments on this project construction.

1. Questionnairs.

The respondents were representative and they were investigated at random in the project site so that the survey could reflect the public opinions and suggestions fairly, objectively and truthfully.

The survey has a 97.5% response rate (156 questionnaires returned out of 160). As the local people are of low educational status and their sense of participation needed to be enhanced step by step, the questionnaires were designed concisely and respondents can give multiple choices for the questions.

The differentiation of age, education background and profession were taken into full consideration in the survey. For the age distribution, 6% of the respondents are younger than 25 years old, 77% are between 25 and 45, and 17% are older than 46. Most of the respondents are middle-aged or young people. For education background, 46% of the respondents have junior high school education or below, 48.8% senior high school or technical secondary school and 5.2% college or above. For the structure of profession, 13% of the respondents are urban residents, 11% are workers and 76% are farmers.

The main contents of questionnaires are as follows:

1	How do you think about your surrounding environment	Satisfied （）	Not satisfied （）	Needing improvement （）
2	Status quo of local power supply	Tense （）	Not tense （）	Not bad （）
3	Status quo of local agricultural water	Can be ensured （）	Cannot be ensured （）	Not bad （）
4	How much do you know about water	A lot （）	Nothing （）	A little （）
5	What is your attitude towards the construction of water control project and waterpower generation project	Supportive （）	Not supportive （）	indifferent （）
6	What are the impacts of the project construction on your life quality	Improve （）	Reduce （）	No impact （）
7	What are the impacts of the project	Significant （） For example：		Minor （）
8	What are the impacts of the project construction on the local	Promote （）	Retard （）	No effect （）
9	Whether the training on agricultural technology is necessary	Necessary （）		Not necessary （）
The significance of the project construction:				
Suggestions and requirements to the project construction:				
Information of respondents： Employment：Urbanite （）; Workers （）; Farmers （）. Age：Younger than 25 （）; 25 to 45 （）; Elder than 46 （）. Education：Junior high school and below （）; Senior high school （）; Technical secondary school （）; University and above （）				

2. Symposim

The stakeholders discussed about cascade development of Yellow River and environmental impact etc. The symposium reflected the sense of democratic participation of the mass. The stakeholders concern much about the development of local economy and they consider that the construction of the project is beneficial to local economic development.

E.2. Summary of comments received

>>
There are no adverse comments on the project activity and nearly all of the respondents are supportive to it.

According to the statistics, 90% of the respondents consider that before the construction of the project, the environment of the project area needs to be improved; 97% of the respondents consider the local power supply can not be ensured before the construction of the project; 48% of the respondents are not familiar with water conservancy and waterpower generation; 91% of the respondents are supportive to the construction of water control and waterpower generation project; 79% of the respondents consider the project construction will improve life quality and promote local economic development; 82% of the respondents consider the training on agricultural technology is necessary.

93% of the respondents consider the significance of the project is: the electricity supply can be ensured; the living standard can be improved.

72% of the respondents consider the construction of the project should be accelerated and the environment should be improved.

E.3. Report on consideration of comments received

>>
In view of the suggestions and requests, during the construction and operation of the proposed project, the project owner will put those measures mentioned in the Environmental Impact Assessment into effect to gain environmental, social and economic benefit.

The project owner will further publicize the significance of water control project and waterpower generation so that people will pay more attention to and support the proposed project.

SECTION F. Approval and authorization

>>
The LoA from the host party is available.

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Appendix 1. Contact information of project participants and responsible persons/ entities

The Project Owner

Project participant and/or responsible person/ entity	■ Project participant ☐ Responsible person/ entity for application of the selected methodology (ies) and, where applicable, the selected standardized baselines to the project activity
Organization name	Ningxia Shapotou Water Control Co., Ltd.
Street/P.O. Box	23rd, Floor, Block A, International Trade New Tiandi, Jinfeng District, Yinchuan, Ningxia, China
Building	/
City	Yinchuan
State/Region	Ningxia
Postcode	750001
Country	People's Republic of China
Telephone	+86-951-8558484
Fax	+86-951-6882981
E-mail	/
Website	/
Contact person	/
Title	General Manager Assistant
Salutation	Mr.
Last name	Li
Middle name	/
First name	Yongxue
Department	/
Mobile	+86-153 0951 1007
Direct fax	+86-951-8558484
Direct tel.	+86-951-6882981
Personal e-mail	pomoc-2012@kp-cdm.com

The Buyer

Project participant and/or responsible person/ entity	■ Project participant ☐ Responsible person/ entity for application of the selected methodology (ies) and, where applicable, the selected standardized baselines to the project activity
Organization name	Carbon Asset Management Sweden AB
Street/P.O. Box	Drottninggatan 92-94
Building	/
City	Stockholm
State/Region	/
Postcode	111 36
Country	Sweden
Telephone	+46 8 506 885 00

Fax	+46 8 34 60 80
E-mail	cam@tricorona.se
Website	/
Contact person	Niels von Zweigbergk
Title	CEO
Salutation	Mr.
Last name	von Zweigbergk
Middle name	/
First name	Niels
Department	/
Mobile	/
Direct fax	+46 8 34 60 80
Direct tel.	+46 8 506 885 51
Personal e-mail	nvz@tricorona.se

Appendix 2. Affirmation regarding public funding

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

Appendix 3. Applicability of methodology and standardized baseline

No more information.

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

BASELINE INFORMATION

To determine the simple OM emission factor and the Build Margin emission factor of the project, data recommended in the *2014 baseline emission factors for regional power grids in China* for the NWPG are adopted.

The following tables summarise the numerical results from the equations listed in the approved methodological tool-*Tool to calculate the emission factor for an electricity system version 05.0*. The information provided by the tables includes data, data sources and the underlying calculations. The emission factors of OM and BM are calculated based on the *Tool to calculate the emission factor for an electricity system*. The information provided by the tables includes data, data sources and the underlying calculations.

1. Calculation of Operating Margin (*OM*) Emission Factor

Table 4-1Thermal Electricity generation of the NWPG

Year	2010			2011			2012		
Province	EG	AER	EDG	EG	AER	EDG	EG	AER	EDG
	(MWh)	(%)	(MWh)	(MWh)	(%)	(MWh)	(MWh)	(%)	(MWh)
Shaanxi	95,800,000	7.23	88,873,660	108,400,000	7.2	100,595,200	114,900,000	7.1	106,742,100
Gansu	59,100,000	6.73	55,122,570	71,400,000	6.8	66,544,800	66,600,000	6.5	62,271,000
Qinghai	10,900,000	6.58	10,182,780	12,200,000	7.2	11,321,600	12,000,000	7.9	11,052,000
Ningxia	57,200,000	-	57,200,000	96,700,000	-	96,700,000	95,200,000		95,200,000
Xinjiang	53,900,000	8.7	49,210,700	72,500,000	8.2	66,555,000	99,800,000	8.1	91,716,200
Total			**260,589,710**			**341,716,600**	**388,500,000**		**366,981,300**

Data source: China electric power yearbook, 2011-2013

EG- Electricity generation, AER- Auxiliary electricity consumption Rate, EDG-Electricity delivered to the grid.

Table 4-2CO_2Emissions from Fuel-firedPower Plantsof NWPG in 2010

Fuel types	Unit	Shaanxi	Gansu	Qinghai	Ningxia Hui Autonomous Region	Xinjiang	Subtotal	Fuel emission factor	NCV	CO_2 emission (tCO_2e)
								($kgCO_2/TJ$)	（$MJ/t,km^3$）	I=F*G*H/100000 (Mass unit)
		A	B	C	D	E	F=A+B+C+D+E	G	H	I=F*G*H/10000 (Volume unit)
Raw coal	10^4t	4850.49	2771.89	483.72	2916.46	2494.9	**13517.46**	87,300	20,908	246,729,926
Cleaned coal	10^4t				1.05		**1.05**	87,300	26,344	24,148
Other washed coal	10^4t	11.01			42.96	6.82	**60.79**	87,300	8,363	443,822
Briquettes	10^4t						**0**	87,300	20,908	0
Coke	10^4t						**0**	95,700	28,435	0
Coal gangue	10^4t	355.13	37.86		163.58	2.85	**559.42**	87,300	8363	4,084,269
Coke oven gas	10^8m^3	1.97	0.89			0.7	**3.56**	37,300	16,726	222,101
Blast furnace gas	10^8m^3	18.24	4.06			5.28	**27.58**	219,000	3763	2,272,860
Converter gas	10^8m^3		0.31				**0.31**	145,000	7945	35,713
Other coal gas	10^8m^3						**0**	37,300	5,227	0
Crude oil	10^4t						**0**	71,100	41,816	0
Gasoline	10^4t	0.01		0.03		0.01	**0.05**	67,500	43,070	1,454
Diesel	10^4t	0.67	0.42	0.21	0.23	0.39	**1.92**	72,600	42,652	59,453
Fuel oil	10^4t		0.17	0.09	0.1	0.7	**1.06**	75,500	41,816	33,465
Naphtha	10^4t						**0**	72,600	43,906	0
Lubricating oil	10^4t						**0**	71,900	41,398	0
Paraffine	10^4t						**0**	72,200	39,934	0
Solvent naphtha	10^4t						**0**	72,200	42,945	0
Asphaltum	10^4t						**0**	69,300	38,931	0
Petrol coke	10^4t						**0**	82,900	31,947	0
LPG	10^4t						**0**	61,600	50,179	0
Refinery gas	10^4t					12.2	**12.2**	48,200	46,055	270,822

Fuel types	Unit	Shaanxi	Gansu	Qinghai	Ningxia Hui Autonomous Region	Xinjiang	Subtotal	Fuel emission factor	NCV	CO_2 emission (tCO_2e)
								($kgCO_2$/TJ)	（MJ/t,km^3）	I=F*G*H/100000 (Mass unit)
		A	B	C	D	E	F=A+B+C+D+E	G	H	I=F*G*H/10000 (Volume unit)
Natural gas	10^8m^3	0.87		2.48	0.3	8.54	**12.19**	54,300	38,931	2,576,909
Other oil products	10^4t					0.01	**0.01**	72,200	41,816	302
Other cokeproducts	10^4t						**0**	95,700	28,435	0
Other energy	10^4t ce	1.76	2.68				**4.44**	0	0	0
									Subtotal	**256,755,243**

Table 4-3 Calculation on Simple OM Emission Factor of NWPG in 2010

Total emission amount in NWPG	256,755,243tCO_2
Total power supply in NWPG	260,589,710MWh
Emission factor in NWPG	0.9853 tCO_2/MWh

Data sources: *China Electric Power Yearbook 2011*，*China Energy Statistical Yearbook 2011*
2006 IPCC guideline for national greenhouse gas inventories, volume 2 energy

Table 4-4CO_2Emissions from Fuel-firedPower Plantsof NWPG in 2011

Fuel types	Unit	Shaanxi	Gansu	Qinghai	Ningxia Hui Autonomous Region	Xinjiang	Subtotal	Fuel emission factor	NCV	CO_2 emission (tCO_2e)
								($kgCO_2$/TJ)	（MJ/t,km^3）	I=F*G*H/100000 (Mass unit)
		A	B	C	D	E	F=A+B+C+D+E	G	H	I=F*G*H/10000 (Volume unit)
Raw coal	10^4t	4107.56	3427.4	556.68	5051.73	3358.94	**16502.31**	87,300	20,908	301,211,450
Cleaned coal	10^4t						**0**	87,300	26,344	0
Other washed coal	10^4t	1473.38			42.36	9.62	**1525.36**	87,300	8,363	11,136,499
Briquettes	10^4t						**0**	87,300	20,908	0
Coke	10^4t						**0**	95,700	28,435	0

Fuel types	Unit	Shaanxi	Gansu	Qinghai	Ningxia Hui Autonomous Region	Xinjiang	Subtotal	Fuel emission factor	NCV	CO_2 emission (tCO_2e)
								($kgCO_2$/TJ)	（MJ/t,km^3）	I=F*G*H/100000 (Mass unit)
		A	B	C	D	E	F=A+B+C+D+E	G	H	I=F*G*H/10000 (Volume unit)
Coal gangue	10^4t	251.88	41.53		170.51	69.53	**533.45**	87,300	8,363	3,894,665
Coke oven gas	10^8m^3	6.35	0.66		0.05	1.38	**8.44**	37,300	16,726	526,555
Blast furnace gas	10^8m^3		4.68		0.14	4.47	**9.29**	219,000	3,763	765,586
Converter gas	10^8m^3		1.08			1.05	**2.13**	145,000	7,945	245,381
Other coal gas	10^8m^3						**0**	37,300	5,227	0
Crude oil	10^4t						**0**	71,100	41,816	0
Gasoline	10^4t						**0**	67,500	43,070	0
Diesel	10^4t	0.66	0.47	0.47	0.29	0.74	**2.63**	72,600	42,652	81,439
Fuel oil	10^4t		0.15	0.08	0.47	0.06	**0.76**	75,500	41,816	23,994
Naphtha	10^4t						**0**	72,600	43,906	0
Lubricating oil	10^4t						**0**	71,900	41,398	0
Paraffine	10^4t						**0**	72,200	39,934	0
Solvent naphtha	10^4t						**0**	72,200	42,945	0
Asphaltum	10^4t						**0**	69,300	38,931	0
Petrol coke	10^4t						**0**	82,900	31,947	0
LPG	10^4t						**0**	61,600	50,179	0
Refinery gas	10^4t					7.99	**7.99**	48,200	46,055	177,366
Natural gas	10^8m^3	0.83		4.62	0.77	9.26	**15.48**	54,300	38,931	3,272,400
Other oil products	10^4t						**0**	72,200	41,816	0
Other cokeproducts	10^4t						**0**	95,700	28,435	0
Other energy	10^4t ce	0.56	2.78			6.8	**10.14**	0	0	0

Fuel types	Unit	Shaanxi	Gansu	Qinghai	Ningxia Hui Autonomous Region	Xinjiang	Subtotal	Fuel emission factor	NCV	CO_2 emission (tCO_2e)
								($kgCO_2/TJ$)	（MJ/t,km^3）	I=F*G*H/100000 (Mass unit)
		A	B	C	D	E	F=A+B+ C+D+E	G	H	I=F*G*H/10000 (Volume unit)
									Subtotal	**321,335,334**

Table 4-5 Calculation on Simple OM Emission Factor of NWPG in 2011

Total emission amount in NWPG	321,335,334tCO_2
Total power supply in NWPG	341,716,600MWh
Emission factor in NWPG	0.9404 tCO_2/MWh

Data sources: *China Electric Power Yearbook 2012*, *China Energy Statistical Yearbook 2012*
2006 IPCC guideline for national greenhouse gas inventories, volume 2 energy

Table 4-6CO_2Emissions from Fuel-firedPower Plantsof NWPG in 2012

Fuel types	Unit	Shaanxi	Gansu	Qinghai	Ningxia Hui Autonomous Region	Xinjiang	Subtotal	Fuel emission factor	NCV	CO_2 emission (tCO_2e)
								($kgCO_2/TJ$)	（MJ/t,km^3）	I=F*G*H/100000 (Mass unit)
		A	B	C	D	E	F=A+B+ C+D+E	G	H	I=F*G*H/10000 (Volume unit)
Raw coal	10^4t	4160.44	3445.38	603.47	4626.48	4966.87	**17802.64**	87,300	20,908	324,945,962
Cleaned coal	10^4t						**0**	87,300	26,344	0
Other washed coal	10^4t	1522.62			351.83	8.45	**1882.9**	87,300	8,363	13,746,863
Briquettes	10^4t						**0**	87,300	20,908	0
Coke	10^4t						**0**	95,700	28,435	0
Coal gangue	10^4t	286.59	41.16		100.76	114.88	**543.39**	87,300	8,363	3,967,236
Coke oven gas	10^8m^3	16.57	0.5		1.23	2.64	**20.94**	37,300	16,726	1,306,404
Blast furnace gas	10^8m^3	23.45	3.76		0.65	4.22	**32.08**	219,000	3,763	2,643,703

Fuel types	Unit	Shaanxi	Gansu	Qinghai	Ningxia Hui Autonomous Region	Xinjiang	Subtotal	Fuel emission factor	NCV	CO_2 emission (tCO_2e)
								($kgCO_2/TJ$)	（$MJ/t,km^3$）	I=F*G*H/100000 (Mass unit)
		A	B	C	D	E	F=A+B+C+D+E	G	H	I=F*G*H/10000 (Volume unit)
Converter gas	10^8m^3		1.01			1.77	**2.78**	145,000	7,945	320,263
Other coal gas	10^8m^3						**0**	37,300	5,227	0
Other coke products	10^4t						**0**	95,700	28,435	0
Crude oil	10^4t						**0**	71,100	41,816	0
Gasoline	10^4t						**0**	67,500	43,070	0
kerosene	10^4t						**0**	71,900	43,070	0
Diesel	10^4t	0.45	0.34	0.27	0.19	0.68	**1.93**	72,600	42,652	59,763
Fuel oil	10^4t		0.07	0.07	0.4	0.05	**0.59**	75,500	41,816	18,627
Naphtha	10^4t						**0**	72,600	43,906	0
Lubricating oil	10^4t						**0**	71,900	41,398	0
Paraffine	10^4t						**0**	72,200	39,934	0
Solvent naphtha	10^4t						**0**	72,200	42,945	0
Asphaltum	10^4t						**0**	69,300	38,931	0
Petrol coke	10^4t						**0**	82,900	31,947	0
LPG	10^4t						**0**	61,600	50,179	0
Refinery gas	10^4t		1.58			5.31	**6.89**	48,200	46,055	152,948
Natural gas	10^8m^3	0.94		4.39	0.56	9.02	**14.91**	54,300	38,931	3,151,904
Other oil products	10^4t						**0**	72,200	41,816	0
LNG	10^4t						**0**	54,300	51,434	0
Other energy	10^4t ce	2.03					**2.03**	0	0	0
									Subtotal	350,313,673

Table 4-7 Calculation on Simple OM Emission Factor of NWPG in 2012

Total emission amount in NWPG	350,313,673tCO_2
Total power supply in NWPG	366,981,300MWh
Emission factor in NWPG	0.9546 tCO_2/MWh

Data sources: *China Electric Power Yearbook 2013*, *China Energy Statistical Yearbook 2013*

2006 IPCC guideline for national greenhouse gas inventories, volume 2 energy

Calculated with the data provided in Table 4-1~Table 4-7, the OM emission factor of the NWPG is calculated as 0.9578 tCO_2/MWh.

2. Calculation of Build Margin (*BM*) Emission Factor

The section Baseline emissions factor detailed the calculation of BM emission factor of NWPG, as per *2014 baseline emission factors for regional power grids in China* published by China DNA on 11 May 2015 details as follows:

Sub-step 1: Calculation of the share of CO_2 emissions from solid, liquid and gaseous fuels.

Table 4-8The Proportion of CO_2Emissions of Different Fuel-fired Power Plants in the Total CO_2Emissions

Fuel types	Unit	Shaanxi	Gansu	Qinghai	Ningxia Hui Autonomous Region	Xinjiang	Subtotal	Fuel emission factor	NCV	CO_2 emission (tCO_2e)
								($kgCO_2$/TJ)	（MJ/t,km^3）	I=F*G*H/100000 (Mass unit)
		A	B	C	D	E	F=A+B+C+D+E	G	H	
Raw coal	10^4t	4160.44	3445.38	603.47	4626.48	4966.87	**17802.64**	87,300	20,908	324,945,962
Cleaned coal	10^4t						**0**	87,300	26,344	0
Other washed coal	10^4t	1522.62	0	0	351.83	8.45	**1882.9**	87,300	8,363	13,746,863
Briquettes	10^4t						**0**	87,300	20,908	0
Coal gangue	10^4t	286.59	41.16		100.76	114.88	**543.39**	87,300	8,363	3,967,236
Coke	10^4t						**0**	95,700	28,435	0
Other cokeproducts	10^4t						**0**	95,700	28,435	0

Fuel types	Unit	Shaanxi	Gansu	Qinghai	Ningxia Hui Autonomous Region	Xinjiang	Subtotal	Fuel emission factor	NCV	CO_2 emission (tCO_2e)
								($kgCO_2$/TJ)	（MJ/t,km^3）	I=F*G*H/100000 (Mass unit)
		A	B	C	D	E	F=A+B+C+D+E	G	H	
Total										**342,660,061**
Crude oil	10^4t						**0**	71,100	41,816	0
Gasoline	10^4t						**0**	67,500	43,070	0
Kerosene							**0**	43,070	71,900	0
Diesel	10^4t	0.45	0.34	0.27	0.19	0.68	**1.93**	72,600	42,652	59,763
Fuel oil	10^4t	0	0.07	0.07	0.4	0.05	**0.59**	75,500	41,816	18,627
Petrol coke	10^4t						**0**	82,900	31,947	0
Other oil products	10^4t						**0**	72,200	41,816	0
Total										**78,390**
Natural gas	10^7m^3	9.40	0	43.90	5.60	90.20	**149.1**	54,300	38,931	3,151,904
LNG	10^4t						**0**	54,300	51,434	0
Coke oven gas	10^7m^3	165.70	5.00	0	12.30	26.40	**209.4**	37,300	16,726	1,306,404
Blast furnace gas	10^7m^3	234.50	37.60	0	6.50	42.20	**320.8**	219,000	3,763	2,643,703
Converter gas	10^7m^3	0	10.10	0		17.70	**27.8**	145,000	7,945	320,263
Other coal gas	10^7m^3						**0**	37,300	5,227	0
LPG	10^4t						**0**	61,600	50,179	0
Refinery gas	10^4t	0	1.58	0	0	5.31	**6.89**	48,200	46,055	152,948
Total										**7,575,223**
Other energy	10^4t ce	2.03	0	0	0	0	**2.03**	0	0	0
										350,313,673

Calculated with the data provided in Table A4-8 and equations B.3, B.4 and B.5, $\lambda_{Coal,y}$=97.82%, $\lambda_{Oil,y}$=0.02%, $\lambda_{Gas,y}$=2.16%

Sub-step 2: with weight of the proportion calculated in Step1, Calculated the emission factor of thermal power based on the emission factors of the best efficient and commercial generation technologies as follow:

Table A4-9 CO_2 emission factor for best efficient and commercially available thermal power technologies in China

Thermal Power Technologies	Variable	Electricity supply efficiency (%)	Emission factor of fuel($kgCO_2$)	Emission factor(tCO_2/MWh)
		A	B	C=3.6/A/10,000×B
Coal fired power plants	$EF_{Coal,Adv,y}$	40.03	87,300	0.7851
Oil fired power plants	$EF_{Oil,Adv,y}$	52.9	75,500	0.5138
Gas fired power plants	$EF_{Gas,Adv,y}$	52.9	54,300	0.3695

As per equation:

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

=97.82%×0.7851+0.02%×0.5138+2.16%×0.3695

=0.77606tCO_2e/MWh

Sub-step 3: take the thermal power emission factor calculated in the Step 2 multiplied by the proportion count for 20% of capacity addition of the grid as the Build Margin emission factor ($EG_{grid,\ BM,y}$).

Table A4-10 Installed capacity of the NWPG in 2012

Installed capacity	Shaanxi	Gansu	Qinghai	Ningxia	Xinjiang	Total
Thermal power (MW)	22,270	15,510	2,300	16,400	22,570	79,050
Hydro power (MW)	2,500	7,300	11,010	430	3,850	25,090
Nuclear power (MW)	0	0	0	0	0	0
Wind power and Other (MW)	171	6,350	1,380	2,890	3,100	13,891
Total (MW)	24,941	29,160	14,690	19,720	29,520	118,031
Retired in 2012	0	0	0	0	100	100

Data source: China electric power yearbook 2013.

Table A4-11 Installed capacity of the NWPG in 2011

Installed capacity	Shaanxi	Gansu	Qinghai	Ningxia	Xinjiang	Total
Thermal power (MW)	22,160	15,240	2,300	16,400	16,230	72,330

Hydro power (MW)	2,320	6,550	10,960	430	3,270	23,530
Nuclear power (MW)	0	0	0	0	0	0
Wind power and Other (MW)	120	5,661	958	1,661	1,880	10,280
Total (MW)	24,600	27,451	14,218	18,491	21,380	106,140

Data source: China electric power yearbook 2012.

Table A4-12 Installed capacity of the NWPG in 2010

Installed capacity	Shaanxi	Gansu	Qinghai	Ningxia	Xinjiang	Total
Thermal power (MW)	21,370	13,240	1,930	12,710	11,720	60,970
Hydro power (MW)	2,210	6,110	10,680	430	2,990	22,420
Nuclear power (MW)	0	0	0	0	0	0
Wind power and Other (MW)	0	1390	0	600	1360	3,352
Total (MW)	23,580	20,740	12,610	13,740	16,070	86,742

Data source: China electric power yearbook 2011.

Table A4-13 Calculation of BM emission factor of the NWPG

	Installedcapacityin 2010	Installedcapacityin 2011	Installedcapacityin 2012	Capacityadditionsfrom 2010 to2012[14]	Capacityadditions from 2011 to2012[15]	2010-2012Share in totalcapacityadditions
Unit	MW	MW		MW	MW	
	A	B	C	D	E	F
Thermal power	60,970	72,330	79,050	18,347	6,820	58.14%
Hydro power	22,420	23,530	25,090	2,670	1,560	8.46%
Nuclear power	0	0	0	0	0	0.00%

[14] The data is the newly added installed capacity after taking into consideration of installed capacity, capacity for closing and stopping the unit.
[15] The data is the newly added installed capacity after taking into consideration of installed capacity, capacity for closing and stopping the unit.

Wind power andOther	3,352	10,280	13,891	10,539	3,611	33.40%
Total	86,742	106,140	118,031	31,556	11,991	100.00%
Share in total installed capacity of 2011				26.74%	10.16%	

$EF_{grid,BM,y}$=0.77606*58.14%=0.4512tCO_2/MWh

Table A4-14 Calculation of CM emission factor

	Value	weight	$EF_{grid,CM,y}$
Operating Margin Emission Factor (tCO_2/MWh)	0.9578	0.75	
Build Margin Emission Factor (tCO_2/MWh)	0.4512	0.25	
Combined Margin Emission Factor (tCO_2/MWh)	$EF_{grid,CM,y}$ =0.25* 0.9578+0.75*0.4512		0.57785

Appendix 5. Further background information on monitoring plan

The MONITORING INFORMATION has been finished during the first crediting period, and it is also suitable for the second crediting period. The detail information is as follows:

Key Definitions

- Monitoring: the systematic surveillance of the project's performance by measuring and recording performance-related indicators relevant in the context of GHG emission reductions.
- Verification: the periodic ex-post auditing of monitoring results, the assessment of achieved emission reductions and of the project's continued conformance with all relevant project criteria by a selected Designated Operational Entity.

The CDM QC Team

Prior to the start of the crediting period, a CDM QC team is established and a CDM QC team leader is nominated. The team leader has the overall responsibility for the monitoring system on the project. All other CDM monitoring staffs have clearly defined roles and responsibilities. The CDM QC team leader together with the project developer will manage the training of new staff. The CDM QC team leader ensures that only trained staff is involved in the operation of the monitoring system.

A formal set of monitoring procedures is established prior to the start of the project. These procedures detail the organisation, control and steps required for certain key monitoring system features, including:

a) CDM staff training;
b) CDM data and record keeping arrangements;
c) Data collection, including day-to-day data handling;
d) CDM data quality control and quality assurance;
e) Equipment maintenance;
f) Equipment calibration;
g) Equipment failure.

The CDM QC team leader is responsible for ensuring that the procedures are followed on site and for continuously improving the procedures to ensure a reliable monitoring system is established.

The following table is the description and the scope of these procedures.

Table 5-1 CDM Monitoring System Procedures

Procedure name	Description	Scope
CDM staff training	This procedure outlines the steps to ensure that staff receive adequate training to collect and archive complete and accurate data necessary for CDM monitoring	This procedure should be followed by all staff on site prior to performing any monitoring duties for the CDM project.
CDM data and record keeping arrangements	This procedure provides details of the sites data and record keeping arrangements. The arrangements ensure that complete and accurate	All data and records should be managed following this procedure. All staff is responsible for ensuring that any data or records are dealt

	are retained by the CDM QC team leader within the quality control system. Data and records is stored and archived according to this procedure.	according to this procedure.
Data collection	This procedure outlines the steps to collect the data from the Meter.	The procedure for the data collection of the Meter should be agreed on by local power grid company and the project owner.
CDM data quality control and quality assurance	Data and records is checked prior to being stored and archived. Data from the project is checked to identify possible errors or omissions. The data	All staffs are responsible for ensuring the collection and archiving of complete and accurate data and records.
Meter maintenance	This procedure outlines the steps to provide regular and preventative maintenance to the Meter.	This procedure should be followed by all staff involved in checking and maintaining the on site Meter. The Meter is sealed by the project owner and local power grid company jointly. One party cannot unseal or modify the Meter in the absence of the other party.
Equipment calibration	This procedure details the process of organizing and managing the calibration process. The procedure includes details of how a qualified institute or organization is commissioned to undertake the calibration to the relevant standards.	The calibration of the Meter is conducted by a qualified institute according to the relevant standards. The CDM QC team leader is responsible for organizing the calibration and ensuring that records are retained.
Emergency preparedness for cases where emergencies can cause unintended emissions.	This procedure details the process of data collection in the case a problem occurred to the Meter.	This procedure should be agreed on by the grid company and the project owner.

The Installation of the Meter

Given the emission factor is ex-calculated and according to the Monitoring Methodology ACM0002(Version 16.0), the grid-connected output is therefore defined as the key data to monitor. The power delivered to the grid is monitored by the Meter installed in the substation. The control, operation and maintenance of the Meter installed in substation is implemented by the local power grid company. This meter also measures the quantity of electricity that the project is paid for. As this meter provides the main CDM measurement, it is the key part of the verification process.

Calibration of Meter & Metering

- The Meter shall be jointly inspected and sealed by the project owner and the local power grid company where the project is connected and shall not be unsealed by either party in the absence of other party or its accredited representatives.
- The Meter is given periodical and proper calibration and checking for accuracy. The calibration and metering is carried out by Ningxia Electric Power Measurement Centre,

a qualified institute for measurement.

- The Meter shall be accurate enough so that error resulting from such equipment shall not exceed +0.5% of full-scale rating.
- The electricity delivered to the grid recorded by the Meter alone suffices for the purpose emission reduction verification as long as the error in the Meter is within the permissible limits.
- The Meter installed shall be tested by Ningxia Electric Power Measurement Centre when:
  1) The error in the Meter is out of the permissible limits,
  2) Maintenance of the Meters due to the faults of the Meters' components.

Monitoring

Electricity delivered to the grid is a key target of the monitoring. The surface area at full reservoir level was measured once at the start of the project by the project owner.

Electricity delivered to the grid is monitored through the Meter at the substation (interconnection facility connecting the Meter to the grid). The data can also be monitored and recorded at the on-site control centre of the substation using a computer system.

The process for monitoring the electricity delivered to the grid is detailed in the following procedure.

a) At the end of each month (estimated), the project owner and the local power grid company will take the meter reading and record this figure.
b) The grid company provides the project owner with the amount of electricity delivered to the grid. This will form the electricity supply figure on the purchase invoices;
c) After a cross check with the Meter on the project site, the CDM QC team records the electricity delivered to the grid;

The reading of the Meter is readily accessible for DOE.

Emergency preparedness system

Should any reading of the Meter be inaccurate by more than the allowable error, or otherwise functioned improperly, the electricity delivered to the grid shall be determined by:

1) Day-to-day data handling is done by CDM QC team and any malfunctions of the Meter will be detected immediately. The local power grid company is responsible to repair or replace the malfunctioning Meter within 10 working days.
2) The electricity during the 10 working days is determined as follows: an appropriate and reasonable estimation method will be designed by local power grid company. Evidence will be provided to DOE for the verification to show the estimation is reasonable and conservative.

Quality Control

Day-to-day data handling and monthly power supply data is reviewed, approved and signed off by the CDM QC team leader before it is accepted. This audit will check compliance with operational procedures in this monitoring information and Section B7.2 of the PDD.

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

Data Management System

This provides information on record keeping of the data collected during monitoring. Record keeping is the most important exercise in relation to the monitoring process. Without accurate

and efficient record keeping, project emission reductions cannot be verified. Below follows an outline of how project related records would be managed.

The procedures for tracking information from the primary source to the end-data calculations are in paper document format. If data and information are from the Internet, the website must be provided. Moreover, the credibility and reliability of those data and information from the Internet must be confirmed by CDM consulting organizations, or other qualified entities. It is the responsibility of the project owner to provide additional necessary data and information for validation and verification required by DOE.

Physical documentation such as paper-based maps, diagrams and EIA Report is used together with this monitoring plan. In order to facilitate auditor's reference, monitoring results is indexed. All paper-based information is stored by the CDM QC team of the project owner and kept at least one copy. All the data shall be kept until two years after the end of credit period.

The person who is in charge of the information management system for emissions reduction monitoring must be qualified as a statistician.

The following table below outlines the key documents relevant to monitoring and verification of the emission reductions from the project.

Table 5-2 List of the key documents relevant to monitoring and verification

I.D. No.	Document Title	Main Content	Source
F-1	PDD	PDD, including the electronic spreadsheets and supporting documentation (assumptions, estimations, measurement, etc)	UNFCCC website
F-2	The report on monitoring and checking of electricity supplied to the grid on a monthly basis.	At the end of each month, the project owner and the grid company will take this figure,	The local power grid company
F-3	The purchase invoices	It is made on the basis of the electricity delivered to the grid.	The project owner
F-4	The surface area at full reservoir level	It records the surface area at full reservoir level according to ACM0002(Version 16)	Measured by the CDM QC team
F-5	Monitoring Quality Control and Quality Assurance Report	Equipments and national and industry standards	The CDM QC team
F-6	The report on qualifications of ıe persons responsible for the monitoring and calculation	i.e. the title of a technical post working experience etc.	The CDM QC team
F-7	Record on maintenance and calibration of metering equipment	Reasons for maintenance and calibration sion after maintenance and calibration.	The qualified institute for measurement
F-8	Day-to-day data of the power generation	It records the day-to-day data of the power generation, and is review by the CDM QC team leader.	The CDM QC team
F-9	Record on CO2 emission reduction	Monthly calculation.	The CDM QC team
F-10	Letter of confirmation on F-2 to F-9(except F-4)	Make confirm of monitoring and calculation data and procedure from F-2 to F-9	The CDM QC team

Verification and Monitoring Results

The verification of the monitoring results of the project is a mandatory process required for all CDM projects. The main objective of the verification is to independently verify that the project has achieved the emission reductions as reported and projected in the PDD.

The main tasks for verification of the project are as follows:

- The project owner will facilitate the verification through providing the DOE with all required information, before, during and, in the event of queries, after the verification.
- The project owner will fully cooperate with the DOE and instruct its staff and managers to be available for interviews and respond honestly to all questions from the DOE.
- The DOE must be an Accredited Entity experienced in environmental auditing and verification. The DOE should be accredited by the CDM Executive Board.
- If the project owner deems that requirements of DOE go beyond the scope of verification, they
  should contact the CDM developer, or other qualified entities to determine whether the requirements of DOE are reasonable. If it is considered unreasonable, a written rejection letter should be provided to the DOE with justifiable reasons. If the project owner and the DOE cannot reach an agreement, the matter will be submitted to EB or UNFCCC for arbitration.

  The project owner should designate a person to take charge of the overall monitoring and verification process and act as the focal point for DOE

Appendix 6. Summary of post registration changes

No more information.

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