**PROJECT DESIGN DOCUMENT FORM
FOR SMALL-SCALE CDM PROJECT ACTIVITIES (F-CDM-SSC-PDD)
Version 04.1**

PROJECT DESIGN DOCUMENT (PDD)

Title of the project activity	Ulan Phase II 10MWp Solar PV Project
Version number of the PDD	03
Completion date of the PDD	06/12/2014
Project participant(s)	Ulan Jinfeng New Energy Photovoltaic Power Generation Co., Ltd.(project owner) Carbon Invcap International Trading Co., Ltd. (buyer)
Host Party(ies)	P.R. of China
Sectoral scope(s) and selected methodology(ies)	01 Energy industries (Renewable sources), AMS-I.D. "Grid connected renewable electricity generation"(Version 17.0)
Estimated amount of annual average GHG emission reductions	13,798tCO_2e

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

>>

Ulan Phase II 10MWp Solar PV Project (hereafter referred to as the Project) is located in Keke Town, Ulan County, Haixi Mongol and Tibetan Autonomous Prefecture, Qinghai Province, P. R. of China, invested by Ulan Jinfeng New Energy Photovoltaic Power Generation Co., Ltd.

The purpose of the Project is to install 41,440 pieces of the polycrystalline silicon solar cell modules with unit capacity of 250Wp to generate clean renewable electricity with zero emissions. The actual installed capacity of the Project is 10.36MWp. It is estimated that the feed-in electricity from the Project is approximately 16,103.7MWh per year. The electricity generated by the Project is supplied to Northwest China Power Grid (NWPG).

For the proposed project:

a) The scenario existing prior to the implementation of the proposed project is that the quantity of net electricity generation by the Project will be generated by other grid-connected power plant or provided by newly added power sources in the NWPG.
b) The baseline scenario is the same as the scenario existing prior to the start of implementation of the project activity.

The Project will achieve greenhouse gas (GHG) emission reductions of 13,798tCO_2e annually and the total GHG emission reductions 96,586tCO_2e for the first crediting period.

The Project clearly fits into the development priority of energy in China. The Project will not only supply renewable electricity to grid, but also contribute to sustainable development of the local community and the host country by means of:

- Reducing the emission of other pollutants resulting from the power generation industry in China;
- Helping to stimulate the growth of the solar photovoltaic power industry and, encouraging and promoting the progress of technology advancement and commercial popularization of grid-connected clean renewable energy generation in China;
- Creating local employment opportunities during assembly and installation period of the photovoltaic modules and during the Project construction and operation period;
- Providing long-term working positions during the operation of the Project.

A.2. Location of project activity

A.2.1. Host Party(ies)

>>

P. R. of China

A.2.2. Region/State/Province etc.

>>

Haixi Mongol and Tibetan Autonomous Prefecture, Qinghai Province

A.2.3. City/Town/Community etc.

>>

Keke Town, Ulan County

A.2.4. Physical/ Geographical location

>>

The Project is located in Keke Town, Ulan County, Haixi Mongol and Tibetan Autonomous Prefecture, Qinghai Province, P. R. of China, with central geographical coordinates of east longitude of 98°23′09″ and north latitude of 36°59′11″.

Figure 1 shows the location of the Project.

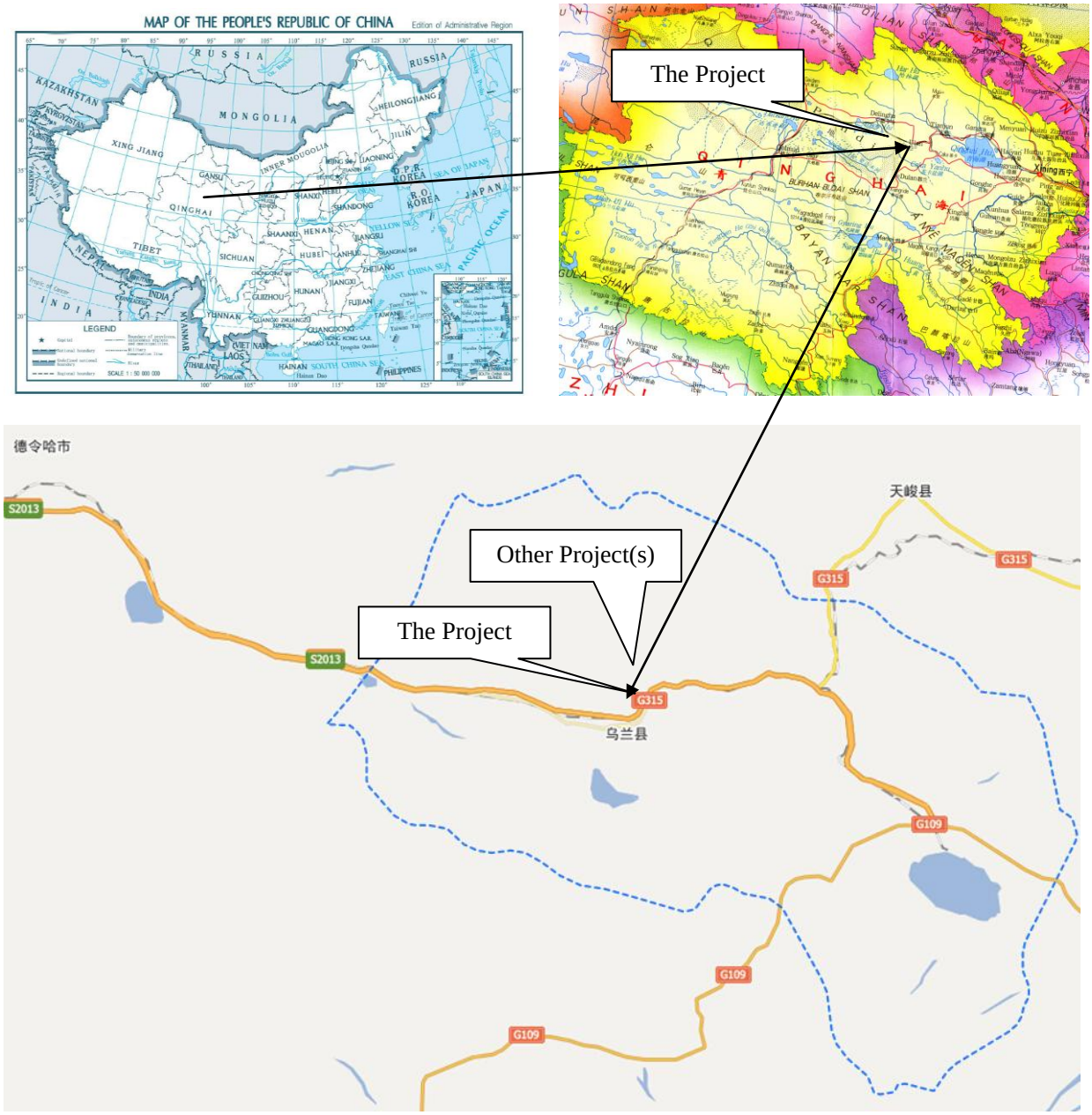


Figure 1. Map shows showing the location of the Project

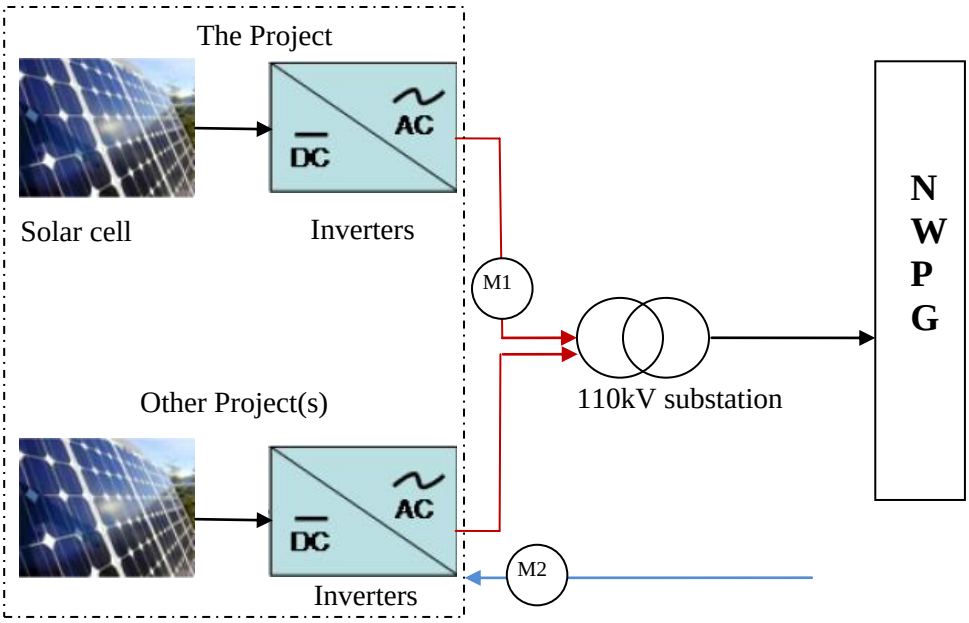
A.3. Technologies and/or measures

>>

The Project is to install 41,440 pieces of the polycrystalline silicon solar cell modules with unit capacity of 250Wp to generate clean renewable electricity with zero emissions. The actual installed capacity of the Project is 10.36MWp. It is estimated that the feed-in electricity from the Project is approximately

16,103.7MWh per year. The operation hours are 1,554.4h and the plant load factor(PLF) is 0.1774[1] based on the FSR of the Project. For the proposed project: a) The scenario existing prior to the implementation of the proposed project is that the quantity of net electricity generation by the Project will be generated by other grid-connected power plant or provided by newly added power sources in the NWPG.b) The baseline scenario is the same as the scenario existing prior to the start of implementation of the project activity.

The electricity generation supplied by the Project will be sent through the 35kV line to the 110kV substation at the project site, and then delivered to the NWPG. The process flow chart of the Project please refers to Figure 2.



Meter	M1	M2
Function	Main meter	Main meter
Accuracy	Not lower than 0.5S	Not lower than 2.0
Bi-direction or not	Yes	No
Purpose	Measured the quantity of the grid electricity export and import of the Project through 35 kV line.	Measured the total quantity of the grid electricity import of the Project and Other Project(s) through auxiliary power line.

Figure 2. The process flow chart of the Project

[1] PLF = The feed-in electricity/(The total installed capacity×8760h)=16,103.7MWh/(10.36MW× 8760h)=0.1774. The PLF was from the FSR of the Project. The FSR is designed by Beijing GrandTrend International Economic and Technical Consulting Co., Ltd. The FSR prepared by the Beijing GrandTrend International Economic and Technical Consulting Co., Ltd. is of high reliability. So, the PLF was determined by a third party contracted by the project participant, which is fully consistent with the *Guidelines for the reporting and validation of plant load factors*(EB48 Annex 11). Therefore, the PLF is reasonable and feasible.

The solar cell modules and inverters of the Project are supplied by domestic manufacturer, thus no technology transfer is involved. The key technical parameters are showed in Table 1 below.

Table 1. The key technical parameters of solar cell modules and inverters[2]

Item		Unit	Project
Solar cell module	Type		JKM250P-60
	Number		41,440
	Rated Max. Power	Wp	250
	Optimum Voltage	V	30.4
	Optimum Current	A	8.23
	Open Circuit voltage	V	37.6
	Short Circuit current	A	8.81
	Lifetime	year	25
Inverter	Type		DS 500 KTL
	Number		20
	Max. Output power	kW	500
	Rated frequency	HZ	50/60

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)
P.R. of China (host)	Ulan Jinfeng New Energy Photovoltaic Power Generation Co., Ltd. (Project owner)	No
United Kingdom of Great Britain and Northern Ireland	Carbon Invcap International Trading Co., Ltd. (buyer)	No

A.5. Public funding of project activity

>>

There is no public funding from Annex I Parties for the Project.

A.6. Debundling for project activity

>>

The Project is not a debundled component of a large scale project activity. The project owner further confirms that they have not registered any small scale CDM project activity or are applying for registration of another small scale CDM project activity within 1 km of the project boundary of the proposed small-scale activity, in the same project category and technology/measure. So the Project is not a debundled component of any large scale CDM activity.

SECTION B. Application of selected approved baseline and monitoring methodology

B.1. Reference of methodology

>>

The following methodology and tool are applied by the proposed project:

[2] The key technical parameters of solar cell modules and inverters were sourced from the specifications of the solar cell modules and inverters.

1. AMS-I.D.: "Grid connected renewable electricity generation" (Version 17.0);
2. "Tool to calculate the emission factor for an electricity system" (Version 04.0);
3. "Guidelines on the demonstration of additionality of small-scale project activities" (Version 09.0).

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

B.2. Project activity eligibility

>>

The Project meets all the applicability conditions of the AMS-I.D. (Version 17.0), as described below:

No.	Applicability	Criteria fulfilled	Explain
1	This methodology comprises renewable energy generation units, such as photovoltaic, hydro, tidal/wave, wind, geothermal and renewable biomass: (a) supplying electricity to a national or a regional grid; or (b) Supplying electricity to an identified consumer facility via national/regional grid through a contractual arrangement such as wheeling.	☒Yes ☐No	The Project is to generate electricity using solar photovoltaic renewable energy generation unit to supply electricity to NWPG which is a regional grid.
2	Illustration of respective situations under which each of the methodology (i.e. AMS-I.D, AMS-I.F and AMS-I.A) applies is included in Table 2 of the methodology.	☒Yes ☐No	The Project type in compliance with the first type: Project supplies electricity to a national/regional grid. It applies AMS-I.D.
3	This methodology is applicable to project activities that: (a) Install a new power plant at a site where there was no renewable energy power plant operating 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).	☒Yes ☐No	The Project is in compliance with (a) install a new power plant at a site where there was no renewable energy power plant operating prior to the implementation of the project activity (Greenfield plant).
4	Hydro power plants with reservoirs that satisfy at least one of the conditions presented in the methodology are eligible to apply this methodology.	N/A	The Project is a new grid connected renewable electricity generation project utilizing solar power. It does not apply to this paragraph.
5	If the new unit has both renewable and nonrenewable	N/A	The Project is a new renewable energy project activity with actual output capacity of 10.36MW

	components (e.g. a wind/diesel unit), the eligibility limit of 15 MW for a small-scale CDM project activity applies only to the renewable component. If the new unit co-fires fossil fuel, the capacity of the entire unit shall not exceed the limit of 15 MW.		without non renewable components, which is within eligibility limit of 15MW for a small-scale CDM project activity and will remain, for every year during the crediting period, within the limits of the type of project activity.
6	Combined heat and power (co-generation) systems are not eligible under this category.	N/A	The Project is the solar based power generation. It does not apply to this paragraph.
7	In the case of project activities that involve the addition of renewable energy generation units at an existing renewable power generation facility, the added capacity of the units added by the project should be lower than 15 MW and should be physically distinct from the existing units.	N/A	The Project is a new grid connected renewable electricity generation project utilizing solar power. It does not apply to this paragraph.
8	In the case of retrofit or replacement, to qualify as a small-scale project, the total output of the retrofitted or replacement unit shall not exceed the limit of 15 MW.	N/A	The Project is a new grid connected renewable electricity generation project utilizing solar power. It does not apply to this paragraph.

Therefore, the Project meets the applicability conditions of AMS-I.D (Version 17.0).

B.3. Project boundary

>>

As defined in methodology AMS-I.D. (Version 17.0), the spatial extent of the project boundary includes the project power plant and all power plants connected physically to the electricity system that the project power plant is connected to. Electricity generation supplied by the Project will be delivered to the NWPG.

According to the latest guideline[3] issued by the China DNA on 17/09/2013, the boundary of the NWPG is composed of Shaanxi Power Grid, Gansu Power Grid, Qinghai Power Grid, Ningxia Power Grid and Xinjiang Power Grid. Therefore, the spatial extent of the project boundary also includes all the power plants physically connected into the NWPG.

Emission sources included in or excluded from the project boundary are provided in the following table.

	sources	**gas**	**Included?**	**Justification/explanation**
Baseline	Electricity generation of NWPG	CO_2	included	Main emission source
		CH_4	excluded	Excluded for simplification.
		N_2O	excluded	Excluded for simplification.
Project activity	Project emission	CO_2	excluded	The Project use solar energy to generate electricity with no CO_2 discharge.
		CH_4	excluded	The Project use solar energy to generate

[3] *2013 baseline emission factors for regional power grids in China*, issued by China DNA (http://cdm.ccchina.gov.cn/Detail.aspx?newsId=41387&TId=19)

				electricity with no CH_4 discharge.
		N_2O	excluded	The Project use solar energy to generate electricity with no N_2O discharge.

Below is a flow diagram of the project boundary.

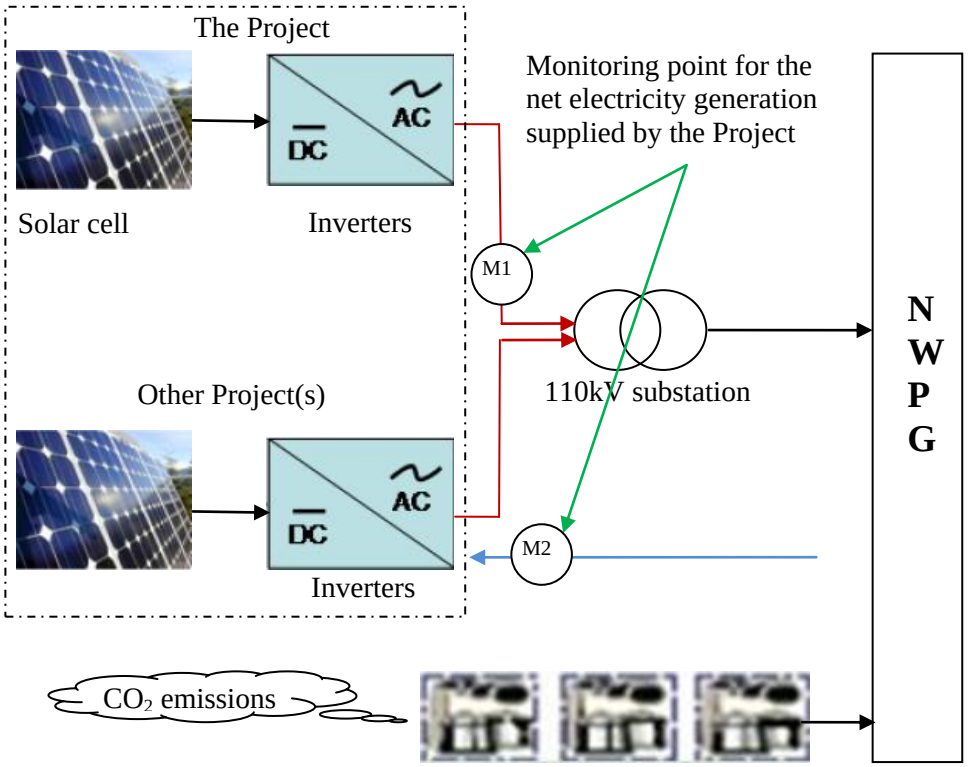


Figure 3. Boundary of the Project

B.4. Establishment and description of baseline scenario

>>

The baseline of the Project is determined as per the methodology AMS-I.D. (Version 17.0) in the Appendix B of *the Simplified Modalities and Procedures for Small-scale CDM Project Activities*. According to the Article 10 of the methodology AMS-I.D. (Version 17.0). The baseline scenario of the Project is identified as follows:

The baseline scenario is that the 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 into the grid.

The selected methodology prescribes the baseline scenario, thus no further analysis is required.

The Project is the installation of a new grid-connected renewable solar power plant that connects with and delivers electricity to the NWPG. Thus, the baseline scenario of the Project is the provision of equivalent amount of electricity by the NWPG. The GHG emission reduction as a result of the project activity will be calculated based on EF_{OM} and EF_{BM} of the NWPG and the amount of annual feed-in electricity

supplied by the Project. Please refer to Annex 4 for the parameters used for calculating the baseline emissions.

B.5. Demonstration of additionality

>>

The milestones are listed in Table 2 to illustrate the timeline of the Project.

Table 2. Timeline and relevant evidences of the Project

Milestone Date	Event	Source
04/2013	The compilation of the FSR of the Project was completed with carbon revenue consideration.	The FSR of the Project
04/2013	The compilation of the EIA of the Project was completed	The EIA of the Project
22/04/2013	The EIA Form of the Project was approved by Haixi Environmental Protection Agency(EPA)	XHZ[2013]121
28/04/2013	The Project was approved by Qinghai Development and Reform Commission	QFGNY[2013]517
15/05/2013	The project owner decided to invest the project with carbon revenue consideration.	Decision Meeting Minutes to develop the project with Carbon Revenue
17/07/2013 (The starting date of the Project)	The Engineering, Procurement and Construction (EPC) contract (except for solar PV cell modules)was signed.	The EPC contract
18/07/2013	The construction of the Project commenced.	Construction Commencement Order
20/12/2013	The operation of the Project was started.	Project Operation Logbook
31/12/2013	The draft PDD and passport were submitted to GS firstly for a Pre-feasibility Assessment.	The confirmation Email from GS
07/01/2014	The Stakeholder Feedback Round of the Project was kicked-off.	Email
24/10/2014	The Project requested for the GS registration.	Email

Guidelines on the demonstration of additionality of small-scale project activities (Version 09.0) is followed to determine the Project's additionality.

According to *Guidelines on the demonstration of additionality of small-scale project activities* (Version 09.0), the grid-connected renewable electricity generation project of installed capacity up to 15 MW with Solar technologies (photovoltaic and solar thermal electricity generation) are automatically defined as additional without further documentation of barriers.

As the Project is a grid-connected solar PV electricity generation project with an installed capacity less than 15MW, it is defined as additional.

B.6. Emission reductions

B.6.1. Explanation of methodological choices

>>

This section includes the following parts:

Calculate the project GHG emissions;

Calculate the baseline GHG emissions;

Calculate the project leakage;
Calculate the emission reductions.

I. Calculate the project GHG emissions

The Project is a grid-connected solar PV electricity generation project and there is no on-site consumption of fossil fuels due to the Project, according to AMS-I.D. (Version 17.0), there is no CO_2 emission from the Project. So the PE_y = 0.

II. Calculate baseline GHG emissions

The baseline emissions are the product of electrical energy baseline $EG_{BL,y}$ expressed in MWh of electricity produced by the renewable generating unit multiplied by the grid emission factor.

$$BE_y = EG_{BL,y} * EF_{CO_2,grid,y} \quad (1)$$

Where

BE_y Baseline emission in year y (tCO_2/y);

$EG_{BL,y}$ Quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year *y* (MWh);

$EF_{CO2,grid,y}$ CO_2 emission factor of the grid in year *y* (t CO_2/MWh).

For the Project,

$$EG_{BL,y} = EG_{facility,y} \quad (2)$$

$EG_{facility,y}$ Quantity of net electricity generation supplied to the grid in year y. The net electricity generation supplied to the grid is the difference between the measured quantities of the grid electricity export and import (MWh).

Paragraph 12 in the methodology gives two methods of calculating emission factor in a transparent and conservative manner and method (a), i.e. "A combined margin (*CM*), consisting of the combination of operating margin (*OM*) and build margin (*BM*) according to the procedures prescribed in the *Tool to calculate the emission factor for an electricity system*" is chosen for the proposed project. So,

$$EF_{CO2,grid,y} = EF_{grid,CM,y} \quad (3)$$

$EF_{grid,CM,y}$ Combined margin CO_2 emission factor for the project electricity system in year *y*.

So

$$BE_y = EG_{facility,y} \times EF_{grid,CM,y} \quad (4)$$

Calculate the baseline emission factor

As per the methodology AMS-I.D (Version 17.0), *Tool to calculate the emission factor for an electricity system* (Version 04.0) is applied to calculate the baseline emission factor.

According to the methodological tool, the baseline emission factor is calculated in the following six steps:

STEP 1. Identify the relevant electricity systems

The electricity generated by the Project will be supplied to the NWPG. In the absence of the Project activity, both the existing power plants and the power plants to be built in the foreseeable future within the NWPG would supply electricity comparable to that supplied by the Project. As per *2013 baseline*

emission factors for regional power grids in China published by China DNA on 17/09/2013, the boundary of the NWPG is composed of Shaanxi Power Grid, Gansu Power Grid, Qinghai Power Grid, Ningxia Power Grid and Xinjiang Power Grid.

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

The 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.
The Option I was selected for the Project.

STEP 3. Select a method to determine the Operating Margin (OM)

The *Tool to calculate the emission factor for an electricity system* (Version 04.0) offers four options for the calculation of the Operating Margin emission factor(s) ($EF_{grid,OM,y}$). Low-cost/must run resources[4] constitute less than 50% of total amount of grid generating output from 2007 to 2011 in NWPG[5]. In line with *2013 baseline emission factors for regional power grids in China* issued by China DNA on 17/09/2013, Method (a) Simple OM was thus selected.

According to the methodological tool, following options were selected:

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.

STEP 4. Calculate the Operating Margin emission factor according to the selected method

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 power plants serving NWPG, not including low-cost/must-run power/units. The *Tool to calculate the emission factor for an electricity system* (Version 04.0) offers two options for the calculating of the Simple OM.

- Based on data of net electricity generation and CO_2 emission factor of each power plant/unit[6] (Option A), or
- 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).

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

[4] Low-cost/must-run resources are defined as power plants with low marginal generation costs or power plants that are dispatched independently of the daily or seasonal load of the grid. They typically include hydro, geothermal, wind, low-cost biomass, nuclear and solar generation. If coal is obviously used as must-run, it should also be included in this list, i.e. excluded from the set of plants.

[5] 22.32%, 21.82%, 24.40%, 24.00% and 21.49% from 2007 to 2011 respectively.

[6] Power units should be considered if some of the power units at the site of the power plant are low-cost/must-run units and some are not. Power plants can be considered if all power units at the site of the power plant belong to the group of low-cost/must-run units or if all power units at the site of the power plant do not belong to the group of low-cost/must-run units.

(c) Off-grid power plants are not included in the calculation (i.e., if Option I has been chosen in Step 2).

Option A should be preferred and must be used if fuel consumption data is available for each power plant/unit. As the fuel consumption data for each power plant/unit is not available in China, Option A is not applicable. Total net electricity generation of all power plants serving NWPG and the fuel types and total fuel consumption of NWPG are available from *China electric power yearbook* and *China energy statistical yearbook*, and the following conditions can be satisfied:
(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).
So, the Project uses Option B for calculating the simple OM emission factor as follows:

$$EF_{grid,OMsimple,y} = \frac{\sum_i (FC_{i,y} \times NCV_{i,y} \times EF_{CO2,i,y})}{EG_y} \quad (5)$$

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 NWPG 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 supplied to the grid by all power sources serving NWPG , not including low-cost/must-run power plants/units, in year *y* (MWh);

i All fuel types combusted in power sources in NWPG in year y;

y Because the Project is a newly built solar PV project, the three most recent years for which data is available at the time of submission of the CDM-PDD to the DOE for validation (ex-ante option).

$$EG_y = GEN_y \times (1 - AER_y) \quad (6)$$

Where:

GEN_y electricity generated by all power sources serving NWPG , not including low-cost/must-run power plants/units, in year *y* (MWh);

AER_y the average auxiliary electricity consumption rate(%) of all power sources serving NWPG , not including low-cost/must-run power plants/units, in year y.

According to *2013 baseline emission factors for regional power grids in China*, the Simple Operating Margin CO_2 emission factor ($EF_{grid,OMsimple,y}$) of NWPG is 0.9720 tCO_2/MWh (see Appendix 4 for details).

STEP 5. Identify the Build Margin Emission Factor

In terms of vintage of data, project participants chose Option 1:

Option 1: For the first crediting period, calculate the Build Margin emission factor ex-ante based on the most recent information available on units already built for sample group m at the time of CDM-PDD submission to the DOE for validation. For the second crediting period, the Build Margin emission factor should be updated based on the most recent information available on units already built at the time of submission of the request for renewal of the crediting period to the DOE. For the third crediting period, the Build Margin emission factor calculated for the second crediting period should be used. This option

does not require monitoring the emission factor during the crediting period.

Capacity additions from retrofits of power plants should not be included in the calculation of the build margin emission factor.

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 ($SET_{5-units}$) 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 ($AEG_{SET \geq 20\%}$, in MWh);
(c) From $SET_{5-units}$ and $SET_{\geq 20\%}$ select the set of power units that comprises the larger annual electricity generation (SET_{sample});

Identify the date when the power units in SET_{sample} started to supply electricity to the grid. If none of the power units in SET_{sample} started to supply electricity to the grid more than 10 years ago, then use SET_{sample} to calculate the build margin. In this case, ignore steps (d), (e) and (f).

However, under the current circumstances in China, the power plants consider the Build Margin data as important business data and will not have them published. Therefore, it is difficult to obtain the data of five power plants that have been put into operation most recently or the newly built power plant capacity additions in the electricity system that comprise 20% of the system generation. In allusion to the situation, the CDM EB accepts the following deviation in the application of the methodology[7].

1) Use of capacity additions during the last 1~3 years for estimating the Build Margin emission factor for grid electricity.
2) Use of weights estimated using installed capacity in place of annual electricity generation, being approximately conservative.

And it is suggested to use the efficiency level of the best technology commercially available in the provincial/regional or national grid of China, as a conservative proxy.

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

$$EF_{grid,BM,y} = \frac{\sum_m EG_{m,y} \times EF_{EL,m,y}}{\sum_m EG_{m,y}} \quad (7)$$

Where

[7] EB guidance for "Request for guidance: Application of AM0005 and AMS-ID in China, 07/10/2005": Request for clarification on use of approved methodology AM0005 for several projects in China. http://cdm.unfccc.int/UserManagement/FileStorage/6POIAMGYOEDOTKW25TA20EHEKPR4DM

$EF_{grid,BM,y}$ Build Margin CO_2 emission factor in year y (tCO_2/MWh);

$EG_{m,y}$ Net quantity of electricity generated and supplied 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 power generation data is available.

As per the methodology deviation, China DNA published the BM calculation method as follow:

Because current statistics data can not separate the installed capacity of coal, oil and gas fueled power generation, the method adopted for BM calculation is as follow:

Firstly make use of the latest energy balance data to calculate all sorts of emission scale in total emission from coal, oil and gas fueled power generation; then based on the emission factor under the business best technology, calculated the fueled power emission factor of the grid; last multiply the fuelled power emission factor and fuelled power proportion of the total power, it's the BM of the grid.

Detailed step and formula as follow:

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

$$\lambda_{Coal,y} = \frac{\sum_{i \in COAL, j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,j,y}}{\sum_{i,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,j,y}} \quad (8)$$

$$\lambda_{Oil,y} = \frac{\sum_{i \in OIL, j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,j,y}}{\sum_{i,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,j,y}} \quad (9)$$

$$\lambda_{Gas,y} = \frac{\sum_{i \in GAS, j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,j,y}}{\sum_{i,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,j,y}} \quad (10)$$

Where

$F_{i,j,y}$ The consumption of fuel i in province j in year y (unit of mass or volume, tonne for solid and liquid fuel ,m^3 for gaseous fuel);

$NCV_{i,y}$ Net calorific value (energy content) of fuel *i* in year *y* (GJ/t for solid and liquid fuel, GJ/m^3 for gaseous fuel);

$EF_{CO_2,i,j,y}$ CO_2 emission factor of fuel type *i* in year y (tCO_2/GJ).

Coal, Oil and Gas is the foot-index for solid fuels, liquid fuels and gaseous fuels.

Sub-step 2. Calculation of the emission factor of thermal power

$$EF_{Thermal,y} = \lambda_{Coal,y} \times EF_{Coal,Adv,y} + \lambda_{Oil,y} \times EF_{Oil,Adv,y} + \lambda_{Gas,y} \times EF_{Gas,Adv,y} \quad (11)$$

$EF_{Coal,Adv,y}$, $EF_{Oil,Adv,y}$ and $EF_{Gas,Adv,y}$ are emission factors of the best efficiency commercial available coal-fired, oil-fired and gas-fired power generation technologies(see Appendix 4 for details).

Sub-step 3. Calculation of the BM in the Grid

$$EF_{grid,BM,y} = \frac{\Delta CAP_{Thermal}}{\Delta CAP_{Total}} \times EF_{Thermal,y} = \frac{CAP_{Thermal,y} - CAP_{Thermal,y-N}}{CAP_{Total,y} - CAP_{Total,y-N}} \times EF_{Thermal,y} \quad (12)$$

$CAP_{Total,y}$ is the total installed capacity in NWPG in year y, $CAP_{Thermal,y}$ is the total installed capacity of thermal power in NWPG in year y. N is the shortest vintage that the added installed capacity nearest to 20% of total installed capacity in NWPG .

Based on *2013 baseline emission factors for regional power grids in China* published by China DNA, the Build Margin Emission Factor ($EF_{grid,BM,y}$) of NWPG could be obtained to be 0.5115 tCO_2/MWh.

STEP 6. Calculate the Combined Margin emissions factor

The Combined Margin emissions factor is calculated as follows:

$$EF_{grid,CM,y} = EF_{grid,OM,y} \times W_{OM} + EF_{grid,BM,y} \times W_{BM} \quad (13)$$

Where

$EF_{grid,CM,y}$ Combined Margin CO_2 emission factor in year y (tCO_2/MWh);

W_{OM} Weighting of Operating Margin emissions factor (%);

W_{BM} Weighting of Build Margin emissions factor (%).

According to *Tool to calculate the emission factor for an electricity system* (Version 04.0), for solar power generation project activities: W_{OM} = 0.75 and W_{BM} = 0.25 (owing to their intermittent and non-dispatchable nature) for the first crediting period and for subsequent crediting periods, so:

$$EF_{grid,CM,y} = 0.9720 \times 0.75 + 0.5115 \times 0.25 = 0.856875 tCO_2/MWh$$

III. Calculate Leakage GHG emissions

According to AMS-I.D. (Version 17.0), if the energy generating equipment is transferred from another activity, leakage is to be considered, the equipment of the project activity are all purchased from manufactures, so the leakage is neglected. So the LE_y =0tCO_2e.

IV. Calculate the emission reductions

The emission reduction calculation formula is as follows:

$$ER_y = BE_y - PE_y - LE_y \quad (14)$$

B.6.2. Data and parameters fixed ex ante

Data / Parameter	$FC_{i,y}$
Unit	Mass or volume unit
Description	Amount of fuel type *i* consumed in the NWPG in year y.
Source of data	*China energy statistical yearbooks,2010-2012*
Value(s) applied	See Appendix 4 for details
Choice of data or Measurement methods and procedures	The data obtained from the official publication *China energy statistical yearbook*, satisfying the requirement of *Tool to calculate the emission factor for an electricity system* (Version 04.0.)
Purpose of data	Calculation of baseline emissions
Additional comment	The three most recent years for which data is available at the time of submission of the CDM-PDD to the DOE for validation

Data / Parameter	$NCV_{i,y}$
Unit	GJ/mass or volume unit
Description	Net calorific value (energy content) of fuel type i in year y.
Source of data	*China energy statistical yearbook, 2010-2012*
Value(s) applied	See Appendix 4 for details
Choice of data or Measurement methods and procedures	The data obtained from the official publication *China energy statistical yearbook*, satisfying the requirement of *Tool to calculate the emission factor for an electricity system* (Version 04.0.)
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data / Parameter	$EF_{CO_2,i,y}$
Unit	tCO_2/GJ
Description	CO_2 emission factor of fuel type *i* in year y.
Source of data	*2006 IPCC guidelines on national GHG inventories, Volume 2 Energy, Chapter 1, table1.3-table 1.4*
Value(s) applied	See Appendix 4 for details
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 *Tool to calculate the emission factor for an electricity system* (Version 04.0.)
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data / Parameter	GEN_y
Unit	MWh
Description	Electricity generated by all power sources serving NWPG in year *y*.
Source of data	*China electric power yearbook, 2010-2012*
Value(s) applied	See Appendix 4 for details
Choice of data or Measurement methods and procedures	The data obtained from the official publication *China electric power yearbook*, satisfying the requirement of *Tool to calculate the emission factor for an electricity system* (Version 04.0.)
Purpose of data	Calculation of baseline emissions
Additional comment	The three most recent years for which data is available at the time of submission of the CDM-PDD to the DOE for validation

Data / Parameter	AER_y
Unit	%
Description	Auxiliary electricity consumption rate of all power sources serving NWPG.
Source of data	*China electric power yearbook, 2010-2012*
Value(s) applied	See Appendix 4 for details
Choice of data or Measurement methods and procedures	The data obtained from the official publication *China electric power yearbook*, satisfying the requirement of *Tool to calculate the emission factor for an electricity system* (Version 04.0.)
Purpose of data	Calculation of baseline emissions
Additional comment	The three most recent years for which data is available at the time of submission of the CDM-PDD to the DOE for validation

Data / Parameter	$F_{i,j,y}$
Unit	Mass or volume unit
Description	Consumption of fuel *i* in province *j* in year *y*.
Source of data	*China energy statistical yearbook, 2010-2012*
Value(s) applied	See Appendix 4 for details
Choice of data or Measurement methods and procedures	The data obtained from the official publication *China energy statistical yearbook*, satisfying the requirement of *Tool to calculate the emission factor for an electricity system* (Version 04.0.)
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data / Parameter	$EF_{Coal,Adv,y}$
Unit	tCO_2/MWh
Description	The emission factor of the best efficiency commercial available coal-fired power generation technologies
Source of data	*2013 baseline emission factors for regional power grids in China* published by China DNA
Value(s) applied	0.7889
Choice of data or Measurement methods and procedures	The data obtained from the China DNA, satisfying the requirement of *Tool to calculate the emission factor for an electricity system* (Version 04.0.)
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data / Parameter	$EF_{Oil,Adv,y}$
Unit	tCO_2/MWh
Description	The emission factor of the best efficiency commercial available oil-fired power generation technologies
Source of data	*2013 baseline emission factors for regional power grids in China* published by China DNA
Value(s) applied	0.5177
Choice of data or Measurement methods and procedures	The data obtained from the China DNA, satisfying the requirement of *Tool to calculate the emission factor for an electricity system* (Version 04.0.)
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data / Parameter	$EF_{Gas,Adv,y}$
Unit	tCO_2/MWh
Description	The emission factor of the best efficiency commercial available gas-fired power generation technologies.
Source of data	*2013 baseline emission factors for regional power grids in China* published by China DNA
Value(s) applied	0.3723
Choice of data or Measurement methods and procedures	The data obtained from the China DNA, satisfying the requirement of *Tool to calculate the emission factor for an electricity system* (Version 04.0.)
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data / Parameter	$CAP_{Total,y}$
Unit	MW
Description	Total installed capacity in NWPG in year y
Source of data	*China electric power yearbook, 2010-2012*
Value(s) applied	See Appendix 4 for details
Choice of data or Measurement methods and procedures	The data obtained from the official publication *China electric power yearbook*, satisfying the requirement of *Tool to calculate the emission factor for an electricity system* (Version 04.0.)
Purpose of data	Calculation of baseline emissions
Additional comment	For calculating the added capacity comprised 20% of NWPG.

Data / Parameter	$CAP_{Thermal,y}$
Unit	MW
Description	Total installed capacity of thermal power in NWPG in year y
Source of data	*China electric power yearbook, 2010-2012*
Value(s) applied	See Appendix 4 for details
Choice of data or Measurement methods and procedures	The data obtained from the official publication *China electric power yearbook*, satisfying the requirement of *Tool to calculate the emission factor for an electricity system* (Version 04.0.)
Purpose of data	Calculation of baseline emissions
Additional comment	-

B.6.3. Ex-ante calculation of emission reductions

>>

I. Calculate the project GHG emissions

The Project is a grid-connected solar PV electricity generation project and there is no on-site consumption of fossil fuels due to the Project, according to AMS-I.D. (Version 17.0), there is no CO_2 emission from the Project. So the PE_y = 0.

II. Calculate the baseline GHG emissions

According to the FSR of the Project, the annual quantity of net electricity generation supplied to the grid is estimated to be 16,103.7MWh; and according to the methodological tool, the combined baseline emission factor $EF_{grid,CM,y}$ is 0.856875tCO_2/MWh , so the annual baseline emission of the Project is:

BE_y = 16,103.7MWh ×0.856875tCO_2/MWh=13,798tCO_2.

III. Estimate project leakage emissions:

According to AMS-I.D. (Version 17.0), if the energy generating equipment is transferred from another activity, leakage is to be considered, the equipment of the project activity are all purchased from manufactures, so the leakage is neglected, the LE_y =0tCO_2e.

IV. Estimate emission reductions

As per formula in section B.6.1, the annual emission reductions of the Project:

$ER_y = BE_y - PE_y - LE_y$ =13,798-0-0=13,798tCO_2e.

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

Year	Baseline emissions (tCO_2 e)	Project emissions (tCO_2 e)	Leakage (tCO_2 e)	Emission reductions (tCO_2 e)
20/12/2013-19/12/2013	13,798	0	0	13,798
20/12/2014-19/12/2014	13,798	0	0	13,798
20/12/2015-19/12/2015	13,798	0	0	13,798
20/12/2016-19/12/2016	13,798	0	0	13,798
20/12/2017-19/12/2017	13,798	0	0	13,798
20/12/2018-19/12/2018	13,798	0	0	13,798
20/12/2019-19/12/2019	13,798	0	0	13,798
Total	**96,586**	**0**	**0**	**96,586**
Total number of crediting years	7			
Annual average over the crediting period	**13,798**	**0**	**0**	**13,798**

B.7. Monitoring plan

B.7.1. Data and parameters to be monitored

Data / Parameter	$EG_{facility,y}$
Unit	MWh/y
Description	Quantity of net electricity generation supplied to the grid in year y. The net electricity generation supplied to the grid is the difference between the measured quantities of the grid electricity export and import.
Source of data	The value in the PDD is from the FSR, the real value is from electricity meter's readings.
Value(s) applied	16,103.7
Measurement methods and procedures	Directly measured by electricity meters M1 at the 35 kV line of the Project and electricity meter M2 at the auxiliary power line. The following parameters shall be measured: (i) The quantity of the grid electricity export(measured by M1); and (ii) The quantity of the grid electricity import(measured by M1 and M2[8]). The accuracy of electricity meters M1 is not lower than 0.5S and the accuracy of electricity meters M2 is not lower than 2.0.
Monitoring frequency	Continuously measured and at least monthly recorded.
QA/QC procedures	Measurement results will be cross checked by the records for sold/purchased electricity; the electricity meters will be calibrated periodically, as the description in B.7.3.
Purpose of data	Calculation of baseline emissions
Additional comment	-

B.7.2. Sampling plan

>>

Not applicable.

B.7.3. Other elements of monitoring plan

>>

Since the baseline emission factor of the Project is determined ex-ante, quantity of net electricity generation supplied to the grid should be the key parameters monitored. The monitoring plan is drafted to focus on monitoring the quantity of net electricity generation supplied to the grid.

Management Structure of the Monitoring Plan

For details regarding the management structure of the monitoring plan, please refer to Figure 4.

[8] The meters M2 recorded the total quantity of the grid electricity import by the Project and other Project(s) through auxiliary power line, for conservativeness, the total quantity of the grid electricity import was deducted for calculating the net electricity generation supplied to grid by the Project.

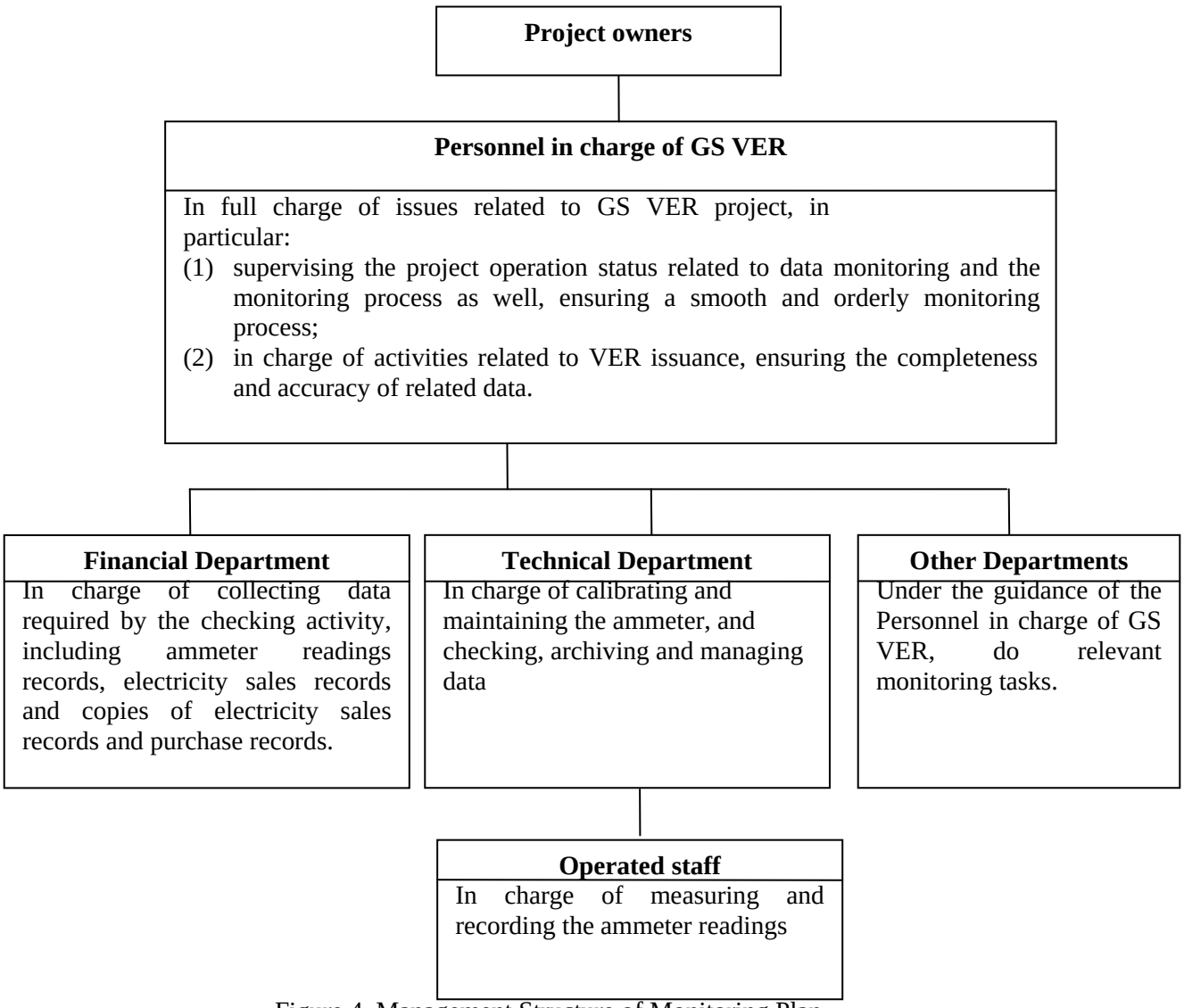
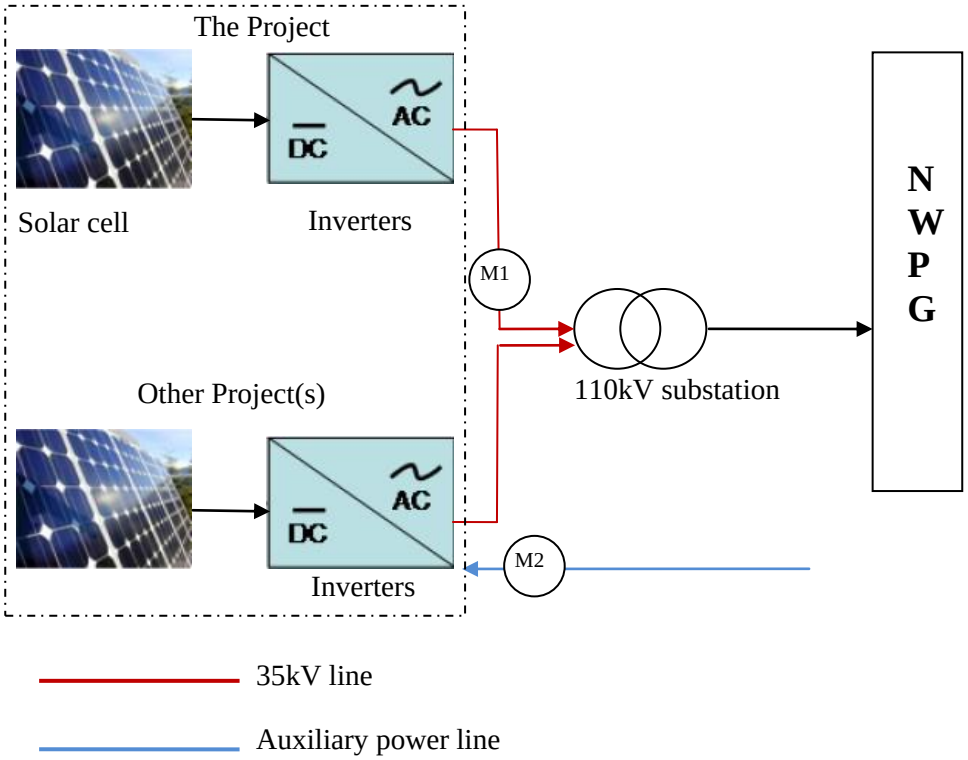


Figure 4. Management Structure of Monitoring Plan

Monitoring Measures

The quantity of net electricity generation supplied to the grid will be measured by the electricity meter M1 installed at the 35 kV line of the Project and electricity meter M2 installed at the auxiliary power line, please refer to figure below. The quantity of net electricity generation supplied to the grid will be double checked by the records of electricity purchase and sale.



Meter	M1	M2
Function	Main meter	Main meter
Accuracy	Not lower than 0.5S	Not lower than 2.0
Bi-direction or not	Yes	No
Purpose	Measured the quantity of the grid electricity export and import of the Project through 35 kV line.	Measured the total quantity of the grid electricity import of the Project and Other Project(s) through auxiliary power line.

Installation of monitoring devices

The electricity meters of the Project will be installed according to the Technical Administrative Code of Electric Energy Metering (DL/T 448-2000). Before the operation of the Project, the project owner and the local grid company will check and accept those electricity meters as per the Technical Administrative Code of Electric Energy Metering.

Calibration of Meters & Metering

The regular calibration and on-site verification should be implemented as per the related standards and rules to ensure the accuracy of electricity meters. Electricity meters should be calibrated annually. After calibration, the electricity meters must be sealed. When the measurement error of electricity meter is larger than the permitted error or the electricity meter must be repaired because of a malfunction, the electricity will be determined as per the Power Purchase Agreement signed between the project owner and the local grid company. For calibration entity, it shall be conducted by a qualified metrical third party organization co-authorized by both the project owner and the grid company.

Emergency Treatment

For M1:
The records of electricity sales and purchase will be used to cross-check the readings of the meter M1 as long as the error in the meter M1 is within the permissible limits. However, when the meter has the malfunction or the breakdown, the net electricity supplied to the grid will be determined according to the stipulation of the PPA, the emission reductions during this period will be considered as $0tCO_2e$.

For M2:
As per the appendix I of Project standard, if M2 is functioned improperly or out of order, the imported electricity will be estimated by assuming that equipment consuming the imported electricity operated at maximum capacity for the full period of the missing data, and the estimate shall include an addition of 10% to account for transmission and distribution losses.

Quality Assurance and Quality Control

The quality assurance and quality control procedures consist of data recording; maintaining and archiving. The quality assurance and quality control procedures should be improved according to the real operating conditions during the project operation period.

Data Management System

Specific staff will be appointed by the project owner to take on the overall responsibility for monitoring greenhouse gas emission reductions and keeping all the data collected as part of monitoring. Data shall be kept and archived electronically for two years after the end of the last crediting period or the last issuance of VERs, whichever occurs later.

SECTION C. Duration and crediting period
C.1. Duration of project activity
C.1.1. Start date of project activity
>>
17/07/2013 (The signing date of the Engineering, Procurement and Construction (EPC) contract(except for solar PV cell modules), which is the earliest of the dates at which the implementation or construction or real action of the project begins)

C.1.2. Expected operational lifetime of project activity
>>
25 years and 0 month (not including the construction period)

C.2. Crediting period of project activity
C.2.1. Type of crediting period
>>
The Project chose the renewable crediting period (7 years×3), this is the first crediting period.

C.2.2. Start date of crediting period
>>
20/12/2013(The date of start of operation, which is later than the date of a maximum of two years prior to Gold Standard registration of the Project)

C.2.3. Length of crediting period
>>
7years and 0 month

SECTION D. Environmental impacts
D.1. Analysis of environmental impacts
>>
On 22/04/2013, the *EIA Form* of the Project was approved. According to the EIA Form, EIA Approval, the environmental impacts arising from the Project, control measures and treating effects are analyzed.

Waste gas

Construction period: during construction period, the construction will cause dust emission which will be greatly mitigated through the following measures:
1) Watering will be implemented timely on the construction site and transport roads.
2) The vehicles will enter the construction site at low speed and the construction materials on the vehicles will be sealed by tarpaulins during transportation.
3) Strengthened management of material field, road hardening and building cement field will minimize dust emissions and secondary dust.

Operation period: no waste gas will be emitted in the operation period.

Solid waste

Construction period: the solid waste during the construction period is resulted from construction rubbish and domestic refuse from workers. All the solid waste will be collected for disposal.

Operation period: the solid waste during operation will be collected for disposal. So no negative impact on the local environment will be resulted.

Waste water

Construction period: the industrial wastewater includes washing water of concrete mixing system and other machines. The industrial wastewater will be reused after oil separation and sedimentation, no waste water will be discharged The sanitary sewage of the construction staff is from the temporary living area, including excrement and urine, washing water, shower water, etc, will be collected and treated by wastewater treatment facility, then re-sued as greening water.

Operation period: Waste water during operation is mainly from staff living and battery modules washing. The staff living waste water will be delivered to the sewage treatment plant for further treatment after collective collection. The washing water is mainly composed of suspended particle generated from a little washing dust and without any hazardous substance, thus, battery modules washing water will be directly spattered as the greening water, no waste water will be discharged. Therefore, the local water environment will not be impacted by the Project.

Ecological impact

During construction period, the foundation excavation, ground leveling and vehicle rolling will damage the surface vegetation and will cause temporary negative impact on the ecological environment. Covering and enclosure measures will be adopted to prevent the soil and water loss resulting from strong wind and rain and therefore, the construction will be controlled strictly to mitigate the destruction on the surrounding ecological environment.

After the completion of the civil construction, the land greening will be carried out in the plant site so as to improve the regional ecological environment.

Noise

Construction period: the noise during the construction period is mainly generated by mechanical equipments and traffic. To reduce the impacts of noise, the construction time and interval will be controlled strictly. Moreover, the project site is far away from the residential area. Thus, the construction noise will cause no effects on the surrounding environment as long as the construction is implemented reasonably.

Operation period: there is no noise during operation.

In summary, the Project will not have significant impacts on the environment.

SECTION E. Local stakeholder consultation

E.1. Solicitation of comments from local stakeholders

>>

According to the area impacted by the Project, authorities of Ulan Government related to the construction and operation of the Project, local villagers who will affected by the Project, non-governmental organizations with offices in China who support gold standard, Chinese expert of gold standard and other agencies or individuals caring the project are identified as the stakeholders of the Project.

In order to obtain stakeholders' views regarding the Project, the project owner, by means of sending invitation letter, putting up public notice or sending emails, etc, invited stakeholders to attend the gold standard stakeholder Feedback Round meeting. On July 24th, 2014, the gold standard stakeholder Feedback Round meeting was held in the conference room of Ulan Jinfeng New Energy Photovoltaic Power Generation Co., Ltd. A total of 11 stakeholders fill in questionnaires and return them with their responses.

The questionnaires mainly focus on the following issues:

·What's the attitude of the stakeholders on the construction and operation of the Project?

What might be the positive impacts as a result of the implementation of the Project in the view of stakeholders?

What might be the negative impacts as a result of the implementation of the Project in the view of stakeholders?

What measures should be taken to reduce the negative impacts in the view of stakeholders?

E.2. Summary of comments received

>>

A total of 11 people received the questionnaires and 11 people return them with their responses with 100% response rate. The basic structure of the respondents is as follows:

Among the respondents, 9 people are male and 2 people are female.

Among the respondents, 2 people are between 18 and 30, 1 people are between 31 and 40, 6 people are between 41 and 50, 2 people is above 50.

Among the respondents, 4 people finished the education of primary school, 2 people finished the education of junior high school, 3 people finished the education of senior high school/technical secondary school, and 2 people finished the education of college.

Among the respondents, 5 respondents have a very good understanding of the Project, the 6 respondents understand or know the Project.

It can be seen that people surveyed are representative of the public opinions in terms of their gender, age and educational levels. People surveyed can represent the people affected most by the Project from the perspective of age structure. Therefore, it can be considered that responses to the survey have comprehensively reflected the attitudes towards the Project of the people possibly affected by the Project. 9 people surveyed (81.82%) support the construction of the Project, and 2 people (18.18%) did not care for the implementation of the Project.

In a word, people surveyed considered that positive impacts of the construction of the project including:

I. Improving the living /working environment (36.36%);
II. Reduction of electricity price (18.18%);
III. Improving the living environment (72.73%);
IV. Increasing in employment opportunities (100.00%);
V. Increasing the income (90.91%);
VI. Increase in the electricity consumption (90.91 %).

No people surveyed considered negative impacts as a result of the Project implementation.

E.3. Report on consideration of comments received

>>

The survey shows that most of the stakeholders at the project sites consider the implementation of the Project can have plenty of positive impacts. The project owner has given full consideration to the comments and suggestions from stakeholders in the process of project construction. Local residents and government are all very supportive to the implementation of the Project. According to the collected comments received from local stakeholders, it is not necessary to modify the Project.

SECTION F. Approval and authorization

>>

The project is a GS VER project, the Approval and authorization is not necessary.

- - - - -

Appendix 1: Contact information of project participants

Organization	Ulan Jinfeng New Energy Photovoltaic Power Generation Co., Ltd.
Street/P.O. Box	
Building	
City	Xishagou Village, Keke Town, Ulan County, Haixi Mongol and Tibetan Autonomous Prefecture
State/Region	Qinghai Province
Postcode	817100
Country	P. R. of China
Telephone	+86-(0)10-58689628
Fax	+86-(0)10-58689504
E-mail	wang_hongye@ctgpc.com.cn
Website	
Contact person	Wang Hongye
Title	
Salutation	Ms.
Last name	Wang
Middle name	
First name	Hongye
Department	
Mobile	
Direct fax	+86-(0)10-58689504
Direct tel.	+86-(0)10-58689628
Personal e-mail	wang_hongye@ctgpc.com.cn

Organization name	Carbon Invcap International Trading Co., Ltd.
Street/P.O. Box	
Building	Kemp House 152-160 city Road
City	London
State/Region	-
Postcode	EC1V2NX
Country	United Kingdom of Great Britain and Northern Ireland
Telephone	+86-(0)10-62682508
Fax	+86-(0)10-62682682
E-mail	gs@carboninvcap.com
Website	-
Contact person	Jessy Tang
Title	project Manager
Salutation	Ms.
Last name	Tang
Middle name	-
First name	Jessy
Department	-
Mobile	-
Direct fax	+86-(0)10-62682682
Direct tel.	+86-(0)10-62682508
Personal e-mail	gs@carboninvcap.com

Appendix 2: Affirmation regarding public funding

There is no public funding from Annex I Parties for the Project.

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

To determine the simple OM emission factor ($EF_{grid,OM,y}$) and the Build Margin emission factor ($EF_{grid,BM,y}$) of the Project, data recommended in the *2013 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 04.0.0). The information provided by the tables includes data, data sources and the underlying calculations.

Table A1.Thermal Electricity generation of NWPG

year	2009			2010			2011		
Province	**EG**	**AER**	**EDG**	**EG**	**AER**	**EDG**	**EG**	**AER**	**EDG**
	(MWh)	**(%)**	**(MWh)**	**(MWh)**	**(%)**	**(MWh)**	**(MWh)**	**(%)**	**(MWh)**
Shaanxi	77,400,000	7.24	71,796,240	95,800,000	7.23	88,873,660	108,400,000	7.2	100,595,200
Gansu	44,100,000	6.88	41,065,920	59,100,000	6.73	55,122,570	71,400,000	6.8	66,544,800
Qinghai	10,700,000	7.01	9,949,930	10,900,000	6.58	10,182,780	12,200,000	7.2	11,321,600
Ningxia autonomous region	44,700,000	7.76	41,231,280	57,200,000		57,200,000	96,700,000		96,700,000
Xinjiang autonomous region	45,200,000	5.16	42,867,680	53,900,000	8.7	49,210,700	72,500,000	8.2	66,555,000
Total			**206,911,050**			**260,589,710**			**341,716,600**

Data source: China electric power yearbook, 2010-2012

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

Table A2. Calculation of simple OM emission factor of NWPG in 2009

Fuel	Unit	Shaanxi	Gansu	Qinghai	Ningxia Autonomous Region	Xinjiang Autonomous Region	Total	Fuel emission factor	NCV	CO_2 emissions
								($kgCO_2/TJ$)	($MJ/t,km^3$)	(tCO_2)
		A	B	C	D	E	F = sum (A: E)	G	H	I
Raw coal	10^4t	3949.22	2060	467.05	2350.13	2380	**11206.4**	87300	20908	204,546,878
Clean coal	10^4t						**0**	87300	26344	0
Other washed coal	10^4t	8.34			56.01	6.66	**71.01**	87300	8363	518,437
briquettes	10^4t						**0**	87300	20908	0
Coke	10^4t						**0**	95700	28435	0
Coke oven gas	10^8m^3	0.49	0.8			0.12	**1.41**	37300	16726	87,967
Other gas	10^8m^3	18.37	0.44				**18.81**	37300	5227	366,733
Crude oil	10^4t						**0**	71100	41816	0
Gasoline	10^4t	0.02					**0.02**	67500	43070	581
Diesel	10^4t	0.6	0.52	0.2	0.07	0.7	**2.09**	72600	42652	64,718
Fuel oil	10^4t		0.25	0.08		0.06	**0.39**	75500	41816	12,313
LPG	10^4t	0.02					**0.02**	61600	50179	618
Refinery gas	10^4t					8.56	**8.56**	48200	46055	190,019
Natural gas	10^8m^3	0.91	0.07	3.93		7.83	**12.74**	54300	38931	2,693,177
Other petroleum products	10^4t						**0**	72200	41816	0
Other coking products	10^4t						**0**	95700	28435	0
Other E (standard coal)	10^4t Ce	73.76	18.52		18.08		**110.36**	0	0	0
									Subtotal	**208,481,441**
Total electricity delivered to NWPG MWh										**206,911,050**
Total emission of NWPG tCO_2										**208,481,441**
The simple OM emission factor of the NWPG tCO_2/MWh										**1.0076**

*I=F*G*H /100000(unit of mass) or I= F*G*H /10000(unit of volume)*Data sources: China energy statistical yearbook 2010, 2006 IPCC guideline on national GHG inventories, Volume 2*

Table A3. Calculation of simple OM emission factor of NWPG in 2010

Fuel	Unit	Shaanxi	Gansu	Qinghai	Ningxia Autonomous Region	Xinjiang Autonomous Region	Total	Fuel carbon coefficient	NCV	CO_2 emissions
								($kgCO_2/TJ$)	($MJ/t,km^3$)	(tCO_2)
		A	B	C	D	E	F = sum (A: E)	G	H	I
Raw coal	10^4 t	4850.49	2771.89	483.72	2916.46	2494.9	**13517.46**	87,300	20,908	246,729,926
Clean coal	10^4 t				1.05		**1.05**	87,300	26,344	24,148
Other washed coal	10^4 t	11.01			42.96	6.82	**60.79**	87,300	8,363	443,822
Briquettes	10^4 t						**0**	87,300	20,908	0
Coke	10^4 t						**0**	95,700	28,435	0
Coal gangue	10^4 t	355.13	37.86		163.58	2.85	**559.42**	87,300	8,363	4,084,269
Coke oven gas	10^8 m^3	1.97	0.89			0.7	**3.56**	37,300	16,726	222,101
BFG	10^8 m^3	18.24	4.06			5.28	**27.58**	219,000	3,763	2,272,860
LDG	10^8 m^3		0.31				**0.31**	145,000	7,945	35,713
Other gas	10^8 m^3						**0**	37,300	5,227	0
Crude oil	10^4 t						**0**	71,100	41,816	0
Gasoline	10^4 t	0.01		0.03		0.01	**0.05**	67,500	43,070	1,454
Diesel	10^4 t	0.67	0.42	0.21	0.23	0.39	**1.92**	72,600	42,652	59,453
Fuel oil	10^4 t		0.17	0.09	0.1	0.7	**1.06**	75,500	41,816	33,465
Naphtha	10^4 t						**0**	72,600	43,906	0
Lubricating Oil	10^4 t						**0**	71,900	41,398	0
Paraffin	10^4 t						**0**	72,200	39,934	0
Solvent Oil	10^4 t						**0**	72,200	42,945	0
Petroleum asphalt	10^4 t						**0**	69,300	38,931	0
Petroleum coke	10^4 t						**0**	82,900	31,947	0
LPG	10^4 t						**0**	61,600	50,179	0
Refinery gas	10^4 t					12.2	**12.2**	48,200	46,055	270,822
Natural gas	10^8 m^3	0.87		2.48	0.3	8.54	**12.19**	54,300	38,931	2,576,909

Other petroleum products	10^4 t					0.01	**0.01**	72,200	41,816	302
Other coking products	10^4 t						**0**	95,700	28,435	0
Other E (standard coal)	10^4 Tce	1.76	2.68				**4.44**	0		
									Subtotal	**256,755,243**
Total electricity delivered to NWPG MWh										**260,589,710**
Total emission of NWPG tCO_2										**256,755,243**
The simple OM emission factor of the NWPG tCO_2/MWh										**0.9853**

*I=F*G*H /100000(unit of mass) or I= F*G*H /10000(unit of volume)*Data sources: China energy statistical yearbook 2011, 2006 IPCC guideline on national GHG inventories, Volume 2*

Table A4. Calculation of simple OM emission factor of NWPG in 2011

Fuel	**Unit**	**Shaanxi**	**Gansu**	**Qinghai**	**Ningxia Autonomous Region**	**Xinjiang Autonomous Region**	**Total**	**Fuel carbon coefficient**	**NCV**	**CO_2 emissions**
								($kgCO_2$/TJ)	**(MJ/t,km^3)**	**(tCO_2)**
		A	**B**	**C**	**D**	**E**	**F = sum (A: E)**	**G**	**H**	**I**
Raw coal	10^4 t	4107.56	3427.4	556.68	5051.73	3358.94	**16502.31**	87300	20908	301,211,450
Clean coal	10^4 t						**0**	87300	26344	0
Other washed coal	10^4 t	1473.38			42.36	9.62	**1525.36**	87300	8363	11,136,499
Briquettes	10^4 t	-	-	-	-	-	**0**	87300	20908	0
Coke	10^4 t	-	-	-	-	-	**0**	95700	28435	0
Coal gangue	10^4 t	251.88	41.53		170.51	**69.53**	**533.45**	87300	8363	3,894,665
Coke oven gas	10^8 m^3	6.35	0.66		0.05	1.38	**8.44**	37300	16726	526,555
BFG	10^8 m^3	-	4.68		0.14	4.47	**9.29**	219,000	3763	765,586
LDG	10^8 m^3	-	1.08	-		1.05	**2.13**	145,000	7945	245,381
Other gas	10^8 m^3	-	-	-	-	-	**-**	37300	5227	0
Crude oil	10^4 t	-	-	-	-	-	**0**	71100	41816	0
Gasoline	10^4 t	-	-	-	-	-	**0**	67500	43070	0

Diesel	10^4 t	0.66	0.47	0.47	0.29	0.74	**2.63**	72600	42652	81,439
Fuel oil	10^4 t	-	0.15	0.08	0.47	0.06	**0.76**	75500	41816	23,994
Naphtha	10^4 t	-	-	-	-	-	**0**	72600	43906	0
Lubricating Oil	10^4 t	-	-	-	-	-	**0**	71900	41398	0
Paraffin	10^4 t	-	-	-	-	-	**0**	72200	39934	0
Solvent Oil	10^4 t	-	-	-	-	-	**0**	72200	42945	0
Petroleum asphalt	10^4 t	-	-	-	-	-	**0**	69300	38931	0
Petroleum coke	10^4 t	-	-	-	-	-	**0**	82900	31947	0
LPG	10^4 t	-	-	-	-	-	**0**	61600	50179	0
Refinery gas	10^4 t	-	-	-	-	7.99	**7.99**	48200	46055	177,366
Natural gas	10^8 m^3	0.83	-	4.62	0.77	9.26	**15.48**	54300	38931	3,272,400
Other petroleum products	10^4 t	-	-	-	-	-	**0.**	72200	41816	0
Other coking products	10^4 t	-	-	-	-	-	**0**	95700	28435	0
Other E (standard coal)	10^4 Tce	0.56	2.78	-	-	**6.8**	**10.14**	0	0	0
									Subtotal	**321,335,334**
Total electricity delivered to NWPG MWh										**341,716,600**
Total emission of NWPG tCO_2										**321,335,334**
The simple OM emission factor of the NWPG tCO_2/MWh										**0.9404**

*I=F*G*H /100000(unit of mass) or I= F*G*H /10000(unit of volume)

Data sources: China energy statistical yearbook 2012, 2006 IPCC guideline on national GHG inventories, Volume 2

According to *Tool to calculate the emission factor for an electricity system* (Version 04.0.0), the simple operating margin emission factor in year 2009, 2010 and 2011 are calculated, the three years weighted average simple operating margin emission factor is calculated as 0.9720 tCO_2/MWh, see Table A1~Table A4 for details.

The section B.6.1 detailed the calculation of BM emission factor of NWPG; the following tables summarize the numerical results from the equations listed in *2013 baseline emission factors for regional power grids in China.*

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

Calculated with the data provided in Table A4 and equations (8), (9) and (10), $\lambda_{Coal,y}$ =98.42%, $\lambda_{Oil,y}$ =0.03%, $\lambda_{Gas,y}$ =1.55%

Sub-step 2: Calculated the emission factor of thermal power based on the emission factors of the best efficient and commercial coal-fired, oil-fired and gas-fired generation technologies as follow:

Table A5. 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($kgCO_2$)	Oxidation	Emission factor(tCO_2/MWh)
		A	B	C	D=3.6/A/1,000,000*B*C
Coal fired power plants	$EF_{Coal,Adv,y}$	39.84%	87,300	1	0.7889
Oil fired power plants	$EF_{Oil,Adv,y}$	52.50%	75,500	1	0.5177
Gas fired power plants	$EF_{Gas,Adv,y}$	52.50%	54,300	1	0.3723

As per equation (7)

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

$$=98.42\% \times 0.7889 + 0.03\% \times 0.5177 + 1.55\% \times 0.3723$$

$$=0.78236\ tCO_2/MWh$$

Sub-step 3: Calculation BM in the grid by multiply the fuelled power emission factor and fuelled power proportion of the total power.

Table A6. Installed capacity of NWPG in 2011

Installed capacity	Unit	Shaanxi	Gansu	Qinghai	Ningxia	Xinjiang	Total
Thermal power	MW	22,160	15,240	2,300	16,400	16,230	72,330
Hydro power (MW)	MW	2,320	6,550	10,960	430	3,270	23,530
Nuclear power (MW)	MW	0	0	0	0	0	0
Wind power and Other (MW)	MW	120	5,661	958	1,661	1,880	10,280
Total (MW)	MW	24,600	27,451	14,218	18,491	21,380	106,140

Data source: China electric power yearbook 2*012.*

Table A7. Installed capacity of NWPG in 2010

Installed capacity	Unit	Shaanxi	Gansu	Qinghai	Ningxia	Xinjiang	Total
Thermal power	MW	21,370	13,240	1,930	12,710	11,720	60,970
Hydro power (MW)	MW	2,210	6,110	10,680	430	2,990	22,420
Nuclear power (MW)	MW	0	0	0	0	0	0
Wind power and Other (MW)	MW	0	1390	0	600	1360	3,350
Total (MW)	MW	23,580	20,740	12,610	13,740	16,070	86,740

Data source: China electric power yearbook 2*011*.

Table A8. Installed capacity of NWPG in 2009

Installed capacity	**Unit**	**Shaanxi**	**Gansu**	**Qinghai**	**Ningxia**	**Xinjiang**	**Total**
Thermal power	MW	19,900	10,990	1,930	8,820	9,520	51,160
Hydro power (MW)	MW	1,920	5,940	8,740	430	2,430	19,460
Nuclear power (MW)	MW	0	0	0	0	0	0
Wind power and Other (MW)	MW	0	750	0	270.3	860	1,880
Total (MW)	MW	21,820	17,680	10,670	9,520	12,810	72,500

Data source: China electric power yearbook 2010.

Table A9. Calculation of BM emission factor of NWPG

	2009	**2010**	**2011**	**Capacity added in 2009-2011**	**Capacity added in 2010-2011**	**Share in added capacity**
	A	**B**	**C**	**D**	**E**	**F**
Thermal (MW)	51,160	60,970	72,330	23,547	11,527	65.38%
Hydropower (MW)	19,460	22,420	23,530	4,070	1,110	11.30%
Nuclear (MW)		0	0	0	0	0.00%
Windpower(MW)	1,880.3	3,352	10,280	8,400	6,928	23.32%
Total (MW)	**72,500**	**86,742**	**106,140**	**36,017**	**19,565**	**100.00%**
Percentage of 2010 capacity				33.93%	18.43%	

$EF_{grid,BM,y}$ =0.78236*65.38%=0.5115tCO$_2$/MWh

Calculation for the combined emission factor is as follows:

Table A10. Calculation of CM emission factor

	Value	Weight	CM
OM(tCO$_2$/MWh)	0.9720	0.75	
BM(tCO$_2$/MWh)	0.5115	0.25	**0.856875**

Appendix 5: Further background information on monitoring plan

No further background information on monitoring plan.

Appendix 6: Summary of post registration changes

Not applicable, therefore no need for further statement.

- - - - -

History of the document

Version	Date	Nature of revision
04.1	11 April 2012	Editorial revision to change history box by adding EB meeting and annex numbers in the Date column.
04.0	EB 66 13 March 2012	Revision required to ensure consistency with the "Guidelines for completing the project design document form for small-scale CDM project activities" (EB 66, Annex 9).
03	EB 28, Annex 34 15 December 2006	• The Board agreed to revise the CDM project design document for small-scale activities (CDM-SSC-PDD), taking into account CDM-PDD and CDM-NM.
02	EB 20, Annex 14 08 July 2005	• The Board agreed to revise the CDM SSC PDD to reflect guidance and clarifications provided by the Board since version 01 of this document. • As a consequence, the guidelines for completing CDM SSC PDD have been revised accordingly to version 2. The latest version can be found at <http://cdm.unfccc.int/Reference/Documents>.
01	EB 07, Annex 05 21 January 2003	Initial adoption.
Decision Class: Regulatory **Document Type:** Form **Business Function:** Registration		