CGN HAMI PHASE I 20MWP GRID-CONNECTED PV POWER PLANT PROJECT

Document Prepared by

CGN Carbon Asset Management (Beijing) Co., Ltd.

Project Title	CGN Hami Phase I 20MWp Grid-connected PV Power Plant Project
Version	Version 03
Date of Issue	06-July-2022
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1 PROJECT DETAILS

1.1 Summary Description of the Project

CGN Hami Phase I 20MWp Grid-connected PV Power Plant Project (hereafter referred to as "the project") is a newly built photovoltaic power plant located in Hami City, Xinjiang Uygur Autonomous Region, P.R.China. The project is to utilize solar energy for electricity generation. The project is constructed and operated by CGN Solar Power Development Co., LTD (hereafter referred to as "the project owner"). The project has a total installed capacity of 20.31MWp, the expected average annual net electricity generation during the whole operation lifetime is 29,846MWh with the plant load factor (PLF) of 16.8%. The electricity generated by the project will be supplied to Northwest China Power Grid (NWCPG). Prior to the implementation of the project, the equivalent electricity supplied by the project was sourced from the NWCPG. The project will substitute part of the fossil fuel-fired power plants connected to NWCPG so as to reduce the CO_2 emission of those plants. The expected electricity generation of the project in first year is 33,294MWh. The attenuation factor of the electricity generation is about 0.99 every year. The expected annual average net electricity generation during the second crediting period is 29,377MWh. The annual average and total emission reductions of the project during the second crediting period are estimated to be 22,893tCO_2e and 228,931tCO_2e respectively.

1.2 Sectoral Scope and Project Type

Category: Renewable electricity in grid connected application

Sectoral Scope 1: Energy industries (renewable/non-renewable sources).

The project is not a grouped project.

1.3 Project Eligibility

The project generates renewable and clean electricity by using solar power that would otherwise have been provided by the Northwest China Power Grid (NWCPG), which reduces the emissions of CO_2 from fossil fuel-fired generation in the grid, and falls into the category of the six Kyoto Protocol greenhouse gases.

CDM methodology ACM0002 Version 20.0 "Grid-connected electricity generation from renewable sources" is adopted, which is the methodology approved under a VCS approved GHG program and is eligible for VCS by Verra.

The project is to utilize solar energy for electricity generation. Prior to the implementation of the project, the equivalent electricity supplied by the project was sourced from NWCPG. Apparently, the project does not generate GHG emissions primarily for the purpose of their subsequent reduction, removal or destruction.

1.4 Project Design

The project includes a single location or installation only and is not a grouped project.

1.5 Project Proponent

Organization name	CGN Solar Power Development Co., LTD
Contact person	Shi Lei
Title	CDM office director
Address	Area 12 of Advanced Business Park, No. 188 west of South 4th Ring Road, No.2 Building, Beijing, The People's Republic of China
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1.6 Other Entities Involved in the Project

Organization name	CGN Carbon Asset Management (Beijing) Co., LTD
Role in the Project	Consultancy
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Title	CDM manager
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1.7 Ownership

The business license is the evidence for right of use and the project owner of CGN Solar Power Development Co., LTD. The approval of FSR and EIA are evidences for legislative right of the same. Besides, the purchasing contract of photovoltaic and the power purchase agreement are the evidences for the ownership of the plant, equipment and process generating.

1.8 Project Start Date

The project started on 28/12/2011 (commissioning start date).

1.9 Project Crediting Period

In the registered VCS PD, the crediting period is described as from 28/12/2011 to 26/12/2012. A deviation is requested for the crediting period in the registered VCS PD. The project is registered under VCS Standard Version 3.4 and completed validation before 19/03/2020. Thus, according to VCS Standard Version 4.2, it remains eligible to apply the crediting period requirements under VCS Standard Version 3 which shall be a maximum of ten years and may be renewed at most twice, so the first renewable crediting period of the project should be updated from 28/12/2011 to 26/12/2012 to 28/12/2011 to 27/12/2021. VCUs have been issued from 28/12/2011 to 27/12/2020 and the verification under VCS for the period from 28/12/2020 to 27/12/2021 is in the process. Moreover, as the project is also registered as a CDM project with a seven year twice renewable project crediting period, it is not eligible for VCU issuance beyond 27/12/2032. Therefore, the second crediting period is from 28/12/2021 to 27/12/2031.

1.10 Project Scale and Estimated GHG Emission Reductions or Removals

Project Scale	
Project	√
Large project	

Year	Estimated GHG emission reductions or removals (tCO_2e)
28/12/2021~27/12/2022	23,863
28/12/2022~27/12/2023	23,642
28/12/2023~27/12/2024	23,423
28/12/2024~27/12/2025	23,206
28/12/2025~27/12/2026	22,992
28/12/2026~27/12/2027	22,779
28/12/2027~27/12/2028	22,568
28/12/2028~27/12/2029	22,359
28/12/2029~27/12/2030	22,152
28/12/2030~27/12/2031	21,947
Total estimated ERs	228,931

Total number of crediting years	10
Average annual ERs	22,893

1.11 Description of the Project Activity

The project is to utilize solar energy for electricity generation. The solar optical energy is directly converted to the electricity energy by using photovoltaic effect that can take place at the interface of the specific semiconductor materials. Prior to the implementation of the project, the equivalent electricity supplied by the project was sourced from NWCPG. By replacing the electricity generated from fossil fuel-fired power plants dominated NWCPG, the project will achieve greenhouse gas (GHG) emission reductions by avoiding CO_2 emissions.

The project scenario is the implementation of the proposed project, the installed capacity of the project is 20.31MWp with PLF of 16.8%, and polycrystalline silicon solar cells are chosen and utilized for the project. Each of solar cell array is composed of solar cell module, junction box, inverter and booster. The DC electric power generated by the photo voltaic modules will be converted into AC power by the inverters, stepped up to 35kV through a set of transformers located in a distributed manner all over the plant. Then the electricity generated by the project will be connected to NWCPG.

The lifetime of the project is 25 years.

The key technical specifications of the solar cell modules as the table below:

Item	Unit	Plate (flat)-type polycrystalline silicon
Type	/	YL235P-29b
Rated capacity	W	235
Open-Circuit Voltage (Voc)	V	37
Short-Circuit Current (Isc)	A	8.54
Peak current	A	7.97
Lifetime	Year	25
Manufacturer	/	Yingli Energy Co., Ltd

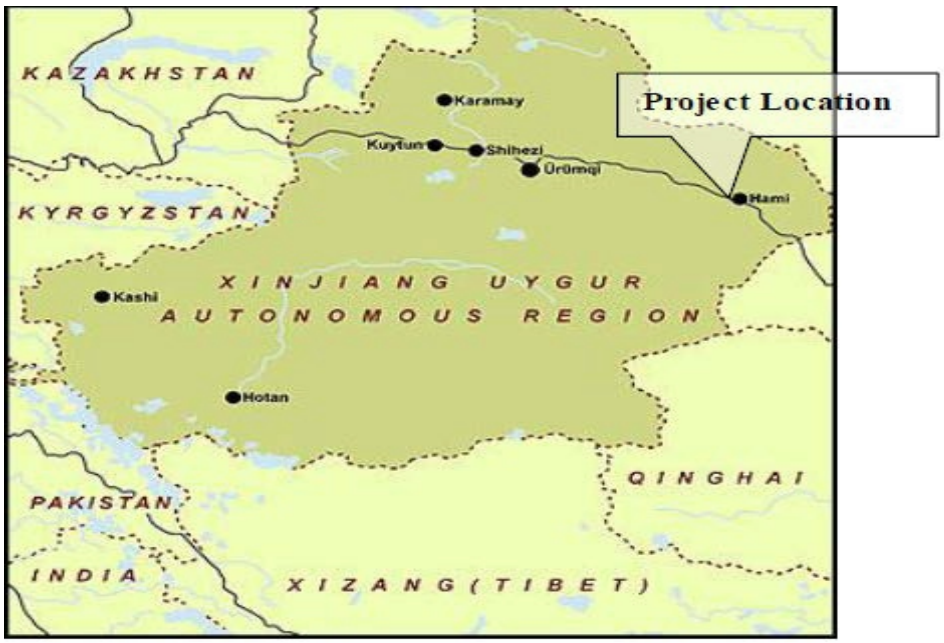
1.12 Project Location

The project is located in Hami City, Xinjiang Uygur Autonomous Region, P. R. China. The central geographical coordinates of the project are E93°38'36.80" and N43°02'13.64".

Figure A1 and A2 shows the geographical location of the project.

Figure A1. The location of the proposed project in the map of P. R. China

Figure A2. The location of the proposed project in the map of Xinjiang Uygur Autonomous Region, P. R. China



1.13 Conditions Prior to Project Initiation

Prior to project initiation, equivalent electricity delivered to the grid by the project activity would have otherwise been generated by the operation of the existing grid-connected power plants or by the addition of new generation sources from NWCPG.

The baseline scenario is the same as the scenario existing prior to the start of implementation of the project activity and please refer to Section 3.4.

1.14 Compliance with Laws, Statutes and Other Regulatory Frameworks

The project complies with all Chinese relevant laws and regulations, mainly including Renewable Energy Law of the People's Republic of China, Environmental Protection Law of the People's Republic of China, Law of the People's Republic of China on the Prevention and Control of Solid Waste Pollution, etc. It also obtained the approval letters from governmental authorities: Development and Reform Commission (DRC), as well as Environment Protection Bureau (EPB) of Xinjiang Uygur Autonomous Region. The two approvals well demonstrate that local government permits the construction of the project. Consequently, the project is compliance with laws, status and other regulatory frameworks.

1.15 Participation under Other GHG Programs

1.15.1 Projects Registered (or seeking registration) under Other GHG Program(s)

The project has been registered as CDM project and the registration number is 8194, the first CDM crediting period is from 27/12/2012 to 26/12/2019, and the crediting period has been

successfully renewed on 18/12/2020 with the second CDM crediting period from 27/12/2019 to 26/12/2026. In addition, the project has not been registered under other GHG program.

1.15.2 Projects Rejected by Other GHG Programs

The project has not been rejected by any other GHG programs.

1.16 Other Forms of Credit

1.16.1 Emissions Trading Programs and Other Binding Limits

The project proponent CGN Solar Power Development Co., LTD. as an enterprise for renewable energy investment, is not included in the compliance entity list by China national Emission Trading Scheme (ETS). Also, the project has not been registered as a CCER (Chinese Certified Emission Reductions) project in China. Thus, the emission reductions generated by project activity is not eligible to be used under the national emission trading programme as per the requirement of the China ETS.

The project is not involved in an emission trading program or any other mechanism that includes GHG allowance trading. The GHG emission reductions and removals generated by the project will not be enforced to be used for compliance in China. The project proponent has signed statement on not being used for the compliance and no double counting claiming of the credits.

1.16.2 Other Forms of Environmental Credit

The project has not sought or received another form of GHG-related environmental credit

1.17 Sustainable Development Contributions

The proposed project makes contribution to the local sustainable development as follows:

1. GHG emission reduction

The project activity will achieve obvious greenhouse gas (GHG) emission reductions by avoiding CO_2 emissions, as grid-connected fossil fuel-fired power dominates in the Northwest China Power Grid, the annual average emission reductions of the project during this crediting period is estimated to be 22,893tCO_2e, which contributes to the China's commitment to peak carbon dioxide emissions before 2030. Thus, the project achieved SDG13 "Take urgent action to combat climate change and its impacts".

2. Increase the share of renewable energy

The project is to replace fossil fuel consumption by fired power plants in the NWCPG which can increase the share of renewable energy and improve China's energy security and efficiency.

Thus, the project achieved SDG7 “Ensure access to affordable, reliable, sustainable and modern energy for all”.

3. Employment opportunities

The conducting of the project will offer job opportunities for local people during both the construction and operational period. Thus, the project achieved SDG8 “Promote sustained inclusive and sustainable economic growth, full and productive employment and decent work for all”.

1.18 Additional Information Relevant to the Project

Leakage Management

According to the consolidated methodology ACM0002 (Version 20.0), the leakage of the project is not considered. No leakage management as the project is not an AFOLU project.

Commercially Sensitive Information

No commercially sensitive information has been excluded from the public version of the project description.

Further Information

No further information is required.

2 SAFEGUARDS

2.1 No Net Harm

The potential negative environmental impacts of both power plants have been analysed by a third-party company; please refer to Section 2.3 for details. With necessary mitigation measures taken, there are no negative environmental impacts due to the Project.

The Project brings many socio-economic benefits to local people, as mentioned in Section 1.17. The Project does not result in any negative socio-economic impacts.

In conclusion, the construction and operation of the Project does not result in any significant environmental impacts or any negative socio-economic impact.

2.2 Local Stakeholder Consultation

To investigate the impacts on local ecological environment and social environment, a survey was made among the potential stakeholders in December 2011, 22 of them are local residence,

5 are governmental officials and 3 others. The survey was arranged through a questionnaire, which was designed to be easily filled in with the following sections:

a) How is the current environment quality?

b) Are there any negative impacts of the project on the everyday life of local residents?

c) Is the project going to help improve the local economy?

d) Does the project impact on light pollution?

e) Which is the environmental topic that concerns you the most during the construction and operation of the project?

f) Do you support the project?

The summary of questionnaire survey is listed as the following:

subject		result		
How is the current environment quality?	Option	good	normal	bad
	Number of persons choose the Option	26	4	/
Are there any negative impacts of the project on the everyday life of local residents?	Option	yes	no	not care
	Number of persons choose the Option	/	26	4
Is the project going to help improve the local economy?	Option	yes	no	not care
	Number of persons choose the Option	8	2	20
Does the project impact on light pollution?	Option	yes	yes but no influence	no
	Number of persons choose the Option	/	/	30
Which is the environmental topic that concerns you the most during the construction and operation of the project?	Option	noise	dusty	waste solid
	Number of persons choose the Option	4	9	17

Do you support the project?	Option	support	not support	not care
	Number of persons choose the Option	30	/	/

The survey shows that the project received strong support from local people. Most of the respondents have concerned about the environmental impacts. However, most issues have been clarified in EIA. All the impacts will be reduced by mitigating measures.

Conclusions from the survey:

The vast majority of public opinions received were supportive. Some of local residents were concerned about the noise, dust and solid waste. As discussed in the EIA report, these issues are well illuminated and specific instructions were given to mitigate the potential impacts of these issues. The project developer will control the noise strictly sourced from the project construction period and operation period according to the national regulations and standards. In addition, the project site is designed to be far enough away from the residential area. The environmental impacts can be avoided, controlled or mitigated via thorough implementation of the mitigation measures. Therefore, the project can be carried out as planned.

Local stakeholder Consultation during the project implementation stage:

The project owner has set out the mechanism for on-going communication with local stakeholders and the communications with local stakeholders are being carried out at periodic intervals.

Firstly, stakeholders were informed of the status and progress of the project through the bulletin board on the village committee, and their comments can be recorded in the village committee's complaint book. This information is fed back to the project proponent by the contact person for a timely response.

Secondly, stakeholders can communicate and give feedback directly to the project proponent at any time through the published phone number of contact person.

Finally, the contract person of project owner also meets local villagers to collect their comments and suggestions yearly.

2.3 Environmental Impact

The environmental impact assessment was approved by Xinjiang Uygur Autonomous Region Environmental Protection Bureau on 11/08/2010. A summary of the report is illustrated as below:

A summary of the impacts is presented below. The environmental impacts are not deemed to be significant and there are no transboundary impacts resulted by the project.

Impact from noise

There is some noise during the operation of solar power plant. The plant substation could be the major source of the noise, proper process will be implemented to reduce the noise level. Emission standard for industrial enterprise noise at boundary (GB12348-2008) Level II noise standard would be fulfilled during the operational period. Consequently, the noise of operation has little impact to the surrounding environment.

Electromagnetic impact

The operation of the substation of the solar power plant will generate electromagnetic pollution, whereas the pollution is slight. The electric design in the substation will be optimized and proper process will be implemented to avoid the electromagnetic impact to the surrounding environment. Therefore, the electronic magnetic pollution to the surrounding environment is insignificant.

Impact from Solid waste

Solid wastes generated from the project activity are excavated earth material and municipal solid waste. Part of the excavated earth material will be backfilled, and the rest will be used for land levelling and road construction near the project site. The municipal solid waste will be collected and treated together with the waste from local residents. As the report indicates, solid waste is handled properly.

Impact from Wastewater

Wastewater is mainly domestic wastewater. Wastewater quantity is fairly small and treatment methods will be applied for on-site primary treatment. Small-scale septic tanks will be built on the site, through which the discharging wastewater will be used as virescence water. Therefore, the impact of wastewater is limited and mitigated.

Conclusion

The environmental impacts of the project activity are not considered as significant.

2.4 Public Comments

The project has been open for public comment on CDM website during CDM validation, no comments were received.

2.5 AFOLU-Specific Safeguards

NA.

3 APPLICATION OF METHODOLOGY

3.1 Title and Reference of Methodology

Following approved baseline & monitoring methodology is applied:

Methodology:

ACM0002 "Grid-connected electricity generation from renewable sources" (Version 20.0)

Reference: https://cdm.unfccc.int/methodologies/DB/XP2LKUSA61DKUQC0PIWPGWDN8ED5PG

The applied tools:

Tools: "Tool for assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period" (Version 03.0.1).

Reference:

https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-11-v3.0.1.pdf

Tools: "Tool to calculate the emission factor for an electricity system" (Version 07.0)

Reference: https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v7.0.pdf

3.2 Applicability of Methodology

The approved methodology ACM0002 (version 20.0) is applicable to the project activity and the project meets the applicability of the applied methodology as follows:

In addition, the project meets the applicability conditions of the applied tools applied in the PD as follows:

Clauses	Requirements of the ACM0002	Scenario of the project	Conclusion
1	This methodology is applicable to grid-connected renewable energy power generation project activities that: a) Install a Greenfield power plant; b) Involve a capacity addition to (an) existing plant(s); c) Involve a retrofit of (an) existing operating plants/units; d) Involve a rehabilitation of (an) existing plant(s)/unit(s); or e) Involve a replacement of (an) existing plant(s)/unit(s).).	The project is a greenfield NWCPG-connected renewable power generation project.	Applicable
2	The methodology is applicable under the following conditions: (a) The project activity may include renewable energy power plant/unit of	The project is a newly built solar power project and the project activity involves the installation of the solar	Applicable

Clauses	Requirements of the ACM0002	Scenario of the project	Conclusion
	one of the following types: hydro power plant/unit with or without reservoir, wind power plant/unit, geothermal power plant/unit, solar power plant/unit, wave power plant/unit or tidal power plant/unit; (b) In the case of capacity additions, retrofits, rehabilitations or replacements (except for wind, solar, wave or tidal power capacity addition projects the existing plant/unit started commercial operation prior to the start of a minimum historical reference period of five years, used for the calculation of baseline emissions and defined in the baseline emission section, and no capacity expansion, retrofit, or rehabilitation of the plant/unit has been undertaken between the start of this minimum historical reference period and the implementation of the project activity.	power plant.	
3	In case of hydro power plants, one of the following conditions must apply: (a) The project activity is implemented in existing single or multiple reservoirs, with no change in the volume of any of the reservoirs; or (b) The project activity is implemented in existing single or multiple reservoirs, where the volume of the reservoir(s) is increased and the power density calculated using equation (7), is greater than 4 W/m^2; or (c) The project activity results in new single or multiple reservoirs and the power density, calculated using equation (7), is greater than 4 W/m^2; or (d) The project activity is an integrated hydro power project involving multiple	Not applicable, the project is not a hydro power plant, so this applicability condition does not need to be considered.	NA

Clauses	Requirements of the ACM0002	Scenario of the project	Conclusion
	reservoirs, where the power density for any of the reservoirs, calculated using equation (7), is lower than or equal to 4 W/m^2, all of the following conditions shall apply: (i) The power density calculated using the total installed capacity of the integrated project, as per equation (8), is greater than 4 W/m^2; (ii) Water flow between reservoirs is not used by any other hydropower unit which is not a part of the project activity; (iii) Installed capacity of the power plant(s) with power density lower than or equal to 4 W/m^2 shall be: a. Lower than or equal to 15 MW; and b. Less than 10 per cent of the total installed capacity of integrated hydro power project.		
4	In the case of integrated hydro power projects, project proponent shall: Demonstrate that water flow from upstream power plants/units spill directly to the downstream reservoir and that collectively constitute to the generation capacity of the integrated hydro power project; or Provide an analysis of the water balance covering the water fed to power units, with all possible combinations of reservoirs and without the construction of reservoirs. The purpose of water balance is to demonstrate the requirement of specific combination of reservoirs constructed under CDM project activity for the optimization of power output. This demonstration has to be carried out in the specific scenario of water availability in different seasons to optimize the water flow at the inlet of	Not applicable, the project is not a hydro power plant, so this applicability condition does not need to be considered.	NA

Clauses	Requirements of the ACM0002	Scenario of the project	Conclusion
	power units. Therefore, this water balance will take into account seasonal flows from river, tributaries (if any), and rainfall for minimum five years prior to implementation of CDM project activity.		
5	The methodology is not applicable to: a) Project activities that involve switching from fossil fuels to renewable energy sources at the site of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site; b) Biomass fired power plants/units.	The project does not involve switching from fossil-fuels to renewable energy sources at the site of the project activity and the project is not a biomass-fired power project.	NA
6	In the case of retrofits, rehabilitations, replacements, or capacity additions, this methodology is only applicable if the most plausible baseline scenario, as a result of the identification of baseline scenario, is "the continuation of the current situation, that is to use the power generation equipment that was already in use prior to the implementation of the project activity and undertaking business as usual maintenance".	Not applicable, the project is a newly built solar power project.	NA

Tool	Criteria	Applicability	Conclusion
Tool to calculate the emission factor for an electricity system	This tool may be applied to estimate the OM, BM and/or CM when calculating baseline emissions for a project activity that substitutes grid electricity that is where a project activity supplies electricity to a grid or a project activity that results in savings of electricity that would have been provided by the grid (e.g. demand-side energy efficiency projects).	The project is the installation of a solar power plant supplying electricity to the grid.	Applicable
Tool to calculate the emission factor for an electricity	In case of CDM projects the tool is not applicable if the project electricity system is located partially or totally in an Annex I	The project electricity system is located in a non-Annex I	NA

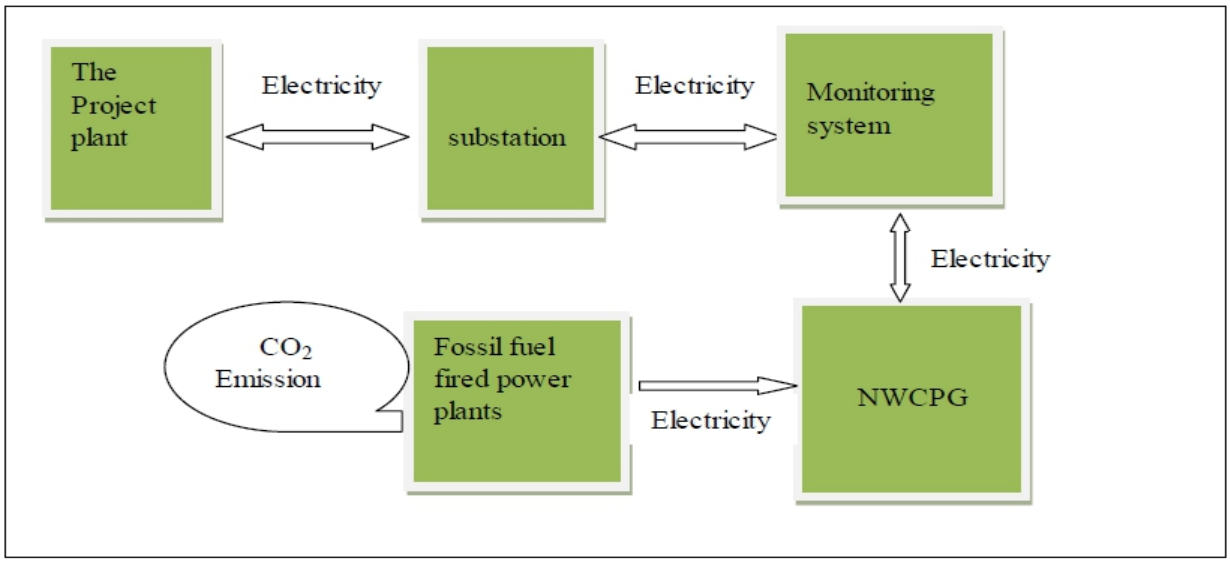
Tool	Criteria	Applicability	Conclusion
system	country.	country.	
Tool for assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period"	This tool provides a stepwise procedure to assess the continued validity of the baseline and to update the baseline at the renewal of a crediting period, as required by paragraph 49 (a) of the modalities and procedures of the clean development mechanism. The tool consists of two steps: The first step provides an approach to evaluate whether the current baseline is still valid for the next crediting period. The second step provides an approach to update the baseline in case that the current baseline is not valid anymore for the next crediting period.	The validity of the baseline of the project is assessed by the following two steps: Evaluate whether the current baseline is still valid for the next crediting period; Update the baseline in case that the current baseline is not valid anymore for the next crediting period.	Applicable

3.3 Project Boundary

Source		Gas	Included?	Justification/Explanation
Baseline	CO_2 emissions from electricity generation in fossil fuel-fired power plants that is displaced due to the project activity.	CO_2	Yes	Major emission source
		CH_4	No	Minor emission source
		N_2O	No	Minor emission source
		Other	No	Minor emission source
Project	The solar power plant	CO_2	No	According to methodology, the project is a solar power plant project, so it does not involve project emission.
		CH_4	No	According to methodology, the project is a solar power plant project, so it does not involve project emission.
		N_2O	No	According to methodology, the project is a solar power plant project, so it does not involve project emission.

Source		Gas	Included?	Justification/Explanation
		Other	No	Project activity does not emit other gas.

The flow diagram of the project boundary is illustrated as follow:



The spatial extent of the project boundary includes the project site and all power plants connected physically to NWCPG.

According to the "Tool to calculate the emission factor for an electricity system" (Version 07.0), the delineation of grid boundaries as provided by the DNA of China is used. Northwest China Power Grid composed of Shaanxi, Gansu, Qinghai, Ningxia and Xinjiang Power Grids is the project electricity system.

3.4 Baseline Scenario

In accordance with "Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period" (version 03.0.1), the validity of the current baseline is assessed using the following sub-steps:

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

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

There are no new national and/or sectoral policies that could affect the baseline scenario during the renewal of the crediting period. For total electricity generation produced by fossil fuel power plants, the average share of the five most recent years is more than 50% of total electricity generation in NWCPG, the proportions are 76%, 76%, 76%, 73% and 70% from the year 2014 to 2018, respectively. Hence in the absence of the project activity, electricity would

still have been generated in the existing grid-connected power plants or by the addition of new generation sources from NWCPG. The current baseline still complies with all relevant mandatory national and sectoral policies which have come into effect after the submission of the project activity for validation and are applicable at the time of requesting renewal of the crediting period. Go to step 1.2.

Step 1.2: Assess the impact of circumstances

The baseline scenario identified at the validation of the project activity was the continuation of the current practice without any investment. The investment environment or market characteristics especially the feed-in tariff, the policy in terms of market access permit, these circumstances continue during the second crediting period and therefore, do not have an impact on the current baseline emissions. Hence the current baseline does not need to be updated. Go to step 1.3.

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

The project is a greenfield project with a lifetime of 25 operation years, with no baseline equipment(s) or an investment for the crediting period for which renewal is requested, this step is not applicable. Go to step 1.4.

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

Data and parameters that need to be updated are as follows:

$EF_{grid,CM,y}$: the baseline emission factor that determined once for the first crediting period at the time of validation, hence it has been updated using the latest version of "Tool to calculate the emission factor for an electricity system". Please refer to section 4 for details.

$EF_{grid,OM,y}$: the baseline emission factor that determined once for the first crediting period at the time of validation, hence it has been updated using the latest version of "Tool to calculate the emission factor for an electricity system". Please refer to section 4 for details.

$EF_{grid,BM,y}$: the baseline emission factor that determined once for the first crediting period at the time of validation, hence it has been updated using the latest version of "Tool to calculate the emission factor for an electricity system". Please refer to section 4 for details.

Data and parameters that are still valid thus need not to be updated are as follows:

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.

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

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

Step 2.1: Update the current baseline

The baseline emissions for the second crediting period have been updated, without reassessing the baseline scenario, based on the latest approved version of the methodology ACM0002 (Version 20.0). This update was applied in the context of the sectoral policies and circumstances that is applicable at the time of requesting for renewal of the crediting period. More details for the updated baseline emissions for the second crediting period can be seen in section 4.

Step 2.2: Update the data and parameters

The updated baseline emission factor for the project ($EF_{grid,CM,y}$) is 0.7793 tCO_2e/MWh.

3.5 Additionality

The project has demonstrated its additionality in the first crediting period and no changes affect the additionality of the project since its registration. There are no new national and/or sectoral policies that could affect the baseline scenario during the renewal of the crediting period. Of course no regulatory surplus required comparing with the first validation at time of renewal of crediting period.

3.6 Methodology Deviations

There is no deviation applied to this second crediting period.

4 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

4.1 Baseline Emissions

According to the ACM0002 (Version 20.0), baseline emissions include only CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity, calculated as follows:

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

Where:

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

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

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

The project activity is a Greenfield solar power plant, then:

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

Where:

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

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

4.1.1 To calculate the emission factor for an electricity system

$EF_{grid,CM,y}$ is calculated as per the latest version of "Tool to calculate the emission factor for an electricity system" (version 07.0). The baseline emission factor $EF_{grid,CM,y}$ is calculated ex ante and fixed for the second crediting period. Detailed as follows:

Step 1. Identify the relevant electricity system

According to the" Tool to calculate the emission factor for an electricity system (Version 07.0)", project participants may delineate the project electricity system using any of the following options:

Option 1. A delineation of the project electricity system and connected electricity systems published by the DNA or the group of the DNAs of the host country(ies), In case a delineation is provided by a group of DNAs, the same delineation should be used by all the project participants applying the tool in these countries;

Option 2. A delineation of the project electricity system defined by the dispatch area of the dispatch centre responsible for scheduling and dispatching electricity generated by the project activity.

Where the dispatch area is controlled by more than one dispatch centre, i.e. layered dispatch area, the higher-level area shall be used as a delineation of the project electricity system (e.g. where regional dispatch centres are required to comply with dispatch orders of the national dispatch centre then area controlled by the national dispatch centre shall be used);

Option 3. A delineation of the project electricity system defined by more than one independent dispatch areas, e.g. multi-national power pools.

Since Chinese DNA has published a delineation of the project electricity system and connected electricity systems, Option 1 is applied for the project. According to the delineations, the Northwest China Power Grid (NWCPG) is identified as the relevant electric power system of the

project, which includes Shaanxi, Gansu, Qinghai, Ningxia and Xinjiang Power Grids. The project is located in Hami City, Xinjiang Uygur Autonomous Region, P.R.China. and covered by the Northwest China Power Grid (NWCPG). According to the "2019 Baseline Emission Factors for Regional Power Grids in China", There is no net electricity imports to NWCPG. Therefore, Northwest China Power Grid (NWCPG) is chosen as the relevant electric power system.

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

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

Option I: Only grid power plants are included in the calculation.

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

Based on China's real situation, only grid power plants are included in the calculation.

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

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

(a) Simple OM, or

(b) Simple adjusted OM, or

(c) Dispatch Data Analysis OM, or

(d) Average OM.

In China, specific data from the grid or each power plant is treated as business confidential and thus not public available. Therefore, method (b) and method (c) is not suitable for the project.

According to ACM0002, the Simple OM method (a) can only be applied when low-cost/must run resources constitute less than 50% of total grid generation in average of the five most recent years or based on long-term normal for hydroelectric production.

The share of low-cost/must-run generation in NWCPG is 24%, 24%, 24%, 27% and 30% of total generation of NWCPG from the year 2014 to 2018, respectively (China Electric Power Yearbooks 2015-2019), all lower than 50%, which satisfied the applicability of the method (a), therefore, the simple OM method is chosen for the calculation of the OM emission factor $EF_{grid,OM,y}$.

As per the latest version of "Tool to calculate the emission factor for an electricity system", one of the following methods should be chosen to calculate the simple OM emission factor:

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

- **Ex post option:** If the ex post option is chosen, the emission factor is determined for the year in which the project activity displaces grid electricity, requiring the emission factor to be updated annually during monitoring. If the data required to calculate the emission factor for year y is usually only available later than six months after the end of year y, alternatively the emission factor of the previous year (y-1) may be used. If the data is usually only available 18 months after the end of the year y, the emission factor of the year proceeding the previous year (y-2) may be used. The same data vintage (y, y-1 or y-2) should be used throughout all crediting periods.

Here ex-ante vintage is chosen, and the $EF_{grid,OM}$ is fixed during the second crediting period.

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

Based on the analysis of the step 3, 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 the system, not including low-cost/must-run power plants/ units. The simple OM may be calculated by one of the following two options:

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

Option B: Based on the total net electricity generation of all power plants serving the system and the fuel types and total fuel consumption of the project electricity system.

For the project activity, the required data for the exercise of Option A is not available and those of Option B can be obtained from official sources, and off-grid power plants are not included in the calculation, therefore, Option B is chosen to calculate the operating margin emission factor:

Option B can only be used if:

(a) The necessary data for option A is not available; and

(b) Only nuclear and renewable power generation are considered as low-cost/must-run power sources and the quantity of electricity supplied to the grid by these sources is known; and

(c) Off-grid power plants are not included in the calculation.

As the data required by option A is not available in China, and the 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 in china, and off-grid power plants are not included in the calculation. Therefore, Option B is used for calculating project OM as follows:

$$EF_{grid,OMsimple,y} = \frac{\sum_i FC_{i,y} \times NCV_{i,y} \times EF_{CO2,i,y}}{EG_y} \quad (2)$$

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_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

If available, $NCV_{i,y}$ and $EF_{CO2,i,y}$ from the fuel supplier of the power plants in invoices may be used; or, regional or national average default values may be used. In this PDD, $NCV_{i,y}$ of different fuels are obtained from China Energy Statistical Yearbook 2018. With regard to the fuel types where $NCV_{i,y}$ fluctuates in a certain range, the floor values of the fluctuation range are used for conservatism. $EF_{CO2,i,y}$ of fossil fuel comes from IPCC default values.

The Simple OM Emission Factor ($EF_{grid,OMsimple,y}$) of the project is calculated on the basis of the fuel consumption data for electricity generation of the NECG, not including those of low-operating cost and must-run power plants, such as wind power, hydropower and nuclear etc. These data are obtained from the China Electric Power Yearbook (2016~2018, published annually) and China Energy Statistical Yearbook (2016~2018). Based on these data, the Simple OM Emission Factor ($EF_{grid,OMsimple,y}$) of the NWCPG is calculated as 0.8922 tCO_2e/MWh.

Step 5. Calculate the build margin emission factor

In terms of vintages of data, project participants can choose between one of the following two options:

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 second crediting period should be used. 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.

Option 2 For the first crediting period, the build margin emission factor shall be updated annually, ex post, including those units built up to the year of registration of the project activity or, if information up to year of registration is not yet available, including those units built up to the latest year for which information is available. For the second crediting period, the build margin emissions factor shall be calculated ex ante, as described in option 1 above. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used.

The PDD chooses **Option 1,** which requires the project participant to calculate the Build Margin Emission Factor $EF_{grid,BM,y}$, ex-ante based on the most recent information available on units already built for sample group m at the time of PDD submission.

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

(a) Identify the set of five power units, excluding power units registered as CDM project activities, that started to supply electricity to the grid most recently ($SET_{5\text{-}units}$) and determine their annual electricity generation ($AEG_{SET\text{-}5\text{-}units}$, in MWh);

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

(c) From $SET_{5\text{-}units}$ and $SET_{\geq 20 \text{ per cent}}$ select the set of power units that comprises the larger annual electricity generation (SET_{sample});

Otherwise:

(d) Exclude from SET_{sample} the power units which started to supply electricity to the grid more than 10 years ago. Include in that set the power units registered as CDM project activity, starting with power units that started to supply electricity to the grid most recently, until the electricity generation of the new set comprises 20 per cent of the annual electricity generation of the project electricity system (if 20 per cent falls on part of the generation of a unit, the generation of that unit is fully included in the calculation) to the extent is possible. Determine for the resulting set ($SET_{sample\text{-}CDM}$) the annual electricity generation ($AEG_{SET\text{-}sample\text{-}CDM}$, in MWh);

If the annual electricity generation of that set is comprising at least 20 per cent of the annual electricity generation of the project electricity system (i.e. $AEG_{SET\text{-}sample\text{-}CDM} \geq 0.2 \times AEG_{total}$), then use the sample group $SET_{sample\text{-}CDM}$ to calculate the build margin. Ignore steps (e) and (f).

(e) Include in the sample group $SET_{sample\text{-}CDM}$ the power units that started to supply electricity to the grid more than 10 years ago until the electricity generation of the new set comprises 20 per cent of the annual electricity generation of the project electricity system (if 20 per cent falls on part of the generation of a unit, the generation of that unit is fully included in the calculation);

(f) The sample group of power units m used to calculate the build margin is the resulting set ($SET_{sample\text{-}CDM\text{-}>10yrs}$).

However, in China, it is very difficult to obtain the data of the five existing power plants built most recently or the power plants capacity additions in the electricity system that comprise 20 per cent of the system generation (in MWh) and that were built most recently, since no data of plant specific generation and fossil fuel consumption is currently available in China. As none of the above options can be selected, the following deviations are adopted to calculate the BM.

First, to calculate the newly added installed capacity and the contribution component of other various power generation technologies, then calculate of the weight of newly added installed capacity of each power generation technology, and finally, to calculate BM emission factor using the commercially optimal efficiency level of each power generation technology.

According to the "Tool to calculate the emission factor for an electricity system", the build margin emissions factor ($EF_{grid,BM,y}$) is calculated as the generation-weighted average emission factor (tCO_2e/MWh) of all power units m during the most recent year y for which power generation data is available. The calculation equation is as follows:

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

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

Since the generating capacity of coal-fired, oil-fired and gas-fired technologies can't be separated from the existing statistical data, the following measures are taken for the calculation:

First, based on the available data of the latest year, determine the ratio of CO_2 emissions from coal, oil, and gas consumption for power generation to the total CO_2 emission; Second, to calculate the emission factor of the thermal power based on the weight of CO_2 emission from coal, oil, and gas, and the emissions factors using commercial technologies with optimal efficiency. And finally, to multiply the thermal emission factor with the portion of the thermal power comprising 20 per cent of the newly added capacity.

Sub-step 5.1. Calculate the weights of CO_2 emission of solid, liquid and gaseous fossil fuels in total emissions for power generation

$$\lambda_{Coal} = \frac{\sum_{i \in COAL, j} F_{i,j,y} \times NCV_{i,y} \times EF_{co_2,i,j,y}}{\sum_{i,j} F_{i,j,y} \times NCV_{i,y} \times EF_{co_2,i,j,y}} \quad (4)$$

$$\lambda_{Oil} = \frac{\sum_{i \in OIL, j} F_{i,j,y} \times NCV_{i,y} \times EF_{co_2,i,j,y}}{\sum_{i,j} F_{i,j,y} \times NCV_{i,y} \times EF_{co_2,i,j,y}} \quad (5)$$

$$\lambda_{Gas} = \frac{\sum_{i \in GAS, j} F_{i,j,y} \times NCV_{i,y} \times EF_{co_2,i,j,y}}{\sum_{i,j} F_{i,j,y} \times NCV_{i,y} \times EF_{co_2,i,j,y}} \quad (6)$$

Where:

$FC_{i,j,y}$ = Amount of fossil fuel type i consumed in province *j* in year *y* (mass or volume unit)

$NCV_{i,y}$ = Net calorific value (energy content) of fossil fuel type *i* in year *y* (GJ/t or GJ/m^3)

$EF_{CO2,i,j,y}$ = CO_2 emission factor of fossil fuel type i in year *y* (tCO_2e/GJ)

Sub-step 5.2. Calculation of Emission Factor of Relevant Thermal Power

$$EF_{Thermal,y} = \lambda_{Coal,y} \times EF_{Coal,Adv,y} + \lambda_{Oil,y} \times EF_{Oil,Adv,y} + \lambda_{Gas,y} \times EF_{Gas,Adv,y} \quad (7)$$

Where:

$EF_{Coal,Adv,y}$, $EF_{Oil,Adv,y}$ and $EF_{Gas,Adv,y}$ refers to the emission factors representing best technologies commercially available for coal, oil and gas fired power plants, respectively.

Sub-step 5.3. Calculate of BM of the grid

$$EF_{grid,BM,y} = \frac{CAP_{Thermal,y}}{CAP_{Total,y}} \times EF_{Thermal,y} \quad (8)$$

Where:

$CAP_{Total,y}$ = The total newly added electricity generation capacity (MW) in year y;

$CAP_{Thermal,y}$ = The newly added electricity generation capacity of thermal power (MW) in year y

Key parameters used to calculate BM emission factor include the low calorific value of each fossil fuel, the oxidation rate, the potential emission factors, and the efficiency of various power generation technologies. The data of low calorific value of each fossil fuel and their oxidation rate comes from China Energy Statistical Yearbook 2018. The potential emission factors are sourced from "2006 IPCC Guidelines for National Greenhouse Gas Inventories" Table 1.3 and Table 1.4 of Page 1.21-1.24 in Chapter one, Volume 2 Energy.

According to the latest and available data at the time of this PD submission, $EF_{grid,BM,y}$ is calculated to be 0.4407 tCO_2e/MWh.

Step6. Calculate the combined margin emission factor

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

(a) Weighted average CM; or

(b) Simplified CM.

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

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

(a) The project activity is located in: (i) a Least Developed Country (LDC); or in (ii) a country with less than 10 registered CDM projects at the starting date of validation; or (iii) a Small Island Developing States (SIDS); and

(b) The data requirements for the application of step 5 above cannot be met.

The PD choose option A.

The combined margin emission factor is calculated as follows:

$$EF_{grid,CM,y} = \omega_{OM} \times EF_{grid,OM,y} + \omega_{BM} \times EF_{grid,BM,y} \quad (9)$$

Where:

$EF_{grid,BM,y}$ = Build margin CO_2 emission factor for the project electricity system in year *y* (tCO_2/MWh)

$EF_{grid,OM,y}$ = Operating margin CO_2 emission factor for the project electricity system in year *y* (tCO_2/MWh)

ω_{OM} = Weighting of operating margin emissions factor (%)

ω_{BM} = Weighting of build margin emissions factor (%)

The combined margin emissions factor $EF_{grid,CM,y}$ should be calculated as the weighted average of the Operating Margin emission factor ($EF_{grid,OM,y}$) and the Build Margin emission factor ($EF_{grid,BM,y}$), where ω_{OM}= 0.75 and ω_{BM} = 0.25 for solar power project (owing to their intermittent and non-dispatchable nature) for the second crediting period and for subsequent crediting periods. The ($EF_{grid,OM,y}$) and ($EF_{grid,BM,y}$) are calculated as described in Step 4 and 5.

$EF_{grid,CM,y}$ = 0.8922 tCO_2e/MWh *0.75+0.4407 tCO_2e/MWh *0.25 = 0.7793 (tCO_2e/MWh)

4.2 Project Emissions

According to ACM0002 (version 20.0), the project is a solar farm, belongs to renewable energy activity, hence PE_y =0 tCO_2e/MWh.

4.3 Leakage

According to ACM0002 (version 20.0), no leakage is considered for this project.

4.4 Net GHG Emission Reductions and Removals

The annual emission reductions ER_y for the project activity are calculated as the baseline emissions minus the project emissions. Being the project of a greenhouse gas GHG zero-emission activity, the final GHG emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y \quad (10)$$

Where:

ER_y Emission reductions in year y (tCO_2)

BE_y Baseline Emissions in year y (tCO_2)

PE_y Project emissions in year y (tCO_2)

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

$$BE_y = EG_{facility,y} \times EG_{grid,CM,y} \quad (11)$$

The summary of ex ante estimates of emission reductions is shown as follows:

Year	$EG_{facility,y}$ (MWh)	Estimated baseline emissions or removals (tCO_2e)	Estimated project emissions or removals (tCO_2e)	Estimated leakage emissions (tCO_2e)	Estimated net GHG emission reductions or removals (tCO_2e)
28/12/2021~27/12/2022	30,622	23,863	0	0	23,863
28/12/2022~27/12/2023	30,338	23,642	0	0	23,642
28/12/2023~27/12/2024	30,057	23,423	0	0	23,423
28/12/2024~27/12/2025	29,779	23,206	0	0	23,206
28/12/2025~27/12/2026	29,504	22,992	0	0	22,992
28/12/2026~27/12/2027	29,231	22,779	0	0	22,779
28/12/2027~27/12/2028	28,960	22,568	0	0	22,568
28/12/2028~27/12/2029	28,692	22,359	0	0	22,359
28/12/2029~27/12/2030	28,427	22,152	0	0	22,152
28/12/2030~27/12/2031	28,163	21,947	0	0	21,947
Total	293,773	228,931	0	0	228,931

5 MONITORING

5.1 Data and Parameters Available at Validation

The baseline grid emission factor is obtained directly from the official source Notification on Determining Baseline Emission Factor of China's Grid by China's DNA. Thus, the relevant basis parameters for calculation of are not described in detail here. With consideration of the fact of the Project, data and parameters that are available at validation are summarized in below tables.

Data / Parameter	$EF_{grid,CM,y}$
Data unit	tCO_2e/MWh
Description	Combined margin CO_2 emission factor in year y
Source of data	Calculated follow the "Tool to calculate the emission factor for an electricity system" (Version 07.0)

Value applied	0.7793
Justification of choice of data or description of measurement methods and procedures applied	Calculated follow the "Tool to calculate the emission factor for an electricity system" (Version 07.0)
Purpose of Data	Calculation of baseline emissions
Comments	N/A

Data / Parameter	$EF_{grid,OM,y}$
Data unit	tCO_2e/MWh
Description	Simple operating margin CO_2 emission factor in year y
Source of data	2019 Baseline Emission Factors for Regional Power Grids in China" published by China DNA
Value applied	0.8922
Justification of choice of data or description of measurement methods and procedures applied	Calculated follow the "Tool to calculate the emission factor for an electricity system" (Version 07.0)
Purpose of Data	Calculation of baseline emissions
Comments	N/A

Data / Parameter	$EF_{grid,BM,y}$
Data unit	tCO_2e/MWh
Description	Build margin CO_2 emission factor in year y
Source of data	2019 Baseline Emission Factors for Regional Power Grids in China" published by China DNA
Value applied	0.4407
Justification of choice of data or description of measurement methods and procedures applied	Calculated follow the "Tool to calculate the emission factor for an electricity system" (Version 07.0)

Purpose of Data	Calculation of baseline emissions
Comments	N/A

Data / Parameter	ω_{OM}
Data unit	-
Description	Weighting of operating margin emissions factor
Source of data	"Tool to calculate the emission factor for an electricity system" (version 07.0)
Value applied	0.75
Justification of choice of data or description of measurement methods and procedures applied	Follow the "Tool to calculate the emission factor for an electricity system" (Version 07.0)
Purpose of Data	Calculation of $EF_{grid,CM,y}$
Comments	N/A

Data / Parameter	ω_{BM}
Data unit	-
Description	Weighting of operating margin emissions factor
Source of data	"Tool to calculate the emission factor for an electricity system" (version 07.0)
Value applied	0.25
Justification of choice of data or description of measurement methods and procedures applied	Follow the "Tool to calculate the emission factor for an electricity system" (Version 07.0)
Purpose of Data	Calculation of $EF_{grid,CM,y}$
Comments	N/A

5.2 Data and Parameters Monitored

Data / Parameter	$EG_{facility,y}$
Data unit	MWh
Description	Quantity of net electricity generation supplied by the project to the Grid in year y.
Source of data	Calculated
Description of measurement methods and procedures to be applied	The net electricity supplied to the Grid by the project is calculated by the following formula: $EG_{facility,y} = EG_{export,y} - EG_{import,y}$
Frequency of monitoring/recording	Continuously measurement and monthly recording
Value applied	29,377 at annual average during the 2nd crediting period
Monitoring equipment	Meters: M1 — Type: DTSD341 — Accuracy Class: 0.2s — Serial number: 1111091971000004 Meters: M2 — Type: DTSD341 — Accuracy Class: 0.2s — Serial number: 1111091971000003
QA/QC procedures to be applied	The project operator is responsible for recording such data. Calculated results are cross checked by records for sold and consumed electricity. The readings of the electricity meter(s) are continuously measured and at least monthly recorded. Data will be archived for 2 years following the end of the last crediting period by means of electronic and paper backup. The metering equipment is properly calibrated and checked annually.
Purpose of data	Calculation of baseline emissions
Calculation method	$EG_{facility,y} = EG_{export,y} - EG_{import,y}$
Comments	-

Data / Parameter	$EG_{export,y}$
Data unit	MWh
Description	Quantity of electricity generation supplied by the project to the Grid in year y.
Source of data	Electricity meter(s)
Description of	Bidirectional meter(s) *are* installed to measure the electricity

measurement methods and procedures to be applied	exported to the grid. The readings of the electricity meter(s) are continuously measured and at least monthly recorded.
Frequency of monitoring/recording	Continuously measurement and monthly recording
Value applied	29,377 at annual average during the 2nd crediting period
Monitoring equipment	Meters: M1; Type: DTSD341; Accuracy Class: 0.2s; Serial number: 1111091971000004 Meters: M2; Type: DTSD341; Accuracy Class: 0.2s; Serial number: 1111091971000003
QA/QC procedures to be applied	The project operator is responsible for recording such data. Measurement results are checked by records for sold electricity. The readings of the electricity meter(s) are continuously measured and at least monthly recorded. Data will be archived for 2 years following the end of the last crediting period by means of electronic and paper backup. The metering equipment is properly calibrated and checked annually.
Purpose of data	Calculation of baseline emissions
Calculation method	Not applicable
Comments	-

Data / Parameter	$EG_{import,y}$
Data unit	MWh
Description	Quantity of electricity imported from the Grid to the project in year y.
Source of data	Electricity meter(s)
Description of measurement methods and procedures to be applied	Bidirectional meter(s) are installed to measure the electricity imported from the grid. The readings of the electricity meter(s) are continuously measured and at least monthly recorded.
Frequency of monitoring/recording	Continuously measurement and monthly recording
Value applied	0
Monitoring equipment	Meters; Type; Accuracy; Serial number

			Class	
	M1	DTSD341	0.2s	1111091971000004
	M2	DTSD341	0.2s	1111091971000003
QA/QC procedures to be applied	The project operator is responsible for recording such data. Measurement results are cross checked by records for consumed electricity. The readings of the electricity meter(s) are continuously measured and at least monthly recorded. Data will be archived for 2 years following the end of the last crediting period by means of electronic and paper backup. The metering equipment is properly calibrated and checked annually.			
Purpose of data	Calculation of baseline emissions			
Calculation method	Not applicable			
Comments	-			

5.3 Monitoring Plan

The project adopts the approved consolidated monitoring methodology ACM0002 "Grid-connected electricity generation from renewable sources (version 20.0) to determine the emission reductions from the net electricity generation from the solar power plant. This plan describes in more detail the process.

1. Monitoring Object

The monitoring is to justify the realistic amount of emission reduction from the VCS project. The monitoring plan will provide credible, accurate, transparent and conservative monitoring data and ensure the real, measurable, long-term GHG emission reduction from this project.

2. Management Structure

The project owner will use this document as guideline in monitoring of the project emission reduction performance and will adhere to the guidelines set out in this monitoring plan to ensure that the monitoring is credible, transparent and conservative.

The responsibilities of the project staff are as follow:

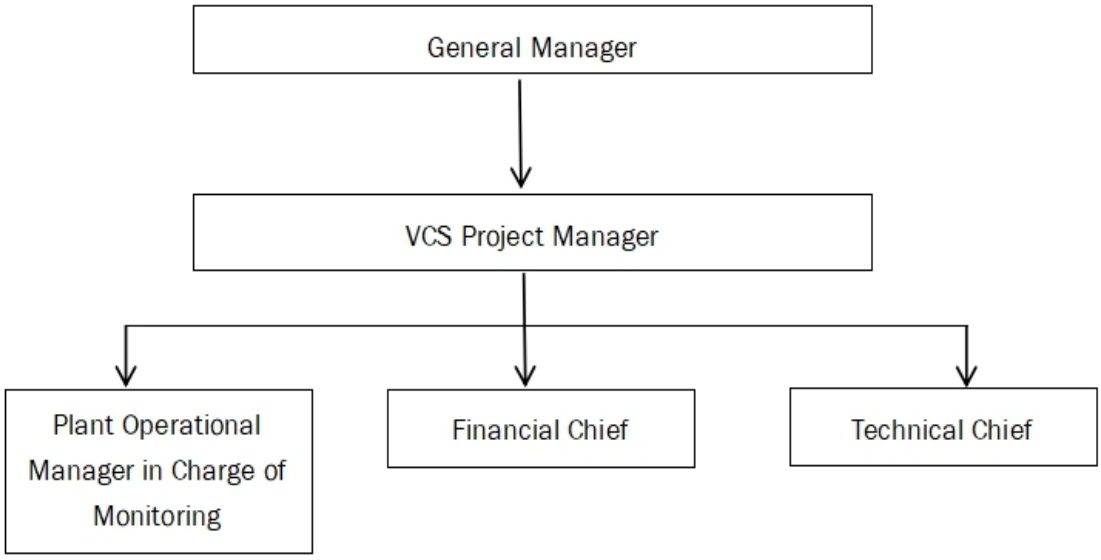
General Manager: To be responsible for supervising the whole monitoring procedure.

VCS Project Manager: To be responsible for data management and compiling monitoring report.

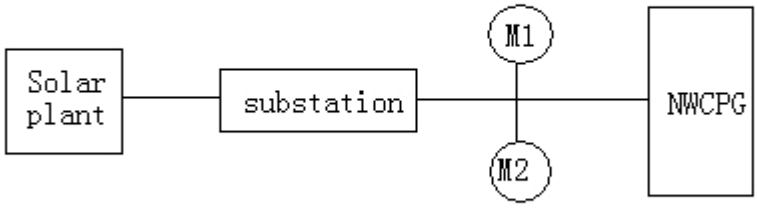
Operational and monitoring manager: To be responsible for collecting data and do internal audit.

Financial chief: To be responsible for collection of sales receipts.

Technical chief: To be responsible for preparing operational reports of the project activity, recording the daily operation of the solar power plant, including operating periods, equipment defects, etc.



3. Monitoring Program and Equipments



The following monitoring equipments are installed to ensure the implement of the monitoring for the project. The gateway meters (M1 and M2) are installed at the connection point between the project and the Grid to monitor the electricity supplied to the grid by the project activity. Usually, the main meter (hereafter referred as the meter M1) is used to monitor the grid-connected electricity supplied to the grid by the project, and when the solar power plant is not in operation and electricity purchased from the grid will be used to ensure the minimum requirement of running the solar power plant, the meter can also be used to monitor the electricity purchased from the grid. M2 refers to the back-up meter. At the same time, the data

can be monitored and recorded at the on-site control centre using a computer system. The meter readings are readily accessible for VVB.

When the project is in operation, both the project owner and the grid company will check the equipments to ensure their work properly. The accuracy of the above meters is no lower than 0.5.

4. Data Collection

The verification will use the main meter's data as long as the inaccuracy of the meter is within the permissible tolerance. The main procedures are as follows:

I The project owner will record the power supplied to the grid and purchased from the grid monthly.

II The project owner will calculate the net electricity supplied to the grid based on the records above;

III The project owner keeps and safe keeps the records of the main meter's data readings for verification by the VVB.

5. Calibration of Meters & Metering

The metering equipment is properly calibrated and checked annually according to DL/T448-2016. The project owner prepares backup procedures to deal with any errors occurred to the meters. The calibration records carry out by the grid company should be provided to the project owner, and these records are maintained by the project owner and the third party designated.

Meters should be tested by a qualified metric organization co-authorized by the project owner and the grid company within 10 days after equipments malfunction caused by improper operation. All the calibration test records should be maintained safely for the verification.

6. Data Management System

To keep safely the records of the data collected during monitoring, the project sets up a complete data management system. The project perfects the whole monitoring procedure by developing the VCS manual, tracking information from the primary source to the end-data calculations in paper document format. It is the responsibility of the project owner to provide additional necessary data and information for validation and verification requirements of respective VVB. Physical documentation such as paper-based maps, diagrams and environmental assessment is collated in a central place, together with this monitoring plan. All paper-based information is stored by the project owner and kept at least one copy.

At the end of each month, the monitoring data are filed in a spreadsheet, and the paper-based printout should be also archived. Furthermore, the project owner collects the sales receipts for the electricity supplied to the grid as a cross-check, and compiled the monitoring report including the monitoring data and relevant evidence at the end of each crediting year.

All the data will be kept for two years following the end of the last crediting period.

7. Monitoring Report

After the VCS project manager collects and sorts the monitored data, the monitoring report is prepared by the designated project participate. The project developer has to make sure that the format and content of the monitoring report are consistent with the monitoring template in the registered PD.

8. Quality Assurance and Quality Control

The workers are trained to be competent and the metering equipments are calibrated and sealed as per the industry practices at regular intervals, with the purpose to provide credible, accurate, transparent and conservative monitoring data and ensure the real, measurable, long-term GHG emission reduction from this project.

Monthly net on-grid electricity supplied data are approved and signed off by the Manager before it is accepted and stored. This audit checks compliance with monitoring procedures in this monitoring plan. This internal audit identifies potential improvements to procedures to improve monitoring and reporting in future years. The purpose of training is to assure those staffs are competent to conduct the monitoring plan, thus to make the monitored data accurate.

If the fault of the main meter exceeds the allowable tolerance or its malfunction occurs, the grid-connected electricity generated by the project will be resolved by following measures:

I Adopting the backup meter's data (after taking the line losses into consideration), unless a test by either party reveals it is inaccuracy;

II If the inaccuracy of the backup meter is not within the acceptable limits or it cannot work properly, the project owner and the grid company shall jointly prepare a new agreement of correct reading;

III If the project owner and the grid company fail to reach an agreement concerning the correct

reading, this matter will be submitted for arbitration according to agreed procedures.

9. Training

The project owner entrusts the professional engineers and experts to train all the relative staffs before operation of generators. The training contains VCS knowledge, operational regulations, quality control (QC) standard flow, data monitoring requirements and data management regulations etc.