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

CONTENTS

Annexes

SECTION A. General description of project activity

A.1. Title of the project activity:

Ningxia Angli Lingwu Photovoltaic Grid Connected Power Plant Project
Version number: 02
Date: 19/10/2012

A.2. Description of the project activity:

Ningxia Angli Lingwu Photovoltaic Grid Connected Power Plant Project (hereafter simplified as "the Project") is a newly built grid-connected photovoltaic power plant with installed capacity of 39MWp (39.3397MWp precisely), which is located at Baitugang Country, Lingwu City, Ningxia Hui Autonomous Region. The Project is developed and operated by Datang Angli (Lingwu) New Energy Co., Ltd. (hereafter simplified as "the project owner").

The purpose of the Project:

(a) The scenario existing prior to the implementation of the Project is that the electricity requirement is satisfied by Ningxia Power Grid which is an integral part of Northwest China Power Grid (hereafter simplified as "NWPG").

(b) The project will generate electricity by using renewable solar photovoltaic (PV) power to the NWPG and replacing equivalent electricity generated by fossil fuel fired power plants connected to the NWPG. The installed capacity of the Project is 39MWp (15,792 pieces of solar modules with 190W of unit capacity, 150,264 pieces of solar modules with 235W of unit capacity and 4,280 pieces of solar modules with 240W of unit capacity), and therefore reducing Greenhouse Gas emissions. The expected annual grid-in electricity is 54,000MWh.

(c) As analyzed in section B.4, the baseline scenario of the Project is the same as the scenario existing prior to the start of implementation of the project activity.

How the project activity reduces GHG emissions:

The annual grid-in electricity generated by the Project is about 54,000MWh.The Project will achieve greenhouse gas (GHG) emission reductions by displacing equivalent electricity supplied by NWPG, which is predominated by fossil fuel-fired power plants. The estimated annual emission reductions are 48,402tCO_2e.

Contribution to sustainable development

The Project promotes local sustainable development through the following aspects:

- The project activity will displace the power generation of fossil fuel power plants, reducing CO_2, SO_x and NO_x emissions significantly, thus mitigating the air pollution and its adverse impacts on human health.
- Improvement of the fossil fuel dominated fuel mix of the electricity generation in the power grid by providing clean and renewable energy source, and help to energy supply security.

- Promote application and diffusion of the innovative/creative solar PV technology in China through the demonstrative practice of the project activity.
- Create employment opportunities for the local community during the construction and operation period.

A.3. Project participants:

Name of Party involved ((host) indicates a host Party)	Private and/or public entity(ies) project participants (as applicable)	Kindly indicate if the Party involved wishes to be considered as project participant (Yes/No)
P.R. of China (host)	Datang Angli (Lingwu) New Energy Co., Ltd. （the project owner）	Yes
(*) In accordance with the CDM modalities and procedures, at the time of making the CDM-PDD public at the stage of validation, a Party involved may or may not have provided its approval. At the time of requesting registration, the approval by the Party(ies) involved is required.		

A.4. Technical description of the project activity:

A.4.1. Location of the project activity:

A.4.1.1. Host Party(ies):

P. R. of China

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

Ningxia Hui Autonomous Region

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

Baitugang Country, Lingwu City

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

The Project is located at Baitugang Country, Lingwu City, Ningxia Hui Autonomous Region，the site inflection point coordinates of the project are as below:

	Longitude	Latitude
A	106°21′49.52″E	37°48′24.42″N
B	106°22′28.03″E	37°48′03.59″N
C	106°22′17.99″E	37°47′28.31″N
D	106°21′25.18″E	37°47′50.96″N

The location of the Project is shown in the map of Figure 1.

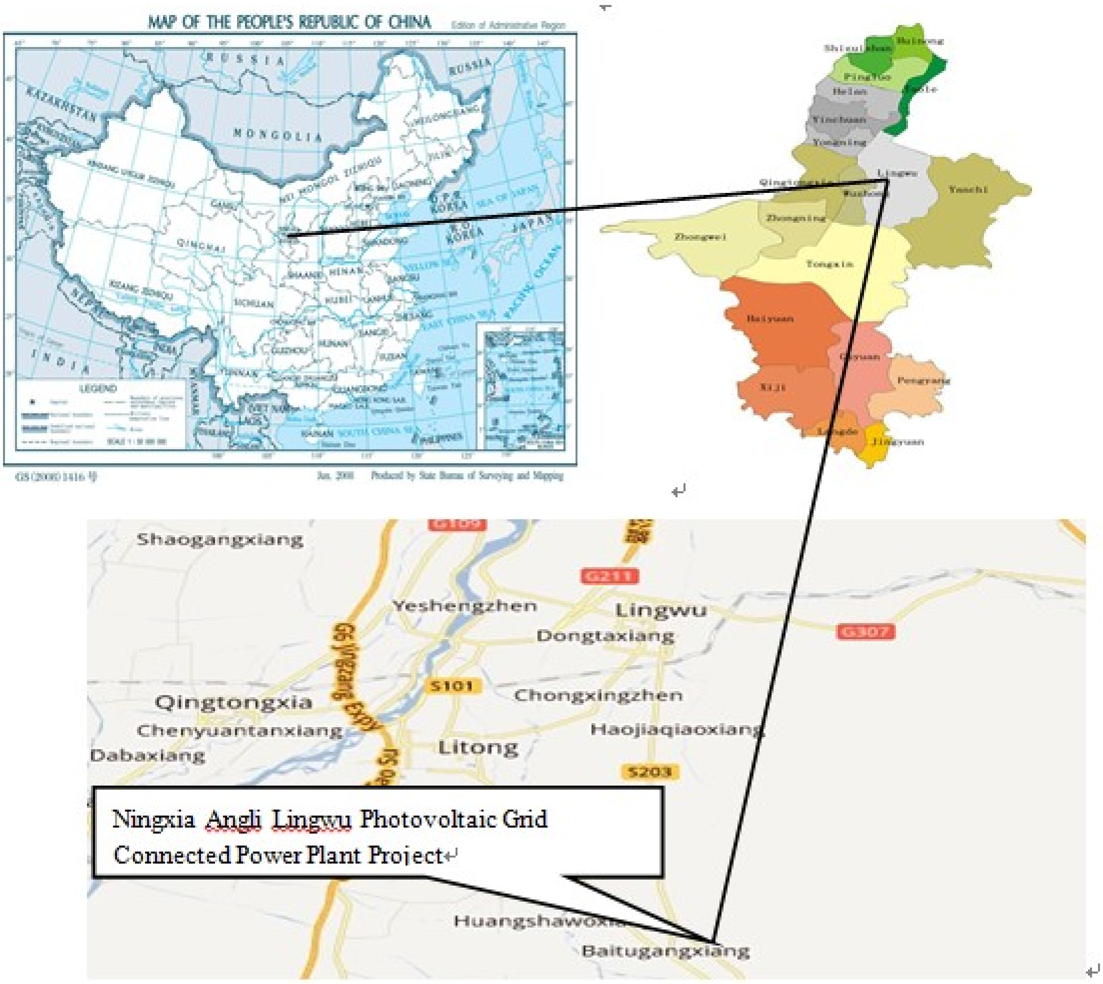

Figure 1: The location of the Project

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

Category: Renewable electricity in gird connected application
Sectroal Scope 1: Energy Industry

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

The Project is a newly built grid-connected photovoltaic power plant with total installed capacity of 39MWp. The annual grid-in electricity is estimated to be 54,000MWh which contributes to the reduction of GHG emission by replacing parts of the electricity supply by NWPG, and the PLF of the Project is 15.67%[1].

The baseline scenario of the Project is the same as the scenario existing prior to the start of implementation of the project activity, i.e. the electricity requirement is satisfied by NWPG.

The schematic diagram of PV station is illustrated in Figure 2. Firstly, the PV array inverts the solar energy to the direct current electricity power. The DC/AC inverters invert the direct current to the alternating current. Then the alternating current is boosted to 0.28kV transformer and 35kV transformer in turn, with 35kV AC generated, and delivered to the NWPG via 35kV outlet circuits.

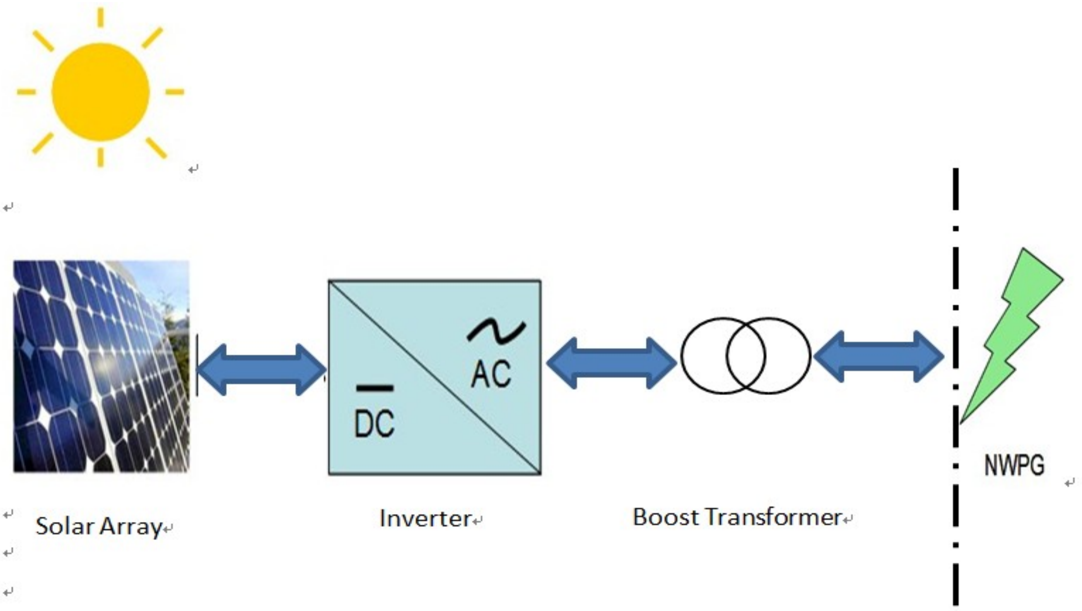

Figure 2. Schematic Diagram of PV Station

[1] According to Annex 11 of EB 48 Report, Guideline for the reporting and validation of plant load factors (version 01), the plant load factor has been defined ex-ante in the CDM-PDD according to the plant load factor determined by a third party *Shandong Engineering Consulting Insititute* (FSR developer) contracted by the project participants. The annual average operation hours in the first 7-year crediting period of the project are 1372.66 hours (54,000MWh/39.3397MW=1372.66 hours) and the plant load factor of the proposed project is 15.67 % (1372.66/8760=15.67%) according to the Feasibility Study Report (FSR).

The key technical parameters of the main equipment are shown as follows:

1. Modules

Solar modules are the core component of the Project, whose function is to convert solar energy into electricity energy through direct current (DC). The project activity consists of 7.7% monocrystalline silicon cells and 92.3% polycrystalline silicon cells[2]. The technical parameters of PV Modules are listed below:

Table 1. Key technical parameters of Monocrystalline Silicon Cell

Parameters	Unit	Value		Data Source
PV Module Type		JAM5(L)-72-190	ATP-190	Technical Specification of Equipment Contract
Capacity	W	190	190	
Pieces		10560	5232	
Open circuit voltage(Voc)	V	44.87	44.5	
Max.power voltage(Vmp)	V	36.48	36.5	
Short circuit current(Isc)	A	5.54	5.69	
Max.power current(Imp)	A	5.21	5.20	
Maximum system voltage	V	1000	1000	
Lifetime	years	25	25	
Manufacturer		JA Solar	ATSUN	

Table 2. Key technical parameters of Polycrystalline Silicon Cell

Parameters	Unit	Value			Data Source
PV Module Type		JAP6-60-235	ATP-235	JAP6-60-240	Technical Specification of Equipment Contract
Capacity	W	235	235	240	
Pieces		117640	32624	4280	
Open circuit voltage(Voc)	V	37.34	37.5	37.45	
Max.power voltage(Vmp)	V	29.52	30.5	29.58	
Short circuit current(Isc)	A	8.40	8.70	8.50	

[2] The total capacity of monocrystalline silicon cell is 3MWp (3.00048MWp precisely), and the total capacity of polycrystalline silicon cells is 36MWp (36.33924MWp precisely).

Max.power current(Imp)	A	7.96	7.70	8.10	
Maximum system voltage	V	1000	1000	1000	
Lifetime	years	25	25	25	
Manufacturer		JA Solar	ATSUN	JA Solar	

2. Inverters

Inverter is an electrical device that converts direct current (DC) to alternating current (AC). 78 sets of inverters with capacity 500KW will be installed in the proposed project. The parameters of inverter are listed below:

Table 3. Key technical parameters of Inverter

Parameters	Unit	Value	Data Source
Max. Input voltage range	V	800-900	Technical Specification of Equipment Contract
max. Input voltage range	A	1100-1200	
rated output voltage range	V	210-310	
Max Efficiency	%	≥98.0	
Cooling Mode		Air-cooled	
Lifetime	years	25	
Manufacturer		Sun Grow	

Domestic technology is employed by the proposed project and no technology transfer involved.

Three meters are used to monitoring the electricity delivered to NWPG. M1 is installed at the output of the on-site booster station of the project, M2 is installed at the same place of M1, M3 is installed at 10kV backup line. The measurement precision of the meters employed by the Project will be at least 0.5S. See details in B.7.

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

The renewable crediting period (7*3years) was chosen. The baseline emission factor is fixed in the first 7-year crediting period (01/12/2012-30/11/2019). The ex-ante estimated annual emission reductions over the first 7-year crediting period of the Project are presented in following table.

Years	Annual estimation of emission reductions in tonnes of CO_2e
01/12/2012-30/11/2013	48,402
01/12/2013-30/11/2014	48,402
01/12/2014-30/11/2015	48,402
01/12/2015-30/11/2016	48,402

01/12/2016-30/11/2017	48,402
01/12/2017-30/11/2018	48,402
01/12/2018-30/11/2019	48,402
Total estimated reductions	338,814
Total number of crediting years	7
Annual average over the crediting period of estimated reductions	48,402

A.4.5. Public funding of the project activity:

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

SECTION B. Application of a baseline and monitoring methodology

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

ACM0002 (version 13.0.0) *Consolidated baseline methodology for grid-connected electricity generation from renewable sources* is used in the Project.

http://cdm.unfccc.int/methodologies/DB/C505BVV9P8VSNNV3LTK1BP3OR24Y5L

Other tools that will be used for the Project activity:

Tool for demonstration and assessment of additionality (version 06.1.0)

http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v6.1.0.pdf

Tool to calculate the emission factor for an electricity system (version 02.2.1)

http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v2.2.1.pdf

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

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

a. The Project is a newly-built 39MWp grid-connected renewable energy (i.e. photovoltaic power) power plant at a site where no renewable power plant was operated prior to the implementation of the project activity.

b. The Project does not involve an on-site switch from fossil fuels to a renewable source.

Therefore, the baseline methodology ACM0002 (version 13.0.0) is applicable to the project activity.

In addition, the project activity meets the applicability conditions that stated in *Tool to calculate the emission factor for an electricity system*.

As the project activity will supply electricity to the NWPG, therefore this tool can be used to estimate OM, BM and/or CM for baseline emission calculation.

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

The electricity generated by the proposed project will be transferred to NWPG, according to *2011 Baseline emission factors for regional power grids in China*[3] issued by the National Development and Reform Commission of the Government of China (China DNA), NWPG consists of independent province-level electricity systems including Shaanxi Province, Gansu Province, Qinghai Province, Ningxia Hui Autonomous Region and Xinjiang Uyghur Autonomous Region. For the proposed project, the spatial extent of the project boundary includes the proposed project and all power plants connected physically to the NWPG that the proposed project is connected to.

[3] China DNA (http://cdm.ccchina.gov.cn), October 20th, 2011.

According to ACM0002, the Green House Gases ("GHG") and emission sources included in or excluded from the project boundary are shown in the following table:

Table 4: Emission sources included in or excluded from the project boundary

Source		Gas	Included?	Justification/Explanation
Baseline emission	CO_2 emission from electricity generation of NWPG	CO_2	Yes	Main emission source.
		CH_4	No	Minor emission source
		N_2O	No	Minor emission source
Project emission	Photovoltaic power plant	CO_2	No	No project emissions for photovoltaic power plant, according to the methodology, $PE_y = 0$.
		CH_4	No	
		N_2O	No	

The project boundary is shown in the following flow diagram:

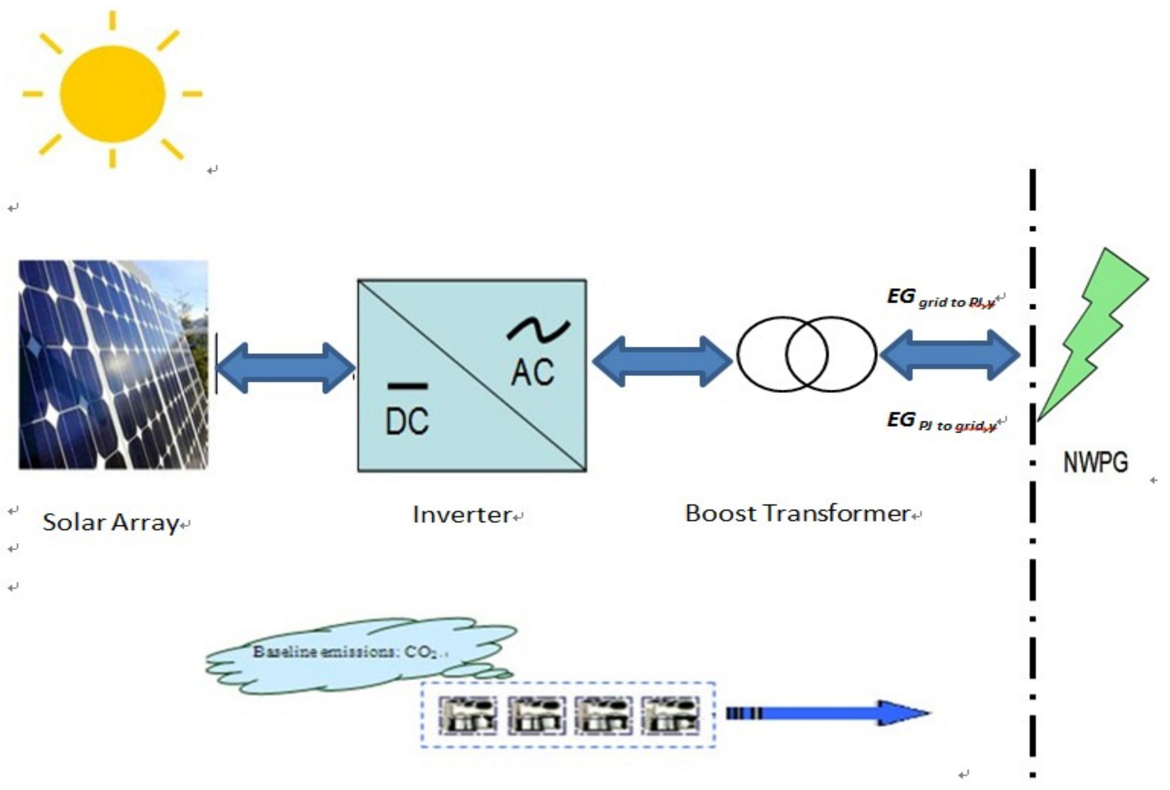

Figure 3: Flow diagram of the project boundary

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

According to the methodology ACM0002 (version 13.0.0), as the Project is the installation of a new grid-connected photovoltaic power plant, the baseline scenario of the Project is the following:

Electricity delivered to NWPG 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 within NWPG, as reflected in the combined margin (CM) calculations described in the *Tool to calculate the emission factor for an electricity system*.

The calculation of CM refers to the Section B.6.1.

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

CDM plays a decisive role in the decision of the Project. The Project could not be constructed and operated without CDM revenues. Below a summarized implementation schedule of the Project is provided, illustrating the main events before the start of operations.
Here is the overview of key events in the development of the proposed project:

Table 5: Timeline of the Project

Date	Project activity timeline
03/2011	The Feasibility Study Report (*FSR*) of the Project was finished
04/2011	The *EIA Report* was finished
13/04/2011	The EIA Report was approved
21/04/2011	The *FSR* was approved
22/04/2011	Board meeting was held by the project owner to make decision that the Project will be developed as a CDM project
19/09/2011	The EPC contract(including construction, equipment purchase, installation) was signed (The starting date of the Project)
26/09/2011	The project construction started
15/02/2012	The CDM prior consideration letter was submitted to NDRC
24/02/2012	The confirmation of CDM prior consideration letter was received from NDRC
28/02/2012	The CDM prior consideration letter was submitted to EB and the confirmation letter was received
19/04/2012	The project started GSP
03/07/2012	The Project has been fully start operation

The FSR was completed in March 2011 by Shandong Engineering Consulting Institute and approved on April 21st, 2011 by Ningxia Hui Autonomous Region Development and Reform Commission. In the FSR, the IRR is lower than the benchmark of 8%, which means the Project is not financial attractive. Therefore, it is advised to apply the CDM for overcoming the financial difficulty in the FSR. Considering the key role of CDM for this project, the directorate of the Project owner decided to apply the project as a CDM project on April 22nd, 2011. The EPC contract was signed on September 19th, 2011, which was the starting date of the project activity. It is obvious that the project owner was aware about CDM revenues before the investment decision of the Project and CDM has played a decisive role in the successful implementation of the Project.

The PDD was completed and submitted to Chinese DNA for getting the letter of approval in February 2012. The CDM prior consideration letters were submitted to NDRC and EB on February 15th, 2012 and February 28th, 2012 respectively and received the confirmation letters on February 24th, 2012 and February 28th, 2012 respectively. The above events clearly demonstrate that the real and continue actions were taken to secure CDM status for the project activity in parallel with its implementation.

The additionality of the Project is demonstrated by using the *Tool for the demonstration and assessment of additionality* (version 06.1.0) approved by the CDM EB and requested by the methodology ACM0002 (version 13.0.0). The *Tool for the demonstration and assessment of additionality* provides a step-wise approach to demonstrate and assess the additionality. These steps include:

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

The objective of this step is to identify realistic and credible alternatives to the project activity through the following sub-steps:

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

According to the methodology ACM0002 (version 13.0.0), as the proposed project is the installation of a new grid-connected photovoltaic power plant, the baseline scenario of the proposed project is the following:

Electricity delivered to NWPG 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 within NWPG, as reflected in the combined margin (CM) calculations described in the "*Tool to calculate the emission factor for an electricity system*".

The selected methodology prescribes the baseline scenario, thus no further analysis is required.[4]

Sub-step 1b. Enforcement of applicable laws and regulation

The alternative means the continuation of current situation, and complies with current laws and regulations of China.

Step 2: Investment analysis

The detail of investment analysis is as following:

Sub-step 2a: Determine appropriate analysis method

The analysis will be analyzed through Option III of the additionality tool, i.e. Benchmark analysis. This method is applicable because:

4 "*Clean Development Mechanism Validation and Verification Manual* "(VVM, Version 01.2), paragraph 105.

- Option I: Simple cost analysis, does not apply as the project generates economic returns by selling of electricity to the grid company.
- Option II: Investment comparison analysis is not appropriate as the only realistic alternative of the project activity is equivalent electricity supply from the NWPG, which is not a specific project.
- Option III, benchmark analysis is appropriate. According to Guidelines on the Assessment of Investment Analysis (Version 05), the paragraph 19 states "*if the proposed baseline scenario leaves the project participant no other choice than to make an investment to supply the same (or substitute) products or services, a benchmark analysis is not appropriate and an investment comparison analysis shall be used. If the alternative to the project activity is the supply of electricity from a grid this is not to be considered an investment and a benchmark approach is considered appropriate*" and "*the benchmark approach is therefore suited to circumstances where the baseline does not require investment or is outside the direct control of the project developer, i.e. cases where the choice of the developer is to invest or not to invest*". This method has also been used in other PDDs of grid connected renewable energy projects in China.

Conclusion: We conclude that only option III is appropriate for the analysis of the additionality of the project activity.

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

With reference to *Interim rules of economic assessment of electrical and engineering retrofit projects*[5], the post-tax Project IRR of electric power project in China is 8.00%. This benchmark is widely used for the power investment in China.

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

Table 4 is the basic parameters for financial analysis.

Table 4: Basic Financial Parameters of the Project[6]

Parameter name	Project data	Data source
Installed capacity (MWp)	39.3397	FSR
Annual grid-in electricity (MWh)	54,000	FSR
Project lifetime (years)	25	FSR
Static total investment (RMB)	813,203,700	FSR
Grid-in tariff including VAT (RMB/kWh)	1.15	FSR
Long-term loan interest rate (%)	7.05	Loan Contract
Long-term loan(RMB)	650,000,000	Loan Contract

[5] State Power Corporation of China, *Interim rules on economic assessment of electrical engineering retrofit projects*. Beijing: China Electric Power Press, 2003.

[6] Based on the Interim Rules of Economic Assessment of Electrical and Engineering Retrofit Projects, fixed parameters should be used in the financial assessment. Therefore, the fixed parameters will be employed in the PDD

Liquid capital(RMB)	1,160,000	FSR
Rate of VAT(%)[7]	17[8]	FSR
Income Tax (%)	25	FSR
Rate of additional tax on city building (%)	5	FSR
Rate of additional tax on education (%)	3	FSR
Period of depreciation(year)	15	FSR
Rate of scrap value	5%	FSR
Annual O&M cost(RMB)	9,243,900[9]	FSR
Price of CER (Euro/tCO_2e)	10.5	Expected

The post-tax Project IRR is 3.11% without CDM revenue which is lower than the benchmark rate of 8%. So the Project faces obvious financial barriers without CDM revenue. But the post-tax Project IRR will increase when the Project has access to CER income, and the financial condition will be improved.

Table 5: Post-tax Project IRR of the project activity

	Project IRR (%)
Without CERs	3.11

Sub-step 2d: Sensitivity analysis

The objective of sensitivity analysis (without CERs) is to show whether the conclusion regarding to the financial attractiveness is robust to reasonable variation under the critical assumptions. For the Project, the Static total investment, Annual grid-in electricity, Grid-in tariff and Annual O&M cost have been selected to assess their impact on the project IRR. Results of the four parameter factors are shown below:

[7] Value Added Tax: The rate of VAT 17% and the rate of VAT drawback 50% are applicable to the wind power industry according to *PRC Tentative Regulations on VAT* (State Council [2008]538) issued by State Administration of Taxation (http://www.js-n-tax.gov.cn/Page1/StatuteDetail.aspx?StatuteID=8862） and *Notice about VAT on Comprehensive Utilization of Resource and other Products* (Cai Shui[2008]156) issued by Ministry of Finance and State Administration of Taxation (http://www.js-n-tax.gov.cn/Page1/StatuteDetail.aspx?StatuteID=8931). Also applicable is the “Notice about implementation of VAT reform in the whole country” (Cai Shui [2008]170) (http://202.108.90.130/n8136506/n8136563/n8193451/n8193466/n8193602/8884823.html), which allows the VAT incurred by the purchase of equipments can be recouped over the operation period against the VAT for electricity sales until the VAT from the equipment is fully recovered. Both VAT reduction policies are taken into account in the PDD. Therefore it is conservative.

[8] The project adopts the wind policy of China, the VAT is 17% with 50% tax refund, which it is conservative.

[9] The Annual O&M cost in this final PDD is different from the one in the GSP PDD. This is because according to *“Guidelines on the Assessment of Investment Analysis”*, the actual interest payable has been taken into account in the final PDD. The Annual O&M cost changed very a little, it did not cause the changes of IRR.

Range	-10%	-5%	0	5%	10%
Static total investment	4.20%	3.63%	3.11%	2.63%	2.18%
Annual O&M Cost	3.28%	3.20%	3.11%	3.02%	2.94%
Annual grid-in electricity	2.01%	2.57%	3.11%	3.64%	4.16%
Grid-in Tariff	2.01%	2.57%	3.11%	3.64%	4.16%

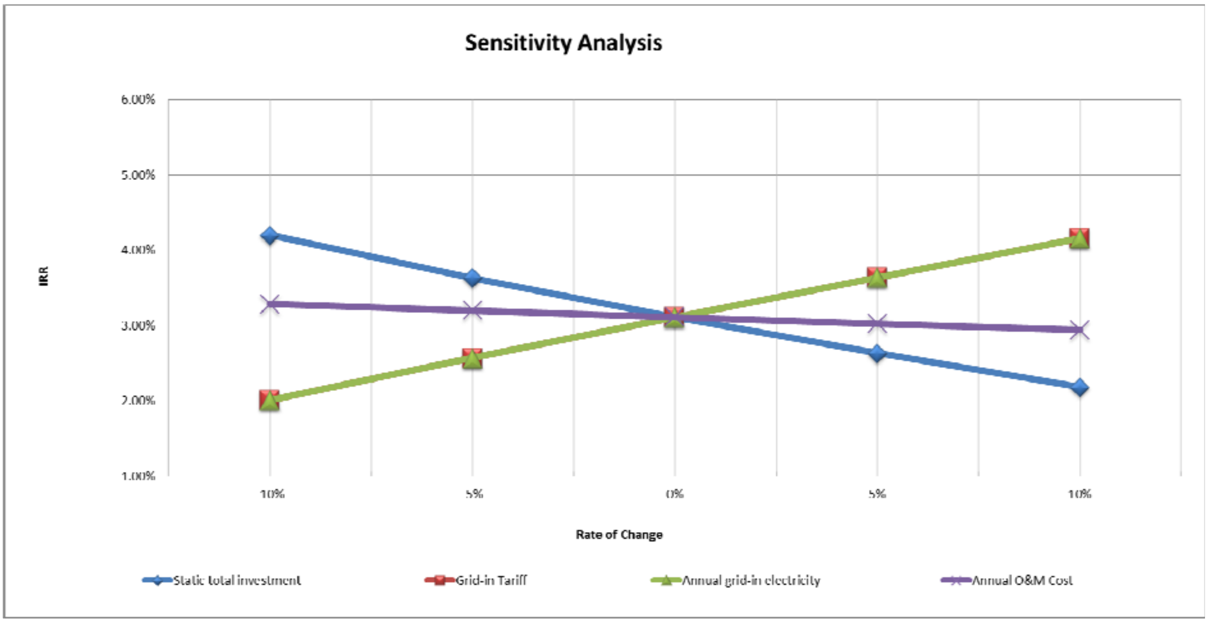

Figure 4: Sensitivity analysis of the Project

When Static total investment, Annual grid-in electricity, Annual O&M Cost and Grid-in Tariff are changed from -10% to 10%, IRR will not reach the benchmark IRR of 8%.

- Static total investment: With a decrease in the static total investment by 10%, the post-tax project IRR is 4.20% which is still lower than the benchmark. When a decrease of 35.32% is assumed in total static investment, the post-tax Project IRR of the project can reach the benchmark of 8%. According to the signed EPC contract, the actual static total investment of this project is 818,200,000 RMB, which is higher than the one estimated in FSR. Therefore, it is impossible to improve the financial attraction due to the decrease of static total investment.

- Annual grid-in electricity: With an increase in the annual grid-in electricity by 10%, the post-tax project IRR is 4.16% which is still lower than the benchmark. When an increase of 52.05% is assumed in annual grid-in electricity, the post-tax project IRR of the project can reach the benchmark of 8%. According to the FSR of the project, the annual power generation is estimated basing on the long term weather statistic data provided by local meteorological station, and then the data was used to calculate the annual theoretical electricity output by using a scientific method. This method is also approved by the government and is widely used in China for photovoltaic power. Therefore it is not credible to improve the economic attraction due to the increase in annual grid-in electricity supplied to grid.

- Grid-in tariff: With an increase in the grid-in tariff by 10%, the post-tax project IRR is 4.16% which is still lower than the benchmark. When an increase of 52.05% is assumed in grid-in tariff, the post-tax project IRR of the project can reach the benchmark of 8%. Based on the grid-in tariff approval of project (Fa Gai Jia Ge 2010[653]) issued by the NDRC, the grid-in tariff of the project is 1.15 RMB/kWh(including VAT), which is the same as the one used in FSR . Therefore, it is not possible to improve the post-tax project IRR through an increase in the tariff.
- Annual O&M cost: With a decrease in the annual O&M cost by 10%, the post-tax project IRR is 3.28% which is still lower than the benchmark. When the annual operating cost decreases by 323.19%, the post-tax Project IRR of the proposed project can reach the benchmark of 8%, thus, it is not possible to improve the post-tax project IRR through a decrease in the annual O&M cost.

Therefore, the results of the sensitivity analysis confirm the conclusion that the Project is financially unattractive.

Step 3. Barrier Analysis

The Project does not adopt barrier analysis.

Step 4. Common Practice Analysis

Because the measure for emission reduction activities of the proposed project belongs to "Switch of technology with or without change of energy source (including energy efficiency improvement as well as use of renewable energies)", according to the "*Tool for the demonstration and assessment of additionality* (version 06.1.0)", the following four steps are taken for the common practice analysis:

Step1:Calculate applicable output range as +/- 50% of the design output or capacity of the proposed project activity.

For the similar scale to the proposed project, the capacity range of ± 50% (19.67MW~59.01MW) has been taken into consideration in the common practice analysis.

Step2: "In the applicable geographical area, identify all plants that deliver the same output or capacity, within the applicable output range calculated in Step1, as the proposed project activity and have started commercial operation before the start date of the project. Note their number N_{all} Registered CDM project activities and projects activities undergoing validation shall not be included in this step"

All plants that deliver the same output or capacity, within the applicable output range of 19.67MW~59.01MW, and have started commercial operation before the September 19th, 2011(start date of the project) have been taken into consideration in the common practice analysis.

Furthermore，China has a vast territory, the development policies and investment environment for projects in each province of China are not same. Particularly different provinces have different solar energy resource. The investment climate in the date of investment decision varies considerably from province to province depending on the local conditions. Registered CDM project activities and projects activities undergoing validation are not included.

Therefore, only power plants within the applicable output range of 19.67MW~59.01MW, have started commercial operation before the start date of the project in Ningxia Hui Autonomous Region, and did not registered as CDM project activities or undergoing validation are considered in common practice analysis.

$N_{all}=N_{all,pv}+ N_{all,other}$

Where:

$N_{all,pv}$=All the photovoltaic power plants within the applicable output range of 19.67MW~59.01MW, have started commercial operation before the start date of the project, and did not registered as CDM project activities or undergoing validation in Ningxia Hui Autonomous Region;

$N_{all,other}$=All the other renewable power plants within the applicable output range of 19.67MW~59.01MW, have started commercial operation before the start date of the project, and did not registered as CDM project activities or undergoing validation in Ningxia Hui Autonomous Region;

Step3: "Within plants identified in Step 2, identify thosed that apply technologies different that the technology applied in the proposed project activity. Note their number N_{diff} ***"***

According to *Tool for the* "demonstration and assessment of additionality"(Version 06.1.0), " *Different technologies is the context of common practice are technologies that deliver the same output and differ by at least one of the following...(a)Energy source/fuel;(b)Feed stock;(c)Size of installation(power capacity);(d)Inverstment climate in the date of investment decision;(e)Other features...*".

The project is a photovoltaic power project, and will make use of modules to transform solar energy into electrical energy. Neither the source of energy from photovoltaic power technology is the same as the other technologies, nor the output of photovoltaic power technology is a comparable quality compared with the other technologies. Therefore, only photovoltaic power plants are considered in common practice analysis. $N_{all,other}= N_{diff,other}$,

Where:

$N_{diff,other}$= The other renewable power plants within the applicable output range of 19.67MW~59.01MW, have started commercial operation before the start date of the project, and did not registered as CDM project activities or undergoing validation in Ningxia Hui Autonomous Region;

Therefore, photovoltaic power plants with the installed capacity of 19.67MW~59.01MW, started commercial operation before the start date of the project, and did not registered as CDM project activities or undergoing validation in Ningxia Hui Autonomous Region are considered to be similar to the proposed project.

According to the relative public available information from local government department and international associations such as Bloomberg[10], all photovoltaic power plants with the installed capacity of 19.67MW~59.01MW, started commercial operation before the start date of the project, are registered or under being developed as CDM projects[11],

Then $N_{all,pv} = N_{diff,pv}$.

Where:

$N_{diff,pv}$= Photovoltaic power plants within the applicable output range of 19.67MW~59.01MW, have started commercial operation before the start date of the project, and did not registered as CDM project activities or undergoing validation in Ningxia Hui Autonomous Region;

Therefore, $N_{diff} = N_{diff,pv} + N_{diff,other} = N_{all}$

Step4: "Calculate the factor $F=1-N_{diff}/N_{all}$ representing the share of plants using technology similar to the technology used in the proposed project activity in all plants that deliver the same output or capacity as the proposed project activity"

According to "Tool for the demonstration and assessment of additionality (Version 06.1.0)", the proposed project activity is a common practice within a sector in the applicable geographical area if the factor F is greater than 0.2 and $N_{all}-N_{diff}$ is greater than 3."

$F=1-N_{diff}/N_{all}=0<0.2; N_{all}- N_{diff}=0<3$

Therefore, photovoltaic power plants with the installed capacity of 19.67MW~59.01MW, started commercial operation before the start date of the project, and did not registered as CDM project activities or undergoing validation in Ningxia Hui Autonomous Region have been developed as CDM projects.

So according to *Tool for demonstration and assessment of additionality* (version 06.1.0), the project activity is not a common practice. In general, the project faces serious barrier which would prevent the implementation of the project activity without CDM. CDM helps to overcome the barriers. If the project is not implemented, the power will be supplied by the NWPG. Hence, the project activity isn't baseline scenario, and it's additional.

Conclusion: The Project satisfies the requirement of the additionality tool. Therefore, the Project is considered additional.

B.6. Emission reductions:

[10] http://www.sdpc.gov.cn/zcfb/zcfbtz/2010tz/t20100409_339707.htm
http://www.nxdrc.gov.cn/zfxxgk/zfxxgkml/index.htm
http://bnef.com/

[11] http://cdm.unfccc.int/Projects/Validation/index.html

B.6.1. Explanation of methodological choices:

Emission reduction for the Project is calculated based on the ACM0002 (version 13.0.0) *Consolidated baseline methodology for grid-connected electricity generation from renewable sources* and the latest approved methodology: *Tool to calculate the emission factor for an electricity system* (version 02.2.1).

Project Emission (PE_y)

The project emission (*PEy*) is zero as the project activity is a photovoltaic power generation project without any fossil fuel consumption. Thus no project emissions are envisaged from the project activity.

According to the methodology ACM0002, **PE_y=0.**

Baseline Emission (BE_y)

Baseline emissions include only CO_2 emission from electricity generation in fossil fuel fired power plants that are displaced due to the project activity. The methodology assumes that all project activity generation above baseline levels would have been generated by existing grid-connected power plants and the addition of new grid-connected power plants. Below is the equation for baseline emission calculation:

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

Where:

BE_y = emissions in the baseline scenario in year y (tCO_2)

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

$EF_{grid,CM,y}$ = 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 $EG_{PJ,y}$

For greenfield renewable energy power plants where no renewable power plants as operated prior to the implementation of the project activity, then:

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

Where:

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

Calculation of $EF_{grid,CM,y}$

According to the “Tool to calculate the emission factor for an electricity system (Version 02.2.1)”, project participants shall apply the following six steps to calculate the combined margin CO_2 emission factor:

Step 1: Identify the relevant electricity systems

In accordance with the boundary definitions of the Chinese DNA, The spatial extent of the project boundary includes the Project and all power plants connected physically to the NWPG that the Project is connected to. NWPG is defined as the project electricity system, which consists of independent province-level electricity systems including Shaanxi Province, Gansu Province, Qinghai Province, Ningxia Hui Autonomous Region and Xinjiang Uyghur Autonomous Region. That can be dispatched without significant transmission constraints. For the purpose of determining the build margin emission factor, the spatial extent is limited to the project electricity system (NWPG).

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

According to the Approval of electricity connection to NWPG, all the power generated by the project activity will be supplied to the power grid company. Thus, the Project does not include off-grid power plants in the project electricity system referred in apply to "Tool to calculate the emission factor for an electricity system" (Version 02.2.1).

Step 3: Select an operating margin (OM) method

Calculation of OM emission factor should be based on one of the following four methods:
(a) Simple OM, or
(b) Simple adjusted OM, or
(c) Dispatch Data Analysis OM, or
(d) Average OM.

The simple OM method can only be used where low-cost/must run resources constitute less than 50% of total grid generation in: (1) average of the five most recent years, or (2) based on long-term normal for hydroelectricity production. Low operating cost and must run resources 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. From 2005 to 2009, the low cost must run resources constitute less than 50% of total amount grid generation output. NWPG only possesses 24.42% of its total electricity generation that comes from renewable energy sources in 2009, 21.82% in 2008, 22.42% in 2007, 24.71% in 2006 and 25.36% in 2005. Therefore, method (a) is applicable for the project.

For the Simple OM, the simple adjusted OM and the average OM, the emission factor can be calculated using either of the two following data vintages:

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 emission 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. For off-grid power plants, use a single calendar year within 5 most recent calendar years prior to the time of submission of the CDM-PDD for validation.

Ex posed option: The year in which the project displaces grid electricity, requiring the emission factor to be updated annually during the monitoring. If the data required calculating the emission factor for year *y* is usually only available later than six month after the end of year *y*.

Ex ante option will be used for OM calculation of the project activity.

In conclusion, method (a) is the only reasonable and feasible method among the four methods for calculating the Operating Margin emission factor ($EF_{grid,OMsimple,y}$) of the NWPG.

Step 4: Calculate the operating margin emission factor according to the selected method (Simple OM)

The Simple Operating Margin emission factor $EF_{grid,OM,y}$ is defined as the generation-weighted average emissions per unit net electricity generation (tCO_2/MWh) of all generating sources serving the system, not including low-operating cost and must-run power plants. Two options can be selected to calculate the simple OM:

- Based on data on fuel consumption and net electricity generation of each power plant / unit (Option A); or
- Based on data 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).

As data for options A is not available, and 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, therefore, option B is chosen to calculate the OM emission factor, following the published DNA data and calculations.

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

$$EF_{grid,OMsimple,y} = \frac{\sum_{i}(FC_{i,y} \times NCV_{i,y} \times EF_{CO2,i,y})}{EG_y} \quad (3)$$

Where:

$EF_{grid,OMsimple,y}$ = Simple operating margin CO_2 emission factor in year y (tCO_2/MWh).

$FC_{i,y}$ = Amount of fossil 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 fossil fuel type i in year y (GJ / mass or volume unit).

$EF_{co2,i,y}$ =CO_2 emission factor of fossil fuel type i in year y (tCO_2/GJ).

$EG_{grid,y}$ = 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 fossil 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.

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

As discussed in step 1, emission factor for the net electricity imports ($EF_{grid,OMsimple,y}$) is determined in the same way as the simple OM emission rate of the exporting grid.

Given the above, the simple operating margin CO_2 emission factor ($EF_{grid,OMsimple,y}$) of NWPG is 1.0001tCO_2/MWh. The detailed calculations and data are listed in the Annex3.

Step5: Calculate the build margin (BM) emission factor

In terms of the vintage of the data, two options are given in the tool. In this case Option 1 is chosen: For the first crediting period, the build margin emission factor is calculated 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 (SET5-units) and determine their annual electricity generation (AEGSET-5-units, in MWh);

(b) Determine the annual electricity generation of the project electricity system, excluding power units registered as CDM project activities (AEGtotal, 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 AEGtotal (if 20% falls on part of the generation of a unit, the generation of that unit is fully included in the calculation) (SET⩾20%) and determine their annual electricity generation (AEGSET-⩾20%, in MWh);

(c) From SET5-units and SET⩾20% select the set of power units that comprises the larger annual electricity generation (SETsample);

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

$$EF_{grid,BM,y} = \frac{\sum_{m} EG_{m,y} \times EF_{EL,m,y}}{\sum_{m} EG_{m,y}} \qquad (4)$$

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 power generation data is available.

As plant specific fuel consumption and electricity generation data is not publicly available in China, EB guidance[12] is used to calculate $EF_{grid,BM,y}$. While the request for deviation was submitted relating to AM0005, the guidance has also widely been used for "Tool to calculate the emission factor for an electricity system" as this replaces reference to ACM0002 which directly replaces AM0005 and all OM and BM calculations in these two methodologies are the same:

- Use capacity additions for estimating the build margin emission factor for grid electricity.
- Use weighting estimated using installed capacity in place of annual electricity generation.
- Use the efficiency level of the best technology commercially available in the provincial/regional or national grid, as a conservative proxy, for each fuel type in estimating the fuel consumption to estimate the build margin (BM).

Deviated Calculation of Build Margin (BM)

Sub-step 1. With the energy balance sheet in China Energy Statistical Yearbook for the most recent year, calculating the respective percentage of CO_2 emissions from coal fired power generation, oil fired power generation, and gas fired power generation against total CO_2 emissions from fossil fuel fried power generation:

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

$$\lambda_{Oil,y} = \frac{\sum_{i \in OIL,} F_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,j,y}}{\sum_{i,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,j,y}} \quad (6)$$

$$\lambda_{Gas,y} = \frac{\sum_{i \in GAS,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,j,y}}{\sum_{i,j} F_{i,j,y} \times NCV_{i,y} \times EF_{CO_2,i,j,y}} \quad (7)$$

Where:

$F_{i,j,y}$ is the amount of fuel *i* (in a mass or volume unit) consumed by province *j* in year(s) *y*.
$NCV_{i,j}$ = Net calorific value (energy content) of fossil fuel type *i* consumed by province *j* (GJ / mass or volume unit).
$EF_{CO2,i,j}$ = CO_2 emission factor of fossil fuel type *i* consumed by province *j* (tCO_2/GJ).
COAL, *OIL* and *GAS* are footnote group for solid fuels, liquid fuels and gas fuels.

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[12] Deviation for projects in China (DNV, 7 Oct 05), see http://cdm.unfccc.int/Projects/deviations/87512.

Sub-step 2: Calculation of Emission Factor of Relevant Thermal Power

$EF_{thermal\,y}$ is calculated as a weighted emission factor as the following formula:

$$EF_{Thermal,y} = \lambda_{Coal,y} \times EF_{Coal,Adv,y} + \lambda_{Oil,y} \times EF_{Oil,Adv,y} + \lambda_{Gas,y} \times EF_{Gas,Adv,y} \quad (8)$$

Where:

$\boldsymbol{EF_{Coal,\,Adv,y}}$ $\boldsymbol{EF_{Oil,Adv,y}}$ and $\boldsymbol{EF_{Gas,\,Aad,y}}$ are the emission factors of the best technology for coal, oil, gas fired power plants commercially available in China, which are calculated based on the efficiency level of the best technology for each fuel type commercially available in China (see details in Annex 3).

Sub-step 3: Calculation of BM of the Grid

BM of the grid is calculated as follows:

$$EF_{grid,BM,y} = \frac{CAP_{Thermal,y}}{CAP_{Total,y}} * EF_{Thermal,y} \quad (9)$$

Where:

$CAP_{Total,y}$ is the additional capacity which is close to but not more than 20% of the existing capacity,
$CAP_{Thermal,y}$ is the additional capacity of thermal plants.

The Project adopts the latest data of OM emission factor in NWPG which is issued by China DNA on 20th October 2011. Please refer to "*2011 Baseline emission factors for regional power grids in China*" by China DNA and Annex 3 for the concrete calculation process.

The Build Margin emissions factor is now calculated as the percentage of thermal plant additions and thermal plant emissions factor.

Based on the formula above, the BM emission factor of NWPG for the proposed project in the crediting period is calculated as:
$EF_{grid,BM,y}$ = 0.5851tCO_2e/MWh.

The details of $EF_{grid,BM,y}$ calculation are given in Annex 3.

Step 6. Calculate the combined margin emissions factor

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

(a) Weighted average CM; or

(b) Simplified CM.

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

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

- The project activity is located in a Least Developed Country (LDC) or in a country with less than 10 registered projects at the starting date of validation; and

- The data requirements for the application of step 5 above cannot be met.

Option (a) is the preferred option. Option (b) cannot be used as the Project activity does not take place in an LDC or in a country with less than 10 registered projects. Therefore, option (a) is chosen.

(a) Weighted average CM

The combined margin emissions factor is calculated as follows:

$$EF_{grid,CM,y} = w_{OM} \times EF_{grid,OM,y} + w_{BM} \times EF_{grid,BM,y} \quad (10)$$

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 inyear y (tCO_2/MWh)
w_{OM} = Weighting of operating margin emission factor (%)
w_{BM} = Weighting of build margin emission factor (%)

According to the tool, for wind and solar power generation project activity, 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. Since the Project activity is photovoltaic power generation project, w_{OM} = 0.75 and w_{BM} = 0.25 will be used in the calculation.
$EF_{grid,CM,y}$ = 0.75*1.0001+0.25*0.5851=0.89635 (tCO_2e/MWh)

Leakage (LE_y)

According to the methodology ACM0002, there will be no leakage caused by the project activity. Thus, LE_y =0.

Emission Reductions (ER_y)

Emission reductions due to the project activity during the year *y* are calculated as follows:

$$ER_y = BE_y - PE_y - LE_y \quad (11)$$

Where:
ER_y = Emission reductions in year y (t CO_2e).
BE_y = Baseline emissions in year y (t CO_2).
PE_y = Project emissions in year y (t CO_2e).
LE_y = Leakage emissions in year y (t CO_2e).

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

Data / Parameter:	*Power Generation*
Data unit:	MWh
Description:	The total power generation and power generated by low-cost/must run power plants for NWPG in year 2007, 2008 and 2009.
Source of data used:	*China electric power yearbook (2008 to 2010)*
Value applied:	See Annex 3 for details
Justification of the choice of data or	NWPG is defined as the project boundary of the Project. According to the *Tool to calculate the emission factor for an electricity system*, the option of simple

description of measurement methods and procedures actually applied :	OM can only be used where low-cost/must run resources constitute less than 50% of the total grid generation.
Any comment:	Official data

Data / Parameter:	*EG_y*
Data unit:	MWh
Description:	Net electricity generated and delivered to NWPG by all power sources serving the system in year 2007, 2008and 2009, excluding low-cost/must-run power plants/units.
Source of data used:	*China electric power yearbook (2008 to 2010)*
Value applied:	See Annex 3 for details
Justification of the choice of data or description of measurement methods and procedures actually applied :	NWPG is defined as the project boundary for the Project. According to the *Tool to calculate the emission factor for an electricity system*, the generation by low-operating cost and must-run power plants within NWPG are excluded from calculation of simple OM emission factor.
Any comment:	Official data

Data / Parameter:	*$FC_{i,y}$*
Data unit:	Mass (10^4 t) or volume (10^8 m^3) unit
Description:	Amount of different type of fossil fuel consumed for power generation within NWPG
Source of data used:	*China energy statistical yearbook (2008 to 2010)*
Value applied:	See Annex 3 for details
Justification of the choice of data or description of measurement methods and procedures actually applied :	NWPG is selected as the project boundary for the Project.
Any comment:	*Official data*

Data / Parameter:	*$EF_{CO2,i,y}$*
Data unit:	kg CO_2/TJ
Description:	Emission factors of fuels for electricity generation
Source of data used:	2006 IPCC default values
Value applied:	See Annex 3 for details
Justification of the choice of data or description of measurement methods and procedures actually applied :	IPCC world-wide default values at the lower limit of the uncertainty at a 95% confidence interval are adopted.
Any comment:	-

Data / Parameter:	*Best electricity supply efficiency of thermal power*

Data unit:	%
Description:	The efficiency level of the best coal-based, oil-based and gas-based power generation technology available in China.
Source of data used:	*2011 Baseline emission factors for regional power grids in China*
Value applied:	See Annex 3 for details.
Justification of the choice of data or description of measurement methods and procedures actually applied :	According to the deviation accepted by EB, the efficiency level of the best technology commercially available in the national grid of China is used as a conservative value for the calculation of BM emission factor.
Any comment:	Official data

Data / Parameter:	$NCV_{i,y}$
Data unit:	MJ/t or MJ/km^3
Description:	Net calorific value of fossil fuel type i in year y
Source of data used:	*China energy statistical yearbook (2008 to 2010)*
Value applied:	See Annex 3 for details.
Justification of the choice of data or description of measurement methods and procedures actually applied :	Official statistic, publicly accessible and reliable data source.
Any comment:	-

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

Project emission (PE_y)

The project emission (PE_y) is zero as the project activity is a photovoltaic power generation project without any fossil fuel consumption. Thus no project emissions are envisaged from the project activity.

Baseline emissions (BE_y)

According to *2011 Baseline emission factors for regional power grids in* China issued by the National Development and Reform Commission of the Government of China (China DNA), the OM emission factor ($EF_{grid,OM,y}$) of NWPG is calculated as 1.0001 tCO_2/MWh, and the build margin emission factor ($EF_{grid,BM,y}$) of NWPG is calculated as 0.5851 tCO_2/MWh.

Based on formula (10) in section B.6.1, the baseline emissions factor ($EF_{grid,CM,y}$) of NWPG is calculated as 0.89635tCO_2/MWh.

Baseline emissions are: $BE_y = EG_{PJ,y} \times EF_{grid,CM,y}$ = 54,000(MWh)×0.89635(tCO_2/MWh) = 48,402 tCO_2

Leakage (LEy)

According to the methodology ACM0002, there will be no leakage caused by the project activity. Thus $LE_y = 0$

Emission Reductions (ERy)

$ER_y = BE_y - PE_y - LE_y$ = 48,402 – 0 – 0 = 48,402 tCO_2e.

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

The renewable crediting period of the Project is 7×3 years. GHG Emission reductions in the first renewable crediting period (from 01/12/2012 to 30/11/2019) are ex-ante worked out as are shown in the following table.

Year	Estimation of project activity emissions (tCO_2e)	Estimation of baseline emissions (tCO_2)	Estimation of leakage (tCO_2e)	Estimation of overall emission reductions (tCO_2e)
01/12/2012-30/11/2013	0	48,402	0	48,402
01/12/2013-30/11/2014	0	48,402	0	48,402
01/12/2014-30/11/2015	0	48,402	0	48,402
01/12/2015-30/11/2016	0	48,402	0	48,402
01/12/2016-30/11/2017	0	48,402	0	48,402
01/12/2017-30/11/2018	0	48,402	0	48,402
01/12/2018-30/11/2019	0	48,402	0	48,402
Total (tCO_2e)	0	338,814	0	338,814

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

B.7.1 Data and parameters monitored:

Data / Parameter:	$EG_{PJ\ to\ grid,y}$
Data unit:	MWh
Description:	Quantity of electricity supplied by the Project to the grid in year y
Source of data to be used:	Measured by meters installed at the output of the on-site booster station
Value of data applied for the purpose of calculating expected emission reductions in section B.5	54,000
Description of measurement methods and procedures to be applied:	Continuous measurement and at least monthly recording
QA/QC procedures to be applied:	Measurement results should be cross-checked by records for sold electricity.
Any comment:	-

Data / Parameter:	$EG_{grid\ to\ PJ,y}$
Data unit:	MWh
Description:	Quantity of electricity imported from the grid by the Project in year y.
Source of data to be used:	Measured by meters installed at the output of the on-site booster station and meter installed at 10kV backup line
Value of data applied for the purpose of calculating	0

expected emission reductions in section B.5	
Description of measurement methods and procedures to be applied:	Continuous measurement and at least monthly recording
QA/QC procedures to be applied:	Measurement results should be cross-checked by records for bought electricity.
Any comment:	-

Data / Parameter:	$EG_{facility,y}$
Data unit:	MWh
Description:	Net electricity supplied by the project activity to the grid in year *y*
Source of data to be used:	Measured by meters installed at the output of the on-site booster station of the project and meter installed at 10kV backup line
Value of data applied for the purpose of calculating expected emission reductions in section B.5	It is calculated by using the Equation ($EG_{PJ\ to\ grid,y}$- $EG_{grid\ to\ PJ,y}$)
Description of measurement methods and procedures to be applied:	Calculated from the above measured parameters and recorded on a monthly basis
QA/QC procedures to be applied:	Measurement results should be cross-checked by records for sold electricity.
Any comment:	/

B.7.2. Description of the monitoring plan:

1. Data to be monitored

In this PDD, emission factor of the Project is determined ex-ante. Therefore, the quantity of electricity supplied by the Project to the grid in year y ($EG_{PJ\ to\ grid,y}$) and the quantity of electricity imported from the grid by the Project in year y ($EG_{grid\ to\ PJ,y}$) which is used to calculate emission reductions will be monitored. the net electricity supplied to the grid ($EG_{facility,y}$) will be calculated ($EG_{facility,y}$ =$EG_{PJ\ to\ grid,y}$- $EG_{grid\ to\ PJ,y}$).

2. Implementation of the monitoring plan

The CDM technical staff and CDM statistic staff will be appointed by the project owner, who supervise and verify metering and recording, collect data (the data on the meter, sales/purchasing invoice or the balance bill), calculate emission reductions and prepare monitoring report.

The CDM manager will take the responsibility for the monitoring plan implementation. A CDM team is to be established and consists of project manager, CDM manager, technical staff, and statistic staff. Organizing structure of the CDM team is shown as Figure 5.

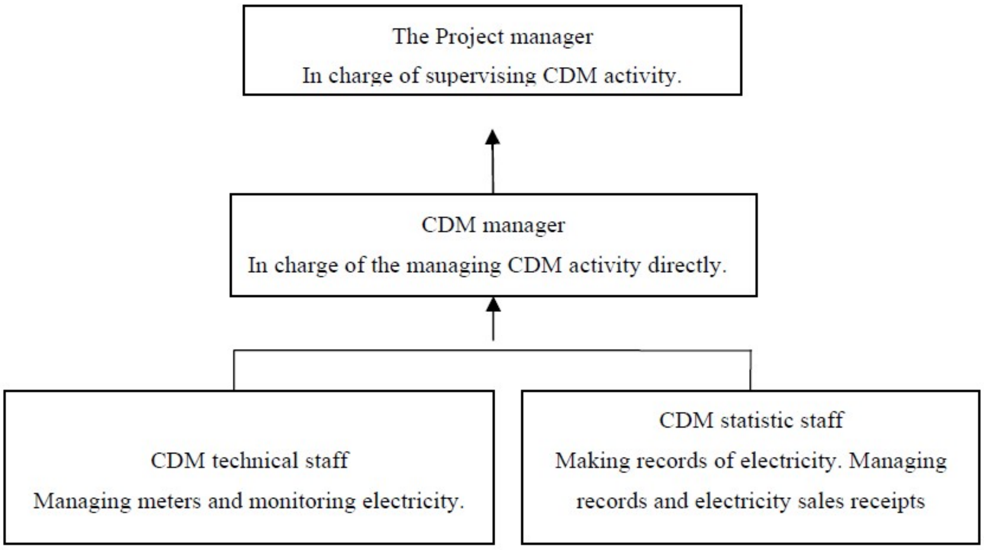

Figure 5: Structure of the CDM team

CDM training will be organized by the project owner which mainly include about the CDM basic knowledge, the monitoring requirement, the validation and verification. The project owner will compile the training manual and monitoring manual to conduct the employees to operate the Project according to the requirement of CDM.

3. Monitoring Equipment and program

The electric energy metering equipment will be properly configured and the metering equipment will be checked by both the project owner and the grid company before the project starts Operating according to *relevant standard in China*.

Main meter (M1, bi-directional, 0.5S or more accurate) which measure the electricity supplied to the grid and electricity use of power plant supplied by the grid will be installed at the output of the on-site booster station of the project, backup meter (M2, bi-directional, 0.5S or more accurate) at the same place of main meter will be employed as the backup meter of M1. Meter (M3, unidirectional, 0.5S or more accurate) which measure the electricity use of power plant supplied by the grid will be installed at 10kV backup line. When the main meter is in troubles, the project owner should employ the data monitored by the backup meter. When two meters are all in trouble, the emission reduction in malfunction period will not be counted.

The power connection diagram is as follows:

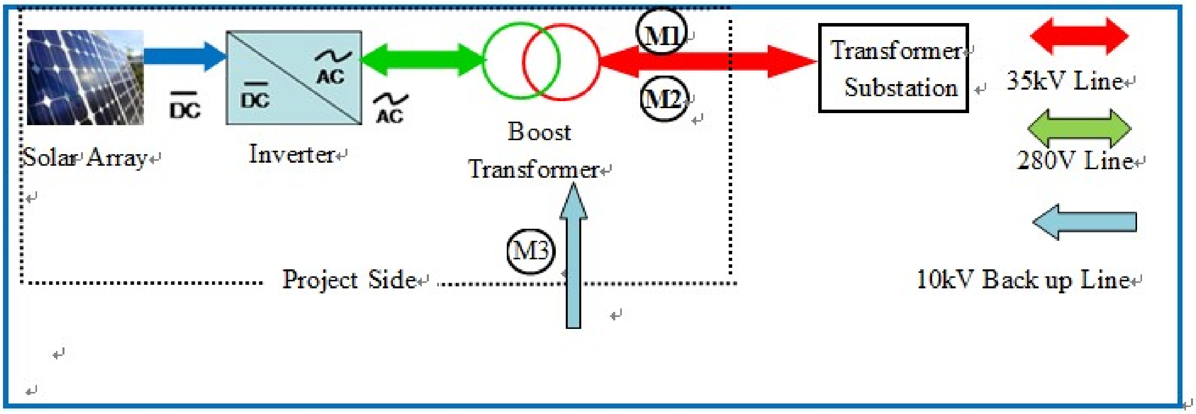

Fig 6 Power Connection Diagram

4. Data Collection

On-duty staff will watch the operation status of metering equipments everyday on site. Furthermore, designated staff will collect the measured electricity and complete the corresponding records on a monthly basis. Before being archived, these records will be checked by other staffs to ensure the correctness. The data from these records will be digested and analyzed and the results will be reported to company administrator or supervisor.

All the relevant data records will be kept by the Project owner during the crediting period and at least for two years after the end of the last crediting period.

5. Quality assurance and quality control

The quality assurance and quality control procedures involves of data monitoring, recording, maintaining and archiving, and monitoring equipment calibration.

The monitoring data would be cross checked by the sold and bought records of the Project for the purpose of quality control.

Calibration of meters & metering should be implemented according to national standards and rules, and all the records should be documented and maintained by the project owner for verification.

6. Procedures of exception handling and reporting

The CDM technical staffs will take real-time monitoring on the operation status of meters to ensure that any abnormity could be detected and the corresponding measures of processing, reporting and recording will be taken in time. The abnormal meter will be repaired immediately and must be calibrated by a qualified third-party before being put into use again.

Problem occurred in monitoring and measurement process will be recorded and reported to company administrator or supervisor. Consequently, the corrective resolution will be adopted to deal with that problem and to avoid it occur again in future.

7. Verification

It is expected that the verification of emission reductions generated from the Project will be carried out annually.

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

Date of completion: 19/10/2012

Name of person/entity determining monitoring methodology:

- Ms. Fiona Tao, Mr. Zhang Lixing, taoyun@dtm.cc, DTM (Beijing) Energy Technology Development Co., Ltd., 4703 Yintai Office Tower C, No 2 Jianguomenwai Avenue, Beijing, People's Republic of China, 100022, Tel: 85079830.
  (Not Project Participant)

SECTION C. Duration of the project activity / crediting period

C.1. Duration of the project activity:

C.1.1. Starting date of the project activity:

19/09/2011 (the EPC contract was signed)

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

25 years, 0 month.

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

C.2.1. Renewable crediting period:

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

01/12/2012 (or the registration date in EB, whichever is later)

C.2.1.2. Length of the first crediting period:

7 years, 0 month.

C.2.2. Fixed crediting period:

Not applicable.

C.2.2.1. Starting date:

Not applicable.

C.2.2.2. Length:

Not applicable.

SECTION D. Environmental impacts

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

The environment impact assessment (EIA) for the Project was approved by Ningxia Hui Automonous Region Protection Bureau in April 2011(Ning Huan Biao[2011] No.36). The EIA report shows that the Project has no significant impacts on environment. Generally, the Project will bring more positive environment benefit than the adverse impacts. The Project uses the natural photovoltaic power to generate electricity, and the whole production process does not consume fossil fuels. Therefore, no pollutant is generated during the production and this reduces the air pollutant to the surrounding. The reduction of air pollutant through reduction of fossil fuel for power generation will has positive impact to the local area.

A summary of the impacts for the project activity are presented as bellows:

• Air quality

During civil construction period, the construction will cause dust emission which will be greatly mitigated through the following measures:

A. Watering will be implemented timely on the construction site and transport roads.
B. The construction materials on the vehicles will be sealed by tarpaulins during transportation.
C. Strengthened management of material field, road hardening and building cement field will minimize dust emissions and secondary dust.

After put into operation, the project will not produce exhaust gas pollution.

• Water quality

The wastewater discharged during civil construction mainly includes construction sewage, machinery equipment washing water and domestic sewage, etc. All of the sewage will be reused after treated. Therefore, the project has no negative effect on the regional water environment.

After commissioning, the sewage mainly results from the workers' life. The sewage will be treated and then reused, have no negative effect on the regional water environment.

• Noise

The noise during civil construction will originate from operating equipment and transportation vehicles. To reduce the impacts of noise, the construction time and interval will be controlled strictly. Moreover, the surrounding areas of the project site are all wastelands and there are no residents around. Thus, the construction noise will cause no effects on the surrounding environment as long as the construction is implemented reasonably.

There is no noise during operation.

• Solid waste

During the civil construction period, the soil waste mainly results from construction rubbish and domestic refuse from workers. All the solid waste will be collected by the sanitation department for disposal.

The soil waste during operation will be collected by the sanitation sector for disposal.

• **Ecological environment**

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. 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.

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

According to the approved EIA report of the Project, the project owner will carry out the environment protection and environment management well during construction and operation period, the Project will not cause significant reverse impacts.

SECTION E. Stakeholders' comments

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

According to the area impacted by the Project, local villagers around the project site are identified as the stakeholders of the Project.

In Sep. 2011, the staff from the project owner carried out a survey of the local villagers and residents in the area. 1 page questionnaire was designed to fill in and has the following sections:

- Project introduction
- Respondent's basic information and education level
- Questions on:

1. Do they agree with the development and construction of the project?
2. Will the project have a negative impact on your environment of living, studying and working?
3. Will the project have a negative impact on the environment, such as noise, water and electromagnetism?
4. Will the project have a negative impact on the ecosystem?
5. Do you think the Project will have promotion in local economic development?
6. Do you have some suggestion about the project?

E.2. Summary of the comments received:

The results of the surveyed are as follows:

Following is a summary of the local survey. The survey forms are available from the project owner.

The questionnaires were sent to 40 households and the survey had a 100% response rate. The result of the survey indicated the support to the project.

The statistic of opinion:

- Among the respondents, 30 people are male, and 10 people are female.
- Among the respondents, 9 people are between 21 and 30, 30 people are between 31 and 40, 1 people are between 41 and 50.
- Among the respondents, 10 people finished the education of primary school, 24 people finished the education of junior high school, 6 people finished the education of senior high school/technical secondary school.
- Among the respondents, 27 people are farmers, 5 people are workers, 8 people have other occupations.

It can be seen that respondents are representative of the public opinions in terms of their gender, age and educational levels. Therefore, it can be considered that responses to the survey have comprehensively reflected the attitudes towards the Project of the villagers possibly affected by the Project.

- 100% of respondents agreed with the development of the Project.
- 95% respondents believed that the project construction will not do harm to the environment, 5% did not respond.
- 97.5% believed that the project construction will do no harm to the ecosystem, 2.5% did not respond.
- 97.5% believed that the project construction will have no impact to the environment of living, studying and working, 2.5% did not respond.
- 100% believed that the project construction will have positive impact on local economic development.
- 100% had no further suggestion.

Conclusions from the survey:

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

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

According to all the comments and advice received, all the shareholders support the construction of the proposed project. The local residents believe if the project owner strictly follow the Environmental Impact Assessment Report, the limited impacts caused by the proposed project will be negligible.

Annex 1

CONTACT INFORMATION ON PARTICIPANTS IN THE PROJECT ACTIVITY

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Annex 2

INFORMATION REGARDING PUBLIC FUNDING

No public funding from Annex I Parties is involved in the Project.

Annex 3

BASELINE INFORMATION

Data recommended in the *2011 Baseline emission factors for regional power grids in China* [13]（issued by Chinese DNA）for NWPG are adopted for the Project.

Table A1~A3 show the thermal power generation supplied to NWPG in 2007, 2008 and 2009.

Table A1. Thermal power generation data within NWPG in 2007

	Electricity generation (MWh)	Auxiliary electricity consumption (%)	Electricity delivered to the grid (MWh)
Shaanxi	59,100,000	6.77	55,098,930
Gansu	42,400,000	5.89	39,902,640
Qinghai	9,700,000	7.19	9,002,570
Ningxia	43,500,000		43,500,000
Xinjiang	34,600,000	9.2	31,416,800
Total			178,920,940

Data source: China Electric Power Yearbook 2008Edition;

Table A2. Thermal power generation data within NWPG in 2008

	Electricity generation (MWh)	Auxiliary electricity consumption (%)	Electricity delivered to the grid (MWh)
Shaanxi	71,500,000	6.95	66,530,750
Gansu	46,800,000	6.4	43,804,800
Qinghai	10,700,000	7.14	9,936,020
Ningxia	44,000,000	7.57	40,669,200
Xinjiang	39,700,000		39,700,000
Total			200,640,770

Data source: China Electric Power Yearbook 2009 Edition.

Table A3. Thermal power generation data within NWPG in 2009

	Electricity generation (MWh)	Auxiliary electricity consumption (%)	Electricity delivered to the grid (MWh)
Shaanxi	77,400,000	7.24	71,796,240
Gansu	44,100,000	6.88	41,065,920
Qinghai	10,700,000	7.01	9,949,930
Ningxia	44,700,000	7.76	41,231,280
Xinjiang	45,200,000	5.16	42,867,680
Total			206,911,050

Data source: China Electric Power Yearbook 2010 Edition.

[13] *2011 Baseline Emission Factors for Regional Power Grids in China*
Please refer tohttp://cdm.ccchina.gov.cn/WebSite/CDM/UpFile/File2720.pdf

With reference to the *2011 Baseline emission factors for regional power grids in China*, Table A4 shows the low calorific values and emission factors that are to be used in the following OM emission factor calculation and BM emission factor calculation.

Table A4. Data of fuels consumed for electricity generation

Fuel type	Emission factor ($kgCO_2/TJ$)	NCV （$MJ/t,km^3$）
Raw coal	87,300	20908
Cleaned coal	87,300	26344
Other washed coal	87,300	8363
Coal briquette	87,300	20908
Coke	95,700	28435
Coke over gas	37,300	16726
Other coal gas	37,300	5227
Crude oil	71,100	41816
Gasoline	67,500	43070
Diesel	72,600	42652
Fuel oil	75,500	41816
LPG	61,600	50179
Refinery gas	48,200	46055
Natural gas	54,300	38931
Other petroleum products	72,200	41816
Other coke products	95,700	28435
Other energy sources	0	0

Data sources: China Energy Statistical Yearbook 2009 edition;

Table 1.3 and Table 1.4, Chapter 1, Volume 2 of the 2006 IPCC Guidelines for National Greenhouse Gas Inventories.

Table A5-A7show the calculation of the simple OM emission factor of NWPG in 2007, 2008, and 2009.

Table A5. Calculation of the simple OM emission factor of NWPG in 2007

Fuel type	**Unit**	**Shaanxi A**	**Gansu B**	**Qinghai C**	**Ningxia D**	**Xinjiang E**	**Total F=A+B+C+D+E**	**Carbon content （tc/TJ） G**	**Emission factor ($kgCO_2/TJ$) I**	**NCV （MJ/t,km^3） J**	**Emission （tCO_2e） K=F×I×J/100000（mass uint） K=F×I×J /10000 (volume unit)**
Raw coal	10^4t	3303.44	1969.03	470.85	2165.8	1762.11	**9671.23**	25.8	87,300	20,908	176,525,905
Cleaned coal	10^4t						**0**	25.8	87,300	26,344	0
Other washed coal	10^4t	3.73			124.31	7.73	**135.77**	25.8	87,300	8,363	991,243
Briquettes	10^4t	3.53					**3.53**	26.6	87,300	20,908	64,432
Coke	10^4t						**0**	29.2	95,700	28,435	0
Coke over gas	10^8m^3	0.52	0.65			0.26	**1.43**	12.1	37,300	16,726	89,215
Other coal gas	10^8m^3	14.14	0.71				**14.85**	12.1	37,300	5,227	289,526
Crude oil	10^4t					0.09	**0.09**	20	71,100	41,816	2,676
Gasoline	10^4t	0.02					**0.02**	18.9	67,500	43,070	581
Diesel	10^4t	1.12	0.26	0.42		1.77	**3.57**	20.2	72,600	42,652	110,546
Fuel oil	10^4t	0.01	1.05	0.04		0.05	**1.15**	21.1	75,500	41,816	36,307
LPG	10^4t						**0**	17.2	61,600	50,179	0
Refinery gas	10^4t					5.99	**5.99**	15.7	48,200	46,055	132,969
Natural gas	10^8m^3	1.68	0.49	1.93		8.66	**12.76**	15.3	54,300	38,931	2,697,404
Other petroleum products	10^4t						**0**	20	75,500	41,816	0
Other coke products	10^4t						**0**	25.8	95,700	28,435	0
Other energy	10^4tce	94.36	9.73				**104.09**	0	0	0	0
									Sub-total	180,940,805	
Total emission of NWPG (tCO_2e)											180,940,805
Thermal power supplied to NWPG (MWh)											178,920,940
Simple OM emission factor of NWPG (tCO_2e/MWh)											1.01129

Data sources: China Energy Statistical Yearbook 2008 Edition.

Table A6. Calculation of the simple OM emission factor of NWPG in 2008

Fuel type	Unit	Shaanxi A	Gansu B	Qinghai C	Ningxia D	Xinjiang E	Total F=A+B+C+D+E	Carbon content（tc/TJ） G	Emission factor ($kgCO_2$/TJ) I	NCV（MJ/t,km^3） J	Emission（tCO_2e） K=F×I×J/100000（mass uint） K=F×I×J /10000 (volume unit)
Raw coal	10^4t	3620	2216.9	507.44	2330.72	1924.9	**10599.96**	25.8	87,300	20,908	193,477,720
Cleaned coal	10^4t						**0**	25.8	87,300	26,344	0
Other washed coal	10^4t	9.22			53.85	8.2	**71.27**	25.8	87,300	8,363	520,335
Briquettes	10^4t						**0**	26.6	87,300	20,908	0
Coke	10^4t						**0**	29.2	95,700	28,435	0
Coke over gas	10^8m^3	0.35	0.74			0.13	**1.22**	12.1	37,300	16,726	76,113
Other coal gas	10^8m^3	18.38	0.2				**18.58**	12.1	37,300	5,227	362,249
Crude oil	10^4t						**0**	20	71,100	41,816	0
Gasoline	10^4t	0.05				0.01	**0.06**	18.9	67,500	43,070	1,744
Diesel	10^4t	1.03	0.44	0.26	0.05	1.64	**3.42**	20.2	72,600	42,652	105,902
Fuel oil	10^4t		0.86	0.04		0.02	**0.92**	21.1	75,500	41,816	29,045
LPG	10^4t						**0**	17.2	61,600	50,179	0
Refinery gas	10^4t					7.25	**7.25**	15.7	48,200	46,055	160,939
Natural gas	10^8m^3	0.94	0.24	2.99		7.2	**11.37**	15.3	54,300	38,931	2,403,565
Other petroleum products	10^4t					0.01	**0.01**	20	72,200	41,816	302
Other coke products	10^4t						**0**	25.8	95,700	28,435	0
Other energy	10^4tce	93.67	10.58		21.24		**125.49**	0	0	0	0
									Sub-total		197,137,915
Total emission of NWPG (tCO_2e)											197,137,915
Thermal power supplied to NWPG (MWh)											200,640,770

Simple OM emission factor of NWPG (tCO_2e/MWh)	0.98254

Data sources: China Energy Statistical Yearbook 2009 Edition.

Table A7. Calculation of the simple OM emission factor of NWPG in 2009

Fuel type	Unit	Shaanxi A	Gansu B	Qinghai C	Ningxia D	Xinjiang E	Total F=A+B+C+D+E	Carbon content (tc/TJ) G	Emission factor ($kgCO_2/TJ$) I	NCV (MJ/t,km³) J	Emission（tCO_2e） K=F×I×J/100000 (mass uint) K=F×I×J /10000 (volume unit)
Raw coal	10^4t	3949.22	2060	467.05	2350.13	2380	**11206.4**	25.8	87,300	20,908	204,546,878
Cleaned coal	10^4t						**0**	25.8	87,300	26,344	0
Other washed coal	10^4t	8.34			56.01	6.66	**71.01**	25.8	87,300	8,363	518,437
Briquette	10^4t						**0**	26.6	87,300	20,908	0
Coke	10^4t						**0**	29.2	95,700	28,435	0
Coke over gas	10^8m^3	0.49	0.8			0.12	**1.41**	12.1	37,300	16,726	87,967
Other coal gas	10^8m^3	18.37	0.44				**18.81**	12.1	37,300	5,227	366,733
Crude oil	10^4t						**0**	20	71,100	41,816	0
Gasoline	10^4t	0.02					**0.02**	18.9	67,500	43,070	581
Diesel	10^4t	0.6	0.52	0.2	0.07	0.7	**2.09**	20.2	72,600	42,652	64,718
Fuel oil	10^4t		0.25	0.08		0.06	**0.39**	21.1	75,500	41,816	12,313
LPG	10^4t	0.02					**0.02**	17.2	61,600	50,179	618
Refinery gas	10^4t					8.56	**8.56**	15.7	48,200	46,055	190,019
Natural gas	10^8m^3	0.91	0.07	3.93		7.83	**12.74**	15.3	54,300	38,931	2,693,177
Other petroleum products	10^4t						**0**	20	75,500	41,816	0
Other coke products	10^4t						**0**	25.8	95,700	28,435	0
Other energy	10^4tce	73.76	18.52		18.08		**110.36**	0	0	0	0
										Sub-total	208,481,441

Total emission of NWPG (tCO_2e)	208,481,441
Thermal power supplied to NWPG (MWh)	206,911,050
Simple OM emission factor of NWPG (tCO_2e/MWh)	1.00759

Data sources: China Energy Statistical Yearbook 2010 Edition.

The simple OM emission factor is weighted average value of the simple OM emission factors of NWPG in 2007, 2008, 2009, as follows:

$$EF_{OM,y} = 1.0001 tCO_2e/MWh$$

Table A8 is data of the efficiency level of the best electricity generation technologies commercially available in China and the corresponding emission factors with reference to *2011Baseline emission factors for regional power grids in China* issued by Chinese DNA.

Table A8. The data of efficiency level of the best electricity generation technologies commercially available in China and the corresponding emission factors

	Parameter	**Efficiency of supplying electricity**	**Fuel emission factor (tCO2/TJ)**	**Oxidation rate (%)**	**Emission factor (tCO_2e/MWh)**
		A	B	C	D=3.6/A/10,000×B×C
Coal-fired power plant	$EF_{Coal,Adv,y}$	39.45	87,300	1	0.7967
Gas-fired power plant	$EF_{Gas,Adv,y}$	51.77	75,500	1	0.5250
Oil-fired power plant	$EF_{Oil,Adv,y}$	51.77	54,300	1	0.3776

Table A9. Data for calculating the thermal power emission factors

Fuel type	Unit	Shaanxi A	Gansu B	Qinghai C	Ningxia D	Xinjiang E	Total F=A+B+C+D+E	NCV (MJ/t, km^3) J	Emission factor ($tCO2/TJ$) I		Emission（tCO_2e） K=F×I×J/100000 （mass uint） K=F×I×J /10000 (volume unit)
Raw coal	10^4t	3,949.22	2,060	467.05	2,350.13	2,380	11,206.4	20,908	87,300		204,546,878
Cleaned coal	10^4t	0	0	0	0	0	0	26,344	87,300		0
Other washed coal	10^4t	8.34	0	0	56.01	6.66	71.01	8,363	87,300		518,437
Coal briquette	10^4t	0	0	0	0	0	0	20,908	87,300		0
Coke	10^4t	0	0	0	0	0	0	28,435	95,700		0
Other coke products		0	0	0	0	0	0	28,435	95,700		0
Sub-total											205,065,315
Crude oil	10^4t	0	0	0	0	0	0	41,816	71,100		0
Gasoline	10^4t	0.02	0	0	0	0	0.02	43,070	67,500		581
Diesel	10^4t	0.6	0.52	0.2	0.07	0.7	2.09	42,652	72,600		64,718
Fuel oil	10^4t	0	0.25	0.08	0	0.06	0.39	41,816	75,500		12,313
Other oil products	10^4t	0	0	0	0	0	0	41,816	72,200		0
Sub-total											77,612
Natural gas	10^7m^3	9.1	0.7	39.3	0	78.3	127.4	38,931	54,300		2,693,177
Coke oven gas	10^7m^3	4.9	8	0	0	1.2	14.1	16,726	37,300		87,967
Other coal gas	10^7m^3	183.7	4.4	0	0	0	188.1	5,227	37,300		366,733
LPG	10^4t	0.02	0	0	0	0	0.02	50,179	61,600		618
Refinery gas	10^4t	0	0	0	0	8.56	8.56	46,055	48,200		190,019
Sub-total											3,338,514
Total											208,481,441

Data sources: China Energy Statistical Yearbook 2010

Calculate with data provided in Table A8, A9 and formula (4)~(6), the value for

$$\lambda_{Coal,y} = 98.36\%,\quad \lambda_{Oil,y} = 0.04\%,\quad \lambda_{Gas,y} = 1.60\%,$$

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

$= 0.7899$ tCO_2e/MWh

Table A10. Installed capacity of NWPG in 2009

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

Data source: China Electric Power Yearbook 2010

Table A11. Installed capacity of NWPG in 2008

	Shaanxi	Gansu	Qinghai	Ningxia	Xinjiang	Total
Thermal power (MW)	17,850	8,980	2,000	7,540	8,200	44,570
Hydro power (MW)	1,810	5,440	5,910	430	2,190	15,780
Nuclear power (MW)	0	0	0	0	0	0
Wind power and Other (MW)	0	600	0	170	510	1,280
Total (MW)	19,660	15,020	7,910	8,140	10,900	61,630

Data source: China Electric Power Yearbook 2009

Table A12. Installed capacity of NWPG in 2007

	Shaanxi	Gansu	Qinghai	Ningxia	Xinjiang	Total
Thermal power (MW)	12290	7840	1903.8	7028	6560	35621.8
Hydro power (MW)	1794	4400	5834.4	428.5	2140	14596.9
Nuclear power (MW)	0	0	0	0	0	0

Wind power and Other (MW)	72.5	346	0	50	330	798.5
Total (MW)	14156.5	12586	7738.2	7506.5	9030	51017.2

Data source: China Electric Power Yearbook 2008.

Table A13. Installed capacity of NWPG in 2006

	Shaanxi	**Gansu**	**Qinghai**	**Ningxia**	**Xinjiang**	**Total**
Thermal power (MW)	9723	6448	1517	6002	5937	29627
Hydro power (MW)	2165	4291	5423	429	1766	14074
Nuclear power (MW)	0	0	0	0	0	0
Wind power and Other (MW)	0	199	0	11	189	399
Total (MW)	11888	10938	6940	6442	7892	44100

Data source: China Electric Power Yearbook 2007

Table A14. Calculation of BM emission factor of NWPG

	Installed capacity in 2007 A	**Installed capacity in 2008 B**	**Installed capacity in 2009 C**	**Newly added installed capacity from 2007 to 2009 D**	**Newly added installed capacity from 2008 to 2009 E**	**Share in total capacity additions F**
Thermal power (MW)	35,620	44,570	51,160	16,998	7,389	74.07%
Hydro power (MW)	14,590	15,780	19,460	4,870	3,680	21.22%
Nuclear power(MW)	0	0	0	0	0	0.00%
Wind power and Other(MW)	798.5	1,280	1,880.3	1,081.8	600	4.71%
Total (MW)	51,008.50	61,630	72,500.3	22,949.8	11,669	100.00%
Proportion to the installed capacity in 2008				**31.65%**	**16.10%**	

Note: the newly added installed capacity is calculated based on capacity of installed generators, generators shut down and the pumped storage units

Based on Table A13 and formula (8) in section B.6.1, calculate the BM emission factor of NWPG as:

$EF_{BM,y}$ =0.7899*74.07%=0.5851tCO_2e/MWh

Annex 4

MONITORING INFORMATION

Please refer to section B.7. No need to complement more information here.

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