CECIC GANSU YUMEN CHANGMA NO.3 WIND FARM PROJECT

Document Prepared by Profit Carbon Environmental Energy Technology (Shanghai) Co., Ltd.

Project Title	**CECIC Gansu Yumen Changma No.3 Wind Farm Project**
Version	02
Date of Issue	17/02/2022
Prepared By	Joanna Zhu
Contact	Room 302, 2815 Longteng Avenue, Xuhui District, Shanghai Telephone: +86-13564459487 Email: yanan.zhu@profitcarbon.com

CONTENTS

1 PROJECT DETAILS

1.1 Summary Description of the Project

CECIC Gansu Yumen Changma No.3 Wind Farm Project (hereinafter referred as "the Project") is in Yumen Town, Yumen City, Gansu Province, the People's Republic of China. The purpose of the Project is to generate electricity using wind power resources in the project region and to deliver to the Northwest China Power Grid (NWPG) which is predominated by connected fossil fuel fired power plants, especially coal fired plants. So, the Project can reduce GHG emissions by replacing the electricity generated by fossil fuel fired power plants in NWPG.

The purpose of the project is to generate renewable wind power and deliver it to NWPG. Currently, most of the electricity in the region is generated through conventional fossil fuel based thermal power plants, according to the China Electricity Power Yearbook. Through combustion of fossil fuels, they emit a large volume of Greenhouse gasses (GHG) into the atmosphere, which has a negative effect on global society.

The Project involves the installation of 134 wind turbines with 1.5MW capacity per unit, with a total installed capacity of 201 MW. Totally 463,714 MWh of clean electricity generated by the Project are expected to be delivered to the NWPG annually.

The baseline scenario of the project is the electricity supply of equal amount as the project from the NWPG. The baseline scenario of the project is the same against the scenario prior to the start of the implementation of the project activity.

The Project started construction on 19/09/2009. The first wind turbine of the Project commissioning started on 28/01/2011. The Project started fully commissioning on 23/10/2012.

The Project is developed by CECIC Wind-power (Gansu) Co., Ltd. (hereinafter referred as “the Project owner” or “PP”), a solely owned subsidiary company of China Energy Conservation Investment Corporation Wind Power Investment Co., Ltd. The second crediting period is 28/01/2021 to 27/01/2031. The estimated average annual emission reductions of the project is 361,383 CO_2e.

1.2 Sectoral Scope and Project Type

Sectoral scope: 1 energy industries (Renewable sources).

Project type: Grid connected wind power project.

The project is not a grouped project.

1.3 Project Eligibility

The project is a wind power project, which reduces CO_2 by replacing electricity from fossil fuel power plants. This complies with the scope of VCS program.

1.4 Project Design

The Project involves the installation of 134 wind turbines with 1.5MW capacity per unit, with a total installed capacity of 201 MW. Totally 463,714 MWh of clean electricity generated by the Project are expected to be delivered to the NWPG annually. It has been designed to include a single installation of an activity. The proposed project has been designed to include a single installation of an activity as per the proposed project description in Section 1.1 and the detail of installed technology in Section 1.11.

1.5 Project Proponent

Organization name	CECIC Wind-power (Gansu) Co., Ltd.
Contact person	Lv Xin
Title	office manager
Address	12th Floor, A Building Jiengeng Mansion, No. 42, Xizhimen North Street, Haidian District, Beijing City, P.R. of China
Telephone	+86-10-62248705
Email	lvxin@cecwpc.cn

1.6 Other Entities Involved in the Project

Organization name	Profit Carbon Environmental Energy Technology (Shanghai) Co., Ltd.
Role in the project	Consultancy
Contact person	Joanna Zhu
Title	Project Director
Address	Room 302, 2815 Longteng Avenue, Xuhui District, Shanghai
Telephone	+86-13564459487
Email	yanan.zhu@profitcarbon.com

1.7 Ownership

The project proponent is CECIC Wind-power (Gansu) Co., Ltd. who has the full ownership of the project. The approval of Environmental Impact Assessment (EIA), Preliminary Design Report (PDR), and Letter of Approval for the Project as a CDM Project issued by China National Development and Reform Commission, and the business license of the project owner are evidence for legislative right. Besides, the equipment purchasing contract and the purchasing power agreement are the evidence for the ownership of the plant, equipment and power generating.

1.8 Project Start Date

28/01/2011 (It is the date when the first turbine was commissioned).

1.9 Project Crediting Period

There is a deviation for the crediting period. The project is registered under VCS standard Version 3.2 and completed validation before 19/03/2020. Thus, it remains eligible to apply the crediting period requirements under VCS 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 28/01/2011~27/04/2011 to 28/01/2011~27/01/2021. According to VCS standard and considering the 20-year lifetime of the project activity and 7*3 CDM renewable crediting period, the total VCS crediting period is 28/01/2011 to 27/01/2031. And the second crediting period is from 28/01/2021~27/01/2031 accordingly.

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)
28/01/2021~31/12/2021	334,651
01/01/2022~31/12/2022	361,383
01/01/2023-31/12/2023	361,383
01/01/2024-31/12/2024	361,383
01/01/2025-31/12/2025	361,383
01/01/2026-31/12/2026	361,383

01/01/2027-31/12/2027	361,383
01/01/2028-31/12/2028	361,383
01/01/2029-31/12/2029	361,383
01/01/2030-31/12/2030	361,383
01/01/2031-27/01/2031	26,732
Total estimated ERs	**3,613,830**
Total number of crediting years	**10**
Average annual ERs	361,383

1.11 Description of the Project Activity

The Project started construction on 19/09/2009. The first wind turbine of the Project started commissioning on 28/01/2011. The Project started fully commissioning on 23/10/2012. The electricity generated by the Project is delivered to NWPG, according to the signed power purchase agreement (PPA) with Gansu Electric Power Grid Corporation.

Total 134 sets of wind power turbine and generators with 1.5MW unit capacity each, are installed in the Project, forming 201MW of total capacity. These wind turbines are manufactured by China's Dongfang Steam Turbine Co., Ltd and the model type of these wind turbines is FD82A/1500. The main technology parameter of this type of wind power turbine can be found at Table 1, which is in line with the specification made in the PD.

Major technical parameters of the key equipment employed by the project are illustrated in the following table.

Table 1 Major technical parameters of key equipment

Item	FD82A/1500
1. Data for Unit	
Rated capacity (kW)	1500
Number of units	134
Capacity control method (m)	Adjusting the pitch of blade and wind wheel speed control
Turbine diameter (m)	82
Hub height (m)	70
Cut in wind speed (m/s)	3.0
Rate wind speed (m/s)	11

Cut out wind speed (m/s)	20.0
Wind speed limit (m/s)	52.5
Operating temperature (˚C)	-20-+40
The wind direction	Upwind
Technical lifetime (y)	20
2. Blade	
Number of blades	3
Material of blade	GRP
End profiles of blades speed (m/s)	74.3
3. Generator	
Type of generator	Double-fed slip ring asynchronous generator
Rated capacity (kW)	1500
Output Voltage (V)	690
Rated speed (rpm)	1000-1800±10%
4. Machinery space & Tower	
Machinery space (t) (exclude blade)	61
Blade	3x6.2
Type of Tower	Conical steel tube
High of Tower (m)	70
Weight of Tower (t)	127.66

In the revised CDM PDD (approved by CDM EB) (version 11.0 dated 02/07/2012), two solar projects (other projects) shared bi-directional gateway meter (M1 as main meter and M1' as backup meter) with the project activity. The quantity of net electricity generation supplied by the Project plant/unit to the grid ($EG_{facility,y}$) is continuous monitored through ten bi-directional meters installed at the 35kV side of 35kV/330kV transformer. However, the readings of the 10 electricity meters were not recorded since 01/01/2020, An alternative measure is adopted for the monitoring of net electricity generation supplied by the project plant/unit to the grid ($EG_{facility,y}$). The quantity of net electricity generation supplied by the project plant/unit to the grid ($EG_{facility,y}$) were continuously monitored through bi-directional gateway meter (M1 as main meter and M1' as backup meter with accuracy 0.2s) share with two solar projects (other projects), as well as, electricity meters MS1 (accuracy 0.5s) and MS2 (accuracy 0.5s), which measures the electricity output and input of two Solar Projects. The location of the meters and the transmission lines are displayed as diagram in section 5.3 for details.

This deviation from the registered monitoring plan doesn't impact the applicability of the methodology, additionality, or the appropriateness of the baseline scenario. The deviation also doesn't lower the accuracy and conservativeness of the monitoring system and the project remains in compliance with VCS Program rules.

This is a Greenfield wind power plant and there are no facilities, systems, and equipment in operation under the existing scenario prior to the implementation of the project activity. The baseline scenario is the continuation of the existing scenario prior to the implementation of the project activity.

1.12 Project Location

The Project site is located 18-31 km southwest of Yumen Town, Yumen City, Gansu Province in the People's Republic of China. It is located at Latitude from N 40°05′39″ to N 40°09′52″ and Longitude from E 96°46′22″ to E 96°51′57″. The altitude of the Project site ranges from between 1690 m to 1825 m above the sea level.

Figure1. Map of Project Location

1.13 Conditions Prior to Project Initiation

The scenario existing prior to the start of the implementation of the project activity is NWPG providing the same electricity service as the Project.

The project scenario is the implementation of the Project, which involves the installation of 134 wind turbines with 1.5MW capacity per unit, with a total installed capacity of 201 Which will supply an average annual generation of 463,714 MWh to NWPG and replace the same amount of electricity generated by fossil fuel fired power plants connected to NWPG.

The baseline scenario is the same as the scenario existing prior to the start of implementation of the project activity.

1.14 Compliance with Laws, Statutes and Other Regulatory Frameworks

The project is wind power generation project and meets the relevant provisions of the Law of the People's Republic of China.

The Environmental Impact Assessment (EIA) report was approved by Environmental Protection Bureau of Gansu on 08/09/2008, and the Feasibility Study Report of the project was approved by Gansu Development and Reform Commission on 01/04/2009. The project has got LoA from China DNA on 21/04/2009. These approvals demonstrate that the project meets the requirement of national laws and regulations, including Renewable Energy Law of the People's Republic of China and Environmental Protection Regulation for Wind Power Project, etc.

The main sectoral policy relevant to the project is the 'Renewable Energy Law of the People's Republic of China', which came into effect on 01/01/2006, and which aims to promote renewable energy in the Host Country. This Law demonstrates the Chinese Government's commitment to the development of renewable energy as part of the overall energy development strategy and encourages grid-connected power generation from renewable sources. Nevertheless, there are no direct incentives, such as financial grants, higher tariffs, or subsidized loans available for these types of project.

1.15 Participation under Other GHG Programs

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

The project is a registered CDM project with reference No. 4734. The first 7-year renewable crediting period under CDM is from 28/04/2011 to 27/04/2018. And the crediting period renewal under CDM scheme is no longer possible. Total GHG emission reductions of 1,348,338 tCO_2 generated from 28/04/2011 to 31/12/2015 by the project has been issued as CERs under CDM program, the detailed information can be found at https://cdm.unfccc.int/Projects/DB/TUEV-RHEIN1303442859.42/view.

All emission reductions during 01/01/2016 to 27/01/2021 have not seek CDM CER issuance. Emission reductions during this monitoring period will only seek issuance under VCS program.

The GHG emission reductions of 1,170,755 tCO_2e generated from 01/01/2016 to 31/12/2019 by the project has been issued as VCUs under VCS program.

Except for CDM, the project did not register under any other GHG program.

1.15.2 Projects Rejected by Other GHG Programs

NA

1.16 Other Forms of Credit

1.16.1 Emissions Trading Programs and Other Binding Limits

The project does not reduce GHG emissions from activities that are included in an emissions trading program or any other mechanism that includes GHG allowance trading.

1.16.2 Other Forms of Environmental Credit

The project has not sought or received another form of GHG-related environmental credit, including renewable energy certificates.

1.17 Additional Information Relevant to the Project

Leakage Management

NA

Commercially Sensitive Information

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

Sustainable Development

The Project is expected to produce various benefits to society as well as the environment. Therefore, the Project will significantly contribute to national as well as local sustainable development, including:

Job creation

Implementation of the Project will generate employment opportunities for local contractors and suppliers, while operation and maintenance of the plant will create additional long-term employment opportunities for skilled professionals. For the Project operation PP is planning to employ a number of skilled workers, while more additional jobs were created by sub-contractors for construction of the Project.

Thus, the project achieved **SDG 8 Decent Work and Economic Growth**[1].

Reduction in GHG emissions

Currently, most of the electricity in the region is generated through conventional fossil fuel based thermal power plants, according to the China Electricity Power Yearbook 2009. Through combustion of fossil fuels, they emit a large volume of Greenhouse gasses (GHG) into the atmosphere, which has a negative effect on global society. Generation of GHG emission free electricity, such as wind, will displace electricity generated by these fossil fuel based thermal plants, therefore reducing GHG emissions. Achieve 423,487 tCO_2e emission reduction in this monitoring period.

Thus, the project achieved **SDG 13 Climate Action**[2].

Reduction of fossil fuel use

The Project Activity will reduce reliance on imported fossil fuels, which will contribute to increasing China's energy security, and will also improve local air quality as it reduces the emissions of SO2, and NOx associated with fossil fuel use.

Thus, the project achieved **SDG 7 Affordable and Clean Energy**[3].

Increase of power supply

Due to rapid economic growth in recent years, China is experiencing a serious shortage of electricity, causing blackouts and brownouts throughout the country. Such power outage reduces economical activity and has a negative effect on daily life. With the new wind farm, the grid is expected to improve its supply while contributing to steady and reliable economical growth in the region.

Further Information

NA

2 SAFEGUARDS

[1] https://sdgs.un.org/goals/goal8

[2] https://sdgs.un.org/goals/goal13

[3] https://sdgs.un.org/goals/goal7

2.1 No Net Harm

There are no negative environmental and/or socio-economic impacts due to the project. In fact, the project as a clean renewable energy project can reduce greenhouse gas emissions and the environmental pollution caused by fossil fuels consumption. Meanwhile, the implementation of the project will improve local socio-economic development through creating career opportunities and paying taxes.

2.2 Local Stakeholder Consultation

The local stakeholder's meeting was held in Yumen City on 18th June 2008. 45 participants attended the meeting including residents, builders, and members of the local authorities. The project owner introduced the Project, and then a survey was arranged through a one-page questionnaire, which was designed to be easily filled in. The opinions expressed by the stakeholders were recorded and are available on request.

The questions regarding the project were mainly as follows:
Do you consider your current living, studying, and working environment to be quiet?

Do you think that the project will have an impact on the environment, such as air quality, noise, water, etc.?

Will the project construction have a negative impact on the living, studying, and working environment of you and your family?

Do you think the project implementation will have some positive impact on your life?

During the project construction which of the following problems concerns you most: noise, air pollution, equipment safety, wastewater discharge, electromagnetic interference, landscape destruction?

Do you agree with the development and construction of the project?

Do you have any suggestion regarding the kind of measures which should be applied during the project construction and operation in order to protect the environment?

Do you have any suggestions/advice for the developer of the Project?

The summary of stakeholder meeting's comments is as following:

Promote the local economic development

The local government strongly supports the development and construction of the proposed Project. It will increase local financial income and promote technological progress of local building materials, tower tube manufacturing, and other related industries.

Local environment protection

According to the project EIA report, the noise level of the installed turbines is within below the national standard. The proposed Project site *is in* the *Gobi Desert*, the underdeveloped region. Moreover, there are no residents or industrial firms near the project site. Furthermore, there are no issues related to noise and communications signal interference, or to bird migration. The

project will play an exemplary role on energy saving, pollution reduction and the environment protection.

Improve the living condition of residents

The project site *is in Gobi Desert* and there are no residents around the project site, so the local residents will not be impacted by the noise from the construction and operation of the project. The proposed project will create new employment opportunities through the project construction and operation.

The summary of *questionnaire is* listed as the following:

86.67% of respondents agree with the development and construction of the project.

86.67% of the respondents believe that the Project will have no negative impact on their living, studying, and working environments.

71.11% of the respondents believe that the project implementation will have a positive impact on their lives.

Conclusion: The stakeholder meeting and the survey showed that the Project receives strong support from the local community. They all believe the Project will promote local economic development and agree with the project development and construction.

Communications with Local stakeholders are being carried out at periodic intervals. The project owner carried out questionnaire survey for the local stakeholders to collect the relevant comments and suggestions every two years. Meanwhile, the local authority has also conducted spot checks on the implementation of the project from time to time as per the request from the local governments' regulations. There were no negative comments received for the project.

2.3 Environmental Impact

In line with the requirements of local government, an Environmental Impact Assessment (EIA) for the proposed wind farm project was carried out. The EIA was completed by Lanzhou University and has been approved by the Environmental Protection Bureau of Gansu Province, indicating that the Project meets all national environmental protection regulations. The analysis and measures to be taken to mitigate the impacts are demonstrated in the following:

Impact on Air Quality

The air pollution during construction mainly comes from flying dust produced by excavating land as well as some exhaust discharge from transportation vehicles and construction machinery. To minimize effects from such activities, PP will take appropriate measures, such as watering the site regularly. In addition, since the project site is far away from the nearest local residential area (over 5Km), there is no impact on local residents from dust and air pollution. The main impact is on the construction staff and appropriate measures such as watering and converting will be taken to reduce any negative impact and ensure staff safety.

Noise Pollution

The noise mainly comes from the drilling machines and cement mixers during the construction period, and aerodynamic interaction between the wind and turbine blades during operation. Although the operating level of these turbines is around 100dB, at a range of 150 meters from the turbines the noise weakens to 33dB, which is below the national standard of 45dB. However, as the Project is far away from any residential area (5km), effects on the surrounding environment of noise pollution are not significant.

Impact of Solid Waste:

Solid waste mainly comes from construction and living waste. During the construction period, construction waste will be properly disposed to avoid water and soil erosion problems. The Project will generate living wastes of 150 kg per day during construction. This waste will be properly collected and delivered to the local county for disposal.

Impact on Wastewater:

The wastewater generated during the construction includes washing water from machines and wastewater from the project office. Since the project site is located in the Gobi Desert area, the wastewater will be reused on the construction site or as fertilizer. During operation, the wastewater and sewage will be treated by using a septic tank and all-in-one biochemical process equipment to recycle and reuse water on the project site. The treated wastewater will be used for on-site greening and road spreading. The treated wastewater quality will meet the requirement of the Fields Irrigation Water Standard (GB 5084-1992), therefore, it has no negative impact on the surrounding environment.

Impact on Ecosystem:

The Project is in the Gobi Desert area with sparse vegetation. Through minimizing the construction area, backfilling the gravel, properly disposing of solid waste during construction, and growing drought-resistant, sand-fixing, and fast-growing plants after construction, the impact on the ecological environment will be reduced.

2.4 Public Comments

NA

2.5 AFOLU-Specific Safeguards

NA

3 APPLICATION OF METHODOLOGY

3.1 Title and Reference of Methodology

The approved methodology applied in the project activity is ACM0002 (version 20.0) – "Grid connected electricity generation from renewable sources".

The methodology also refers to the approved versions of the following tools:

Tool to calculate the emission factor for an electricity system (version 07.0).

Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation, version 03.0.

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).

3.2 Applicability of Methodology

Since it is a wind power generation project which exports electricity to the NWPG, ACM0002 has been selected as the methodology for this project.

The Project conforms to the applicability condition of ACM0002 (version 20.0) – "Consolidated methodology for Grid-Connected Electricity Generation from Renewable Sources" as demonstrated in the table below:

Clauses	Requirements of the ACM0002 (version 20.0)	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 NWPG-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 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	The Project involves installation of a new wind power plant, and does not involve capacity addition, retrofits, or replacements.	Applicable

	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.		
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 reservoirs, where the power density for any of the reservoirs, calculated using equation (7), is lower than or equal to 4 W/m2, 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/m2 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.	Not applicable, the Project does not involve installation, modification or retrofit of hydro power plants. Therefore, does not need to be considered.	N/A

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 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.	Not applicable, the project is not a hydro power plant, so this applicability condition does not need to be considered.	N/A
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 is a new wind project to export electricity to the Grid system. Therefore, 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.	Applicable
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 wind power project.	N/A

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

Tool	Criteria Applicability	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 wind power plant supplying electricity to the grid.	Applicable
Tool to calculate the emission factor for an electricity system	In case of CDM projects the tool is not applicable if the project electricity system is located partially or totally in an Annex I country.	The project electricity system is located in a non-Annex I country.	Applicable
Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation	If emissions are calculated for electricity consumption, the tool is only applicable if one out of the following three scenarios applies to the sources of electricity consumption: (a) Scenario A: Electricity consumption from the grid. (b) Scenario B: Electricity consumption from (an) off-grid fossil fuel fired captive power plant(s). or (c) Scenario C: Electricity consumption from the grid and (a) fossil fuel fired captive power plant(s).	The electricity consumption of the project is purchased from the grid.	Applicable
Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation	This tool can be referred to in methodologies to provide procedures to monitor amount of electricity generated in the project scenario, only if one out of the following three project scenarios applies to the recipient of the electricity generated: (a) Scenario I: Electricity is supplied to the grid; (b) Scenario II: Electricity is supplied to consumers/electricity consuming facilities; or (c) Scenario III: Electricity is supplied to the grid and consumers/electricity consuming facilities.	The electricity generated by the project is supplied to the grid.	Applicable
Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity	This tool is not applicable in cases where captive renewable power generation technologies are installed to provide electricity in the project activity, in the baseline scenario or to sources of leakage. The tool only	There are no captive renewable power generation technologies installed to provide electricity in the project activity, in the	Applicable

generation	accounts for CO2 emissions.	baseline scenario or to sources of leakage.	
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

In accordance with the methodology ACM0002 (version 20.0), the spatial extent of the project boundary includes the project power plant and all power plants connected physically to the NWPG. According to China DNA's guidance, NWPG is composed of Shanxi Grid, Gansu Grid, Qinghai Grid, Ningxia Grid, and Xinjiang Grid. The schematic diagram of the Project is as shown on the below figure.

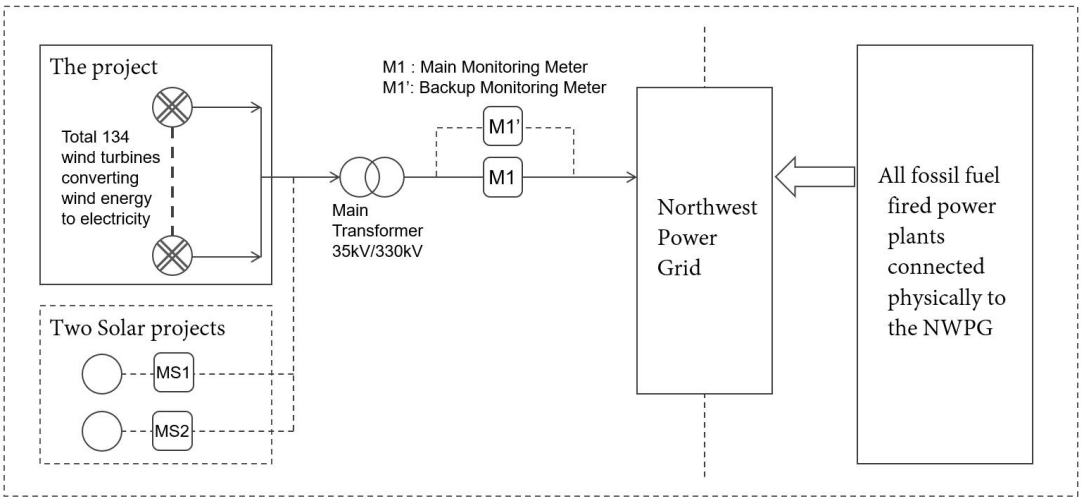

Figure 2. The boundary of the project

According to the approved methodology ACM0002 (version 20.0), the emission sources and GHGs in the project boundary are as follows:

Source		Gas	Included?	Justification/Explanation
Baseline	Power plants connected to the Northwest China Grid	CO_2	Yes	Main emission sources
		CH_4	No	Minor emission sources
		N_2O	No	Minor emission sources
Project	The wind power plant	CO_2	No	According to ACM0002, the project generates electricity by wind, which is a kind of renewable energy, thus project emissions should not be considered.
		CH_4	No	
		N_2O	No	

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 NWPG. 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 NWPG. 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 20 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:

$EF_{gird,CM,y}$: the baseline emission factor that determined once for the first crediting period at the time of validation, hence it shall be updated using the latest version of "Tool to calculate the emission factor for an electricity system".

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 ($EF_{gird,CM,y}$) is 0.779325 tCO_2e/MWh.

3.5 Additionality

According to VCS standard 4.0, a full reassessment of additionality is not required.

The validity of the original baseline scenario is demonstrated in Section 3.4, and it was concluded that the current baseline is still valid for the next crediting period. Only EF related parameters should be updated for the second crediting period.

Project has no change compared with the original status. Therefore, the project description is the same as in the first crediting period.

The demonstration of regulatory surplus is provided below.

The project activity is in compliance with current laws and regulations in China, such as Renewable Energy Law of the People's Republic of China and Environmental Protection Regulation for Wind Power Project, etc. The law and regulations are described in section 1.14. There is no other regulatory requirement for the implementation of a wind power technology.

3.6 Methodology Deviations

There has a project description deviation. In revised CDM PDD (approved by CDM EB) (version 11.0 dated 02/07/2012), two solar projects (other projects) shared bi-directional gateway meter (M1 as main meter and M1' as backup meter) with the project activity. The quantity of net electricity generation supplied by the Project plant/unit to the grid ($EG_{facility,y}$) is continuous monitored through ten bi-directional meters installed at the 35kV side of 35kV/330kV transformer. However, the readings of the 10 electricity meters were not recorded since 01/01/2020, An alternative measure is adopted for the monitoring of net electricity generation supplied by the project plant/unit to the grid ($EG_{facility,y}$) during this monitoring period (from 01/01/2020 to 27/01/2021). The quantity of net electricity generation supplied by the project plant/unit to the grid ($EG_{facility,y}$) were continuously monitored through bi-directional gateway meter (M1 as main meter and M1' as backup meter with accuracy 0.2s) share with two solar projects (other projects), as well as, electricity meters MS1 (accuracy 0.5s) and MS2 (accuracy 0.5s), which measures the electricity output and input of two Solar Projects. The location of the meters and the transmission lines are displayed as diagram in section 5.3 for details.

This deviation is a permanent deviation. The deviation will not negatively impact the conservativeness of the quantification of GHG emission reductions or removals. The deviation relates only to the criteria and procedures for monitoring or measurement, doesn't relate to any other part of the methodology.

Furthermore, as per the revised CDM PDD (approved by CDM EB) (version 11.0 dated 02/07/2012), there is a deviation on calculation of Build Margin when adopting the methodological tool - "Tool to calculate the emission factor for an electricity system" by the Chinese DNA in the "2019 Baseline Emission Factors for Regional Power Grids in China". The deviation has been approved by the EB Board in a response letter entitled "Request for clarification on use of approved methodology AM0005 for several projects in China"*4*. The same deviation method has been adopted in this crediting period of the project by the Chinese DNA.

Except deviations above, there are no other project deviations or methodology deviations for the project activity.

4 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

4.1 Baseline Emissions

[4] http://cdm.unfccc.int/UserManagement/FileStorage/AM_CLAR_QEJWJEF3CFBP1OZAK6V5YXPQKK7WYJ

The GHG emission reduction calculation of the project was based on the applied methodology ACM0002 (version 20.0).

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

Where:

BE_y is the baseline emissions in year y (tCO_2e)

$EG_{PJ,y}$ is the quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the VCS project activity in year y

$EF_{grid,CM,y}$ is the 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_2e/MWh)

The Project is the installation of a new grid-connected renewable power plant at a site where no renewable power plant was operated prior to the implementation of the Project. So:

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

Where:

$EG_{PJ,y}$ is the quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the VCS project activity in year y.

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

And the baseline emission factor $EF_{grid,CM,y}$ is calculated as per the latest version of "Tool to calculate the emission factor for an electricity system" (version 07.0). The $EF_{grid,CM,y}$ 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, project electricity system is defined by the spatial extent of the power plants that are physically connected through transmission and distribution lines to the project activity. The Chinese DNA has published a delineation of the project electricity system and connected electricity system. According to the delineation, the project electricity system of the local grid to which the Project activity is connected is NWPG.

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.

For the operating margin, "Option I: only grid power plants are included in the calculation" was selected.

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.

Detailed information to carry out a dispatch data analysis is not publicly available; therefore, method (b) and method (c) is not suitable for the project.

According to tool, the Simple OM method is applicable to the project if the low-cost resources constitute less than 50% of total grid generation on average in the five most recent years or based on long-term normal for hydroelectric production.

According to the data from China Electric Power Yearbook 2013-2017, from year 2012 to year 2016, for the NWPG the project activity connected to, the low-cost/must-run electric power resources generation accounts for the total grid total are 4.96%, 5.92%, 6.39%, 7.21% and 8.94%, respectively, 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 $EF_{grid,OM,y}$.

The Simple OM can be calculated using either of the two following data vintages for years(s) y:

(a) (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.

(b) (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.

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

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

The Simple OM emission factor is calculated as the generation-weighted average CO_2 emissions per unit net electricity generation (tCO_2/MWh) of all generating power plants serving the system, not including low-cost/must-run power plants/units. The simple OM may be calculated:

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

b) 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:

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:

$$\boldsymbol{EF_{grid,OMsimpl,y}} = \frac{\sum_{i,m} \boldsymbol{FC_{i,y}} \times \boldsymbol{NCV_{i,y}} \times \boldsymbol{EF_{CO2,i,y}}}{\sum_{m} \boldsymbol{EG_{y}}} \quad \text{(Equation 3)}$$

Where:

$\boldsymbol{EF_{grid,OMsimpl,y}}$ simply operating margin CO_2 emission factor in year y (tCO_2/MWh)

$\boldsymbol{FC_{i,y}}$ Amount of fuel type i consumed in the project electricity system in year y (mass or volume unit).

$\boldsymbol{NCV_{i,y}}$ Net calorific value (energy content) of fuel type i in year y (GJ/mass or volume unit)

$\boldsymbol{EF_{CO2,i,y}}$ CO_2 emission factor of fuel type i in year y (tCO_2/GJ)

$\boldsymbol{EG_{y}}$ 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)

$\boldsymbol{i}$ All fuel types combusted in power sources in the project electricity system in year y

$\boldsymbol{y}$ The relevant year as per the data vintage chosen in Step 3

Regarding parameter selection, local values of $NCV_{i,y}$ and $EF_{CO2,i,y}$ should be used where available. If no such values are available, IPCC world-wide default values are preferable. In this PD, the Net Calorific Value ($NCV_{i,y}$) of each type of fossil fuel used in the calculation comes from China Energy Statistic Yearbook 2016-2018. Emission factors ($EF_{CO2,i,y}$) of each type of fossil fuel come from IPCC 2006 default values.

The Simple OM Emission Factor ($EF_{grid,OMsimpl,y}$) of the project is calculated based on the fuel consumption data for electricity generation of the NWPG, 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 ($EF_{grid,OMsimpl,y}$) of the NWPG 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 PD 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 PD submission.

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:

$$\boldsymbol{EF_{grid,BM,y}} = \frac{\sum_m \boldsymbol{EG_{m,y}} \times \boldsymbol{EF_{EL,m,y}}}{\sum_m \boldsymbol{EG_{m,y}}} \qquad \text{(Equation 4)}$$

Where:

$\boldsymbol{EF_{grid,BM,y}}$ Build margin CO_2 emission factor in year y (tCO_2/MWh)

$\boldsymbol{EG_{m,y}}$ Net quantity of electricity generated and delivered to the grid by power unit m in year y (tCO_2/MWh)

$\boldsymbol{EF_{EL,m,y}}$ CO_2 emission factor of power unit m in year y (tCO_2/MWh)

$\boldsymbol{m}$ Power units included in the build margin

y Most recent historical year for which electricity generation data is available

As it is difficult to obtain the detailed data on the power generation, fuel consumption and thermal efficiency of each newly built power unit from public documents. According to "Tool to calculate the emission factor for an electricity system" (version 07.0). The BM emission factor is calculated as follows:

1) Using the efficiency level of the best technology commercially available in the provincial/regional or national grid of China, as a conservative proxy, for each fuel type in estimating the fuel consumption to estimate the build margin.

2) Use of capacity additions during last 1 ~ 3 years for estimating the build margin emission factor for grid electricity.

3) Use of weights estimated using installed capacity in place of annual electricity generation.

The newly built power plants in the past few years are bundled into "grouped new power plant" according to their construction year, their province and their fuel type. The annual net electricity generation in the year y of each "grouped new power plant" is estimated according to their total capacity and the average utilization hours, as the following equation:

$$\boldsymbol{EG_{m,y} = CAP_m \times H_{m,y}} \quad \text{(Equation 5)}$$

where:

$EG_{m,y}$	=	Annual net electricity generation the unit *m* in year *y* (MWh)
CAP_m	=	Installed capacity of the unit *m* (MW)
$H_{m,y}$	=	Utilization hour of the unit m in the year *y* (h), determined according to the average utilization hour of the same type of unit in the same province
y	=	The most recent year for which the generation data is available. For the calculation of BM in 2019, *y* = 2017
m	=	grouped new power plant

Since the newly built power plants in the same province (A), in the same year (t) and using the same fuel type (k) are grouped into "a grouped new power plant", CAP_m represents the total installed capacity of fuel type k power plants located in the province A and in the year t:

$$\boldsymbol{CAP_m = CAP_{A,t,k}} \quad \text{(Equation 6)}$$

where:

CAP_m	=	Installed capacity of the unit *m* (MW), with *m* representing the specified combination of A, t, and k

$CAP_{A,t,k}$ = Total installed capacity of fuel type *k* power plants located in the province *A* and in the year *t*

A = Provinces covered by the NWPG, namely, Shaanxi Province, Gansu Province, Qinghai Province, Ningxia Autonomous Region, Xinjiang Autonomous Region

t = Years related to the grouped new power plants, for the 2019 calculation, *t* represents 2017, 2016, 2015…. Until the aggregated electricity generation of the grouped new power plants reaches 20% of the total electricity generation of the NWPG

k = Fuel type of the grouped new power plants, including hydro, thermal (coal, gas, oil, waste incineration, other thermal), nuclear, wind, solar and others.

Figure 3 shows the procedure to determine the sample group of power units *m*.

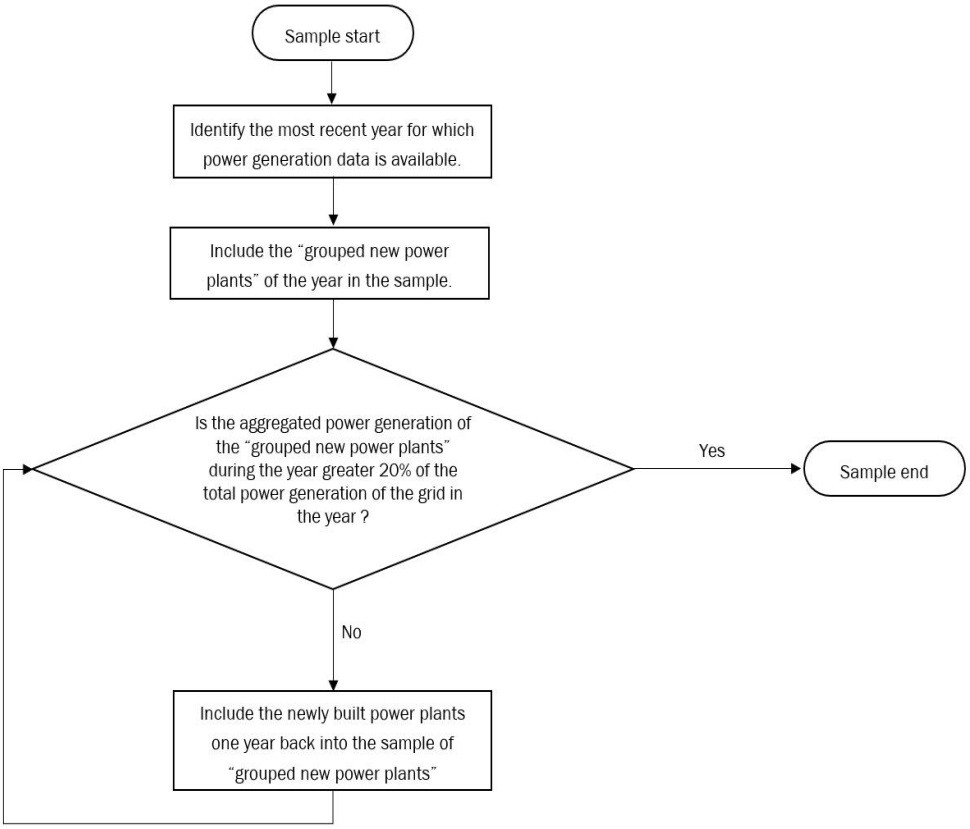

Figure 3 Procedure to determine the sample group of power units *m* used for the BM emission factor calculation

The emission factors of each fuel type $EF_{EL,m,y}$ are determined according to the Option A2 in the TOOL07, as the following equation:

$$EF_{EL,m,y} = \frac{EF_{CO2,m,i,y} \times 3.6}{\eta_{m,y}} \quad \text{(Equation 7)}$$

where:

$EF_{EL,m,y}$ = CO_2 emission factor of power unit *m* in year *y* (t CO_2/MWh)

$EF_{CO2,m,i,y}$ = Average CO_2 emission factor of fuel type *i* used in power unit *m* in year *y* (t CO_2/GJ)

$\eta_{m,y}$ = Average net energy conversion efficiency of power unit *m* in year *y* (ratio)

m = All power units serving the grid in year *y* except low-cost / must-run power units

3.6 = Conversion factor (GJ/MWh)

Among the fuel types, the emission factors of hydro, nuclear, wind, solar, other thermal and others are 0. Concerning the emission factors of coal, gas, oil and waste incineration, Equation (B-14) takes the following form due to conservativeness:

$$EF_{best,m,y} = \frac{EF_{CO2,m,i,y} \times 3.6}{\eta_{best,y}} \quad \text{(Equation 8)}$$

where:

$EF_{best,m,y}$ = Emission factor of power unit *m* with the best technology commercially available in year *y* (t CO_2/MWh)

$\eta_{best,y}$ = Power generation efficiency of the best technology commercially available in year *y*

m = Power units serving the grid with coal, gas, oil or waste incineration in year *y*

According to the latest and available data at the time of this PDD submission, $EF_{grid,BM,y}$ is calculated to be 0.4407 tCO2e/MWh.

Step 6. Calculate the combined margin emission factor

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

(a) Weighted average CM; or

(b) Simplified CM.

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

The combined margin emissions factor ($EF_{grid,CM,y}$) is calculated as follows:

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

Where:

$EF_{grid,BM,y}$ Build margin CO_2 emission for the project electricity system factor in year y (tCO_2e /MWh)

$EF_{grid,OM,y}$ Operating margin CO_2 emission factor for the project electricity system in year y (tCO_2e /MWh)

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

ω_{OM} Weighting of operating 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 all other project excluded wind and solar project for the second and third crediting period. The $EF_{grid,OM,y}$ and $EF_{grid,BM,y}$ are calculated as described in Step 4 and 5.

Therefore,

$EF_{grid,CM,y}$ = 0.8922 tCO_2e/MWh*0.75+0.4407 tCO_2e/MWh*0.25 = 0.779325(tCO_2e/MWh)
BE_y =463,714 MWh*0.779325 tCO_2e/MWh= 361,383 tCO_2e

4.2 Project Emissions

According to ACM0002 (version 20.0), the project is a GHG zero-emission electricity generating activity; therefore, no project emissions from the project activity were identified PE_y = 0.

4.3 Leakage

As per the applied methodology ACM0002, no leakage is considered.

4.4 Net GHG Emission Reductions and Removals

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

$$ER_y = BE_y - PE_y \quad \text{(Equation 10)}$$

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)

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

Year	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)
28/01/2021~31/12/2021	334,651	0	0	334,651
01/01/2022~31/12/2022	361,383	0	0	361,383
01/01/2023-31/12/2023	361,383	0	0	361,383
01/01/2024-31/12/2024	361,383	0	0	361,383
01/01/2025-31/12/2025	361,383	0	0	361,383
01/01/2026-31/12/2026	361,383	0	0	361,383
01/01/2027-31/12/2027	361,383	0	0	361,383
01/01/2028-31/12/2028	361,383	0	0	361,383
01/01/2029-31/12/2029	361,383	0	0	361,383
01/01/2030-31/12/2030	361,383	0	0	361,383
01/01/2031-27/01/2031	26,732	0	0	26,732
Total	**3,613,830**	**0**	**0**	**3,613,830**

5 MONITORING

5.1 Data and Parameters Available at Validation

The baseline gird emission factor $EF_{grid,CM,y}$ 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 $EF_{grid,CM,y}$ 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	$EF_{grid,OM,y}$
Data unit	tCO_2e/MWh

Description	Operating margin emission factor for North China Power Grid
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 as per the latest version of "Tool to calculate the emission factor for an electricity system" (version 07.0) by China DNA
Purpose of Data	Calculation of $EF_{grid,CM,y}$
Comments	Calculated ex ante and fixed for the second crediting period

Data / Parameter	$EF_{grid,BM,y}$
Data unit	tCO_2e/MWh
Description	Build margin emission factor for North China Power Grid
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 as per the latest version of "Tool to calculate the emission factor for an electricity system" (version 07.0) by China DNA
Purpose of Data	Calculation of $EF_{grid,CM,y}$
Comments	Calculated ex ante and fixed for the second crediting period

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	-
Purpose of Data	Calculation of $EF_{grid,CM,y}$
Comments	Calculated ex ante and fixed for the second crediting period

Data / Parameter	ω_{BM}
Data unit	-
Description	Weighting of build 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	-
Purpose of Data	Calculation of $EF_{grid,CM,y}$
Comments	Calculated ex ante and fixed for the second crediting period

Data / Parameter	$EF_{grid,CM,y}$
Data unit	tCO_2e/MWh
Description	Baseline emission factor for North China Power Grid
Source of data	Calculated through $EF_{grid,OM,y}$, $EF_{grid,BM,y}$, ω_{OM}, ω_{BM} according to the equation (9) in section 4.1
Value applied	0.779325
Justification of choice of data or description of measurement methods and procedures applied	Calculated as per the latest version of "Tool to calculate the emission factor for an electricity system" (version 07.0) by China DNA
Purpose of Data	Baseline emission calculation

Comments	Calculated ex ante and fixed for the second crediting period

5.2 Data and Parameters Monitored

Data / Parameter	$EG_{facility,y}$
Data unit	MWh/yr
Description	Quantity of net electricity generation supplied by the project plants/units to the grid
Source of data	Calculated according to the equation (11) in section 5.3
Description of measurement methods and procedures to be applied	The net electricity supplied to the Grid by the project are calculated through $EG_{PJ\ to\ grid,y}$, $EG_{grid\ to\ PJ,y}$, according to the equation (11) in section 5.3
Frequency of monitoring/recording	-
Value applied	Estimated to be 361,383 MWh/yr
Monitoring equipment	-
QA/QC procedures to be applied	Electricity supplied to the grid is checked by internal verification procedure and electricity sales and purchase receipts.
Purpose of data	Baseline emission calculation
Calculation method	Calculated according to the equation (11) in section 5.3
Comments	Uncertainty level of data is low

Data / Parameter	EG
Data unit	MWh/yr
Description	Total electricity supplied to the grid via the main power line by the Project and two solar projects.
Source of data	Readings of bidirectional electricity Meter M1 (and/or M1') installed at the 330kV side of 35kV/330kV transformer. When main meter M1 is not working, the reading of backup meter M1' will be used.
Description of measurement methods and procedures to be	Continuously measured and monthly recorded. Data are archived for 2 years following the end of the crediting period by means of

applied	electronic and paper backup.
Frequency of monitoring/recording	Continuously measured and monthly recorded
Value applied	-
Monitoring equipment	-
QA/QC procedures to be applied	The accuracy of electricity meters is 0.2s. The calibration frequency is one time/year in accordance with the national calibration standard.
Purpose of data	Baseline emission calculation
Calculation method	-
Comments	Uncertainty level of data is low

Data / Parameter	$EG_{PJ\ to\ grid,y}$
Data unit	MWh/yr
Description	The Electricity exported to the grid by the Project
Source of data	calculated through EG, $EG_{Solar1,y}$, $EG_{Solar2,y}$ according to the equation (12) in section 5.3
Description of measurement methods and procedures to be applied	Continuously measured and monthly recorded. Data are archived for 2 years following the end of the crediting period by means of electronic and paper backup.
Frequency of monitoring/recording	Continuously measured and monthly recorded
Value applied	-
Monitoring equipment	-
QA/QC procedures to be applied	The accuracy of electricity meters is 0.2s. The calibration frequency is one time/year in accordance with the national calibration standard. The data will be cross checked by sales receipt.
Purpose of data	Baseline emission calculation
Calculation method	-
Comments	Uncertainty level of data is low

Data / Parameter	$EG_{grid\ to\ PJ,y}$
Data unit	MWh/yr
Description	The Electricity imported from the grid by the Project.
Source of data	Use the value measured by the bidirectional meter M1 (and/or M1'), including two solar projects, as the most conservative value. When main meter M1 is not working, the reading of backup meter M1' will be used.
Description of measurement methods and procedures to be applied	Continuously measured and monthly recorded. Data are archived for 2 years following the end of the crediting period by means of electronic and paper backup.
Frequency of monitoring/recording	Continuously measured and monthly recorded
Value applied	-
Monitoring equipment	-
QA/QC procedures to be applied	The accuracy of electricity meters is 0.2s. The calibration frequency is one time/year in accordance with the national calibration standard. The data will be cross checked by purchase receipts.
Purpose of data	Baseline emission calculation
Calculation method	-
Comments	Uncertainty level of data is low

Data / Parameter	$EG_{solar1,y}$
Data unit	MWh/yr
Description	Total electricity purchased from the grid by the Solar Project I and during year y
Source of data	Readings of electricity Meters MS1 installed at the 35kV transmission line of the Project site.
Description of measurement methods and procedures to be applied	Continuously measured and monthly recorded. Data are archived for 2 years following the end of the crediting period by means of electronic and paper backup.

Frequency of monitoring/recording	Continuously measured and monthly recorded
Value applied	-
Monitoring equipment	-
QA/QC procedures to be applied	The accuracy of electricity meters is 0.5s. The calibration frequency is one time/year in accordance with the national calibration standard.
Purpose of data	Baseline emission calculation
Calculation method	-
Comments	Uncertainty level of data is low

Data / Parameter	$EG_{solar2,y}$
Data unit	MWh/yr
Description	Total electricity purchased from the grid by the Solar Project II and during year y
Source of data	Readings of electricity Meters MS2 installed at the 35kV transmission line of the Project site.
Description of measurement methods and procedures to be applied	Continuously measured and monthly recorded. Data are archived for 2 years following the end of the crediting period by means of electronic and paper backup.
Frequency of monitoring/recording	Continuously measured and monthly recorded
Value applied	-
Monitoring equipment	-
QA/QC procedures to be applied	The accuracy of electricity meters is 0.5s. The calibration frequency is one time/year in accordance with the national calibration standard.
Purpose of data	Baseline emission calculation
Calculation method	-
Comments	Uncertainty level of data is low

5.3 Monitoring Plan

The monitoring plan of the project is designed according to the approved consolidated monitoring methodology ACM0002 "Grid-connected electricity generation from renewable sources" (version 20.0). This monitoring plan sets out a number of monitoring tasks in order to ensure the complete, consistent, clear and accurate monitoring and the accurate calculation of the emission reduction in the crediting period. This plan is mainly implemented by the project owner with the cooperation of the grid company.

1. Monitoring Object

The main objective data is the power supplied to and purchased from the grid, which is calculated according to the generated electricity and the purchased electricity and supplied to the grid, thus, to calculate the emission reduction of the project.

2. Monitoring Implementers

The Project owner (CECIC Wind-power (Gansu) Co., Ltd.) established a Project Management Office (PMO). The organization structure of PMO is illustrated as follows:

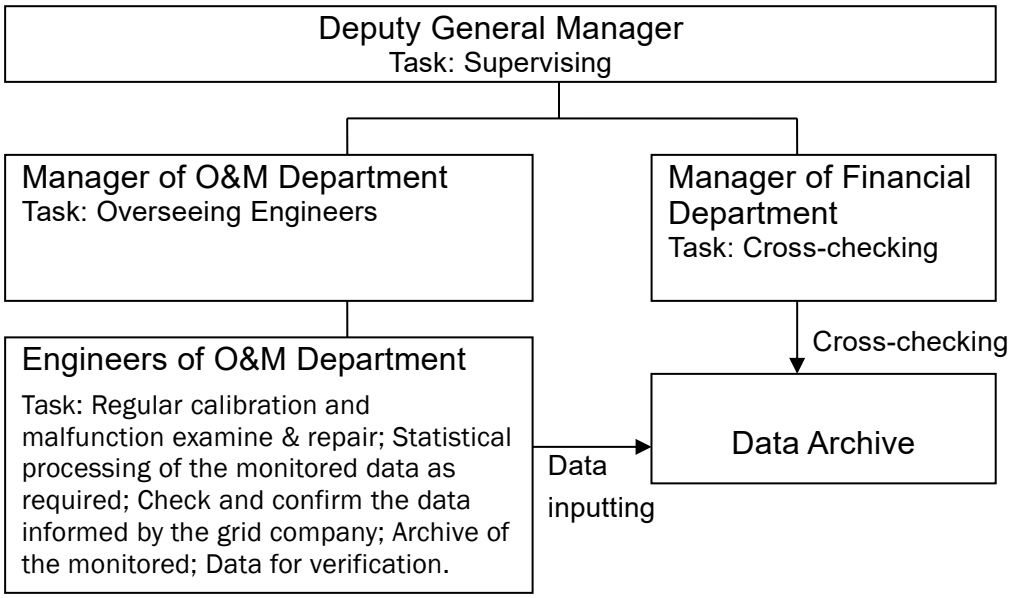

Figure 4: Monitoring structure of the project

PP will form a VCS Project Management Team headed by the vice general manager. Monitoring and reporting will be implemented by the Operation & Maintenance Department and Financial Department.

Engineers of the Operation & Maintenance Department will conduct following tasks: Daily operation and maintenance of the measurement instrument/meters; Regular calibration and malfunction examine & repair; Statistical processing of the measured data as required; Archive of the measured data for verification.

The manager of O&M Department will check the reported measured data monthly. The manager of Financial Department will be responsible for the cross-check via the sales invoice and other relevant records monthly.

3. Monitoring Program and Equipment

The power connection and monitoring system is shown as below:

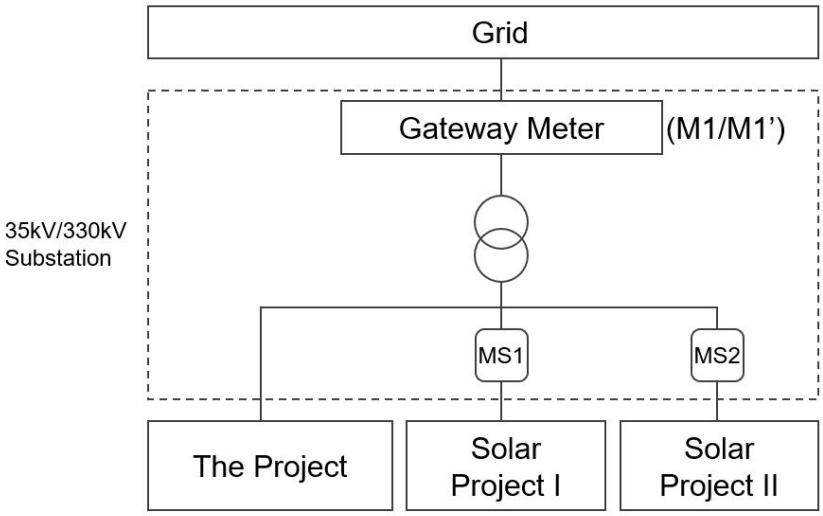

Figure 5. The location of meters

The electricity generated by the Project feeds to the Changma west 35kV/330kV substation through the 35kV transmission lines, then to NWPG after 35kV/330kV transformer. The Project will share the same gateway meter (M1 as main meter and M1' as backup meter) installed at the 330kV side of the 35kV/330kV substation with two solar projects. Meanwhile, the electricity output and input of two Solar Projects can be measured by their own meters (MS1, MS2). Hence the quantity of net electricity generation supplied by the project plant/unit to the grid ($EG_{facility,y}$) is calculated as follow:

$$EG_{facility,y} = EG_{PJ\ to\ grid,y} - EG_{grid\ to\ PJ,y} \quad \text{(Equation 11)}$$

$$EG_{PJ\ to\ grid,y} = EG - EG_{solar1,y} - EG_{solar2,y} \quad \text{(Equation 12)}$$

Where

$EG_{facility,y}$ is the quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the Project activity in year y (MWh/yr).

$EG_{PJ\ to\ grid,y}$ is the Electricity exported to the grid by the Project.

$EG_{grid\ to\ PJ,y}$ is the Electricity imported from the grid by the Project.

EG is the *electricity* exported to the grid measured by M1 (and/or M1').

$EG_{solar1,y}$ is the electricity supply by the Solar Project I measured by MS1.

$EG_{solar2,y}$ is the electricity supply by the Solar Project II measured by MS2.

Meanwhile, electricity imported from the grid by the project ($EG_{grid\ to\ PJ,\ y}$) use the value measured by the meter M1 (and/or M1'), including two solar projects, as the most conservative value.

4. Data Collection

Designated personnel of the grid company read and record the readings monthly, then inform the reading to the project company for confirmation. Meanwhile, the staff of the Project company reads and records the meters readings through telecommunication system, too.

Consider of the transmission and line loss, the electricity exported to the grid by the Project and the electricity imported from the grid by the Project are calculated by the grid company according to the approach defined in the PPA. After both sides confirming, Electricity sales and purchase receipts, for the electricity exported to the grid by the Project and the electricity imported from the grid by the Project are issued separately by the grid company in the end of each month. During this monitoring period, the cut off time is the 24:00 of the last day of each month. At this time, Designated personnel of the grid company and project owner read and record the meter readings of main meter M1, M1', MS1 and MS2 together. The manager of the Project wind farm counter-checked the reported data against with the electricity receipts before archived. The most conservative values have been used for the ERs calculation. The electricity imported from the grid by the Project has been deducted from the electricity exported to the grid by the Project to get the quantity of the net electricity supplied to the grid by the Project.

All data collected as part of monitoring is archived electronically and is kept until 2 years after the end of the total crediting period of the Project.

5. Quality Assurance and Quality Control

Calibration

The metering equipments will be calibrated and checked by a qualified third party according to an appropriate industry standard or the manufacturer's specifications. The calibration records will be maintained and made available for review by the DOE.

Accuracy

As mentioned above, measurement meters have accuracy range of no less than 0.5S and will be calibrated and checked for accuracy according to local industry standards to make sure that any error resulting from such equipment will not exceed 0.5% of full-scale rating. All the meters shall be jointly inspected and sealed on behalf of the parties concerned and shall be only checked in the presence of the other party or its accredited representatives.

Crosschecking of data

Monitored data will be counter-checked by receipt of electricity sales.

Corrective actions

When reading error of any meter exceeds the allowable range or any inconsistency occurs, the meter should be repaired and followed by calibration by a third part in accordance with the standard, within 10 days. The grid company shall inform the project company before the calibration and all the record should be kept by the project company.

When the any meter detects the error beyond the allowable range or inconsistency, the grid company shall repair the meter, recalibrate, or replace, while giving the project company sufficient notice to allow their representative to attend during any corrective activities. When it happens, the electricity will be calculated and estimated by the project company and the grid company using a reasonable and conservative method, based on the reading of gateway meter and other projects meters, and historical generation data. Also, the project owner should provide the evidence to testify whether the method is reasonable and conservative.

Training

To make sure that the monitoring can be carried out properly, the PP will provide an extensive training to the whole monitoring team. The training content mainly includes of the monitoring data collecting procedure, data cross-check procedure and archiving procedure, etc. The consultant will help the project owner to issue a VCS monitoring management guideline manual.