# GUAZHOU BEIDAQIAO NO.1 WIND FARM PROJECT IN GANSU PROVINCE, CHINA

Document Prepared by Beijing MD Energy Technology Co., Ltd.

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# 1 PROJECT DETAILS

## 1.1 Summary Description of the Project

Guazhou Beidaqiao No.1 Wind Farm Project in Gansu Province, China (hereinafter referred to as "the Project") is located in Guazhou County, Jiuquan City, Gansu Province, China. The primary objective of the project is to generate renewable electricity to meet the ever-increasing demand in the Gansu Grid and Northwest China Power Grid (NWPG). The total installed capacity of the Project is 201MW with 67 sets of SL1500 wind turbine units and 67 sets of GW1500 wind turbine units. Dependent on the reliability of the local wind resource, the project is expected to supply 461,464 MWh of electricity annually to Northwest China Power Grid (NWPG).

The scenario existing prior to the start of the implementation of the project is: the same electricity output by the project activity would have otherwise been generated by the operation of NWPG connected power plants and by the addition of new generation sources. That is the same as the baseline scenario.

When the project is operated, the electricity generated will displace part of the electricity from fossil fuel-fired plants connected to the NWPG, and thus greenhouse gas (GHG) generated by coal-fired power plants could be reduced. The estimated annual GHG emission reductions in the first crediting period are 428,829 tCO2e/yr, and are 359,630 tCO2e/yr during the second crediting period.

The construction start date of the project activity is 24/10/2009, which is the date of the EPC contract (Engineering, Procurement and Construction contract). The project activity started operation on 03/01/2011. The project activity was registered as a CDM project activity on 29/09/2011. The first VCS crediting period is from 03/01/2011 to 02/01/2021 (10 years, renewable). The project operated normally in the first VCS crediting period. The project is applying for the crediting period renewal and the second VCS crediting period is expected from 03/01/2021 to 02/01/2031 (10 years).

## 1.2 Sectoral Scope and Project Type

The project falls in the sectoral scope 1: energy industries (renewable-/non-renewable sources).

Project type: Renewable (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

This project is a single project. It is not designed to include multiple project activity instances, or as a grouped project.

The project involves the installation of 67 sets of SL1500 wind turbine units and 67 sets of GW1500 wind turbine units, with total installed capacity of 201MW..

### Eligibility Criteria

N/A as this is not a grouped project.

## 1.5 Project Proponent

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|---|---|
| **Organization name** | Hydrochina Guazhou Wind Power Co., Ltd. |
| **Contact person** | Kong Weidou |
| **Title** | Project Manager |
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| **Telephone** | +86 010-86301832 |
| **Email** | kongweidou@hydrochina.com.cn |

## 1.6 Other Entities Involved in the Project

| | |
|---|---|
| **Organization name** | Beijing MD Energy Technology Co., Ltd. |
| **Role in the project** | Consultancy |
| **Contact person** | Will Yang |
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## 1.7 Ownership

The Feasibility Study Report (FSR) was approved by the National Development and Reform Commission (NDRC) on 21/04/2009. the Environmental Impact Assessment (EIA) Report was approved by Gansu Environmental Protection Administration on 06/08/2008. The two approvals established the project ownership of Hydrochina Guazhou Wind Power Co., Ltd. The purchasing contract of turbines, and the purchasing power agreement are the evidences for the property and contractual right in the plant, equipment and electricity..

## 1.8 Project Start Date

03/01/2011 (Operation start date)

## 1.9 Project Crediting Period

The first crediting period under VCS is from 03/01/2011 to 02/01/2021 (10 years, renewable). Therefore, the total crediting period under VCS would have been from 03/01/2011 to 02/01/2041 (30 years). However, the project was registered under CDM on 29/09/2011. And the total crediting period under CDM is from 29/09/2011 to 28/09/2032 (21 years).

As per VCS Standard version 4.2, para. 3.8.7, Projects registered under other GHG programs are not eligible for VCU issuance beyond the end of the total project crediting period under those programs. For example, a CDM project with a seven year twice renewable project crediting period is not eligible for VCU issuance beyond the end of those 21 years. Where projects have been registered under more than one other GHG program, they are not eligible for VCU issuance after the date that is the earliest end date of all applicable project crediting periods.

Therefore, according to VCS standard and considering the 22 years lifetime of the project activity and 7*3 CDM renewable crediting period, the total VCS crediting period is 03/01/2011 to 02/01/2032.

The project is applying for the second crediting period, which is from 03/01/2021 to 02/01/2031.

## 1.10 Project Scale and Estimated GHG Emission Reductions or Removals

| Project Scale | |
|---|---|
| Project | |
| Large project | √ |

| Year | Estimated GHG emission reductions or removals ($tCO_2e$) |
|---|---|
| 03/01/2021 - 31/12/2021 (363 days) | 357,659 |
| 01/01/2022 - 31/12/2022 | 359,630 |
| 01/01/2023 - 31/12/2023 | 359,630 |
| 01/01/2024 - 31/12/2024 | 359,630 |
| 01/01/2025 - 31/12/2025 | 359,630 |
| 01/01/2026 - 31/12/2026 | 359,630 |
| 01/01/2027 - 31/12/2027 | 359,630 |
| 01/01/2028 - 31/12/2028 | 359,630 |
| 01/01/2029 - 31/12/2029 | 359,630 |
| 01/01/2030 - 31/12/2030 | 359,630 |
| 01/01/2031 - 02/01/2031 (2 days) | 1,971 |
| **Total estimated ERs** | **3,596,300** |
| **Total number of crediting years** | **10** |
| **Average annual ERs** | **359,630** |

## 1.11 Description of the Project Activity

The proposed project will install 134 wind turbine-generators, each with a capacity of 1,500 kW, forming a total capacity of 201 MW. The annual net power supplied to the grid is 461,464 MWh. The 67 sets of wind turbines model SL1500/77 are manufactured by Sinovel Wind Technology Co., Ltd, and the other 67 sets of wind turbines model GW77/1500 are manufactured by Xinjiang Goldwind Technology Co., Ltd. The technology is introduced from Germany and produced under license. Therefore, the establishment and operation of the project activity will promote technology transfer and utilization in China. The technology is considered good practice in China. Key Technical Specifications of the Wind Turbines are shown in the following table 1.

Table 1. Key Technical Specifications of the Wind Turbines

| Parameter of Turbines | Unit | Value | |
|---|---|---|---|
| Type | / | SL1500/77 | GW77/1500 |
| Quantity of Turbine | / | 67 | 67 |

| | | | |
|---|---|---|---|
| Rated Power | kW | 1500 | 1500 |
| Cut-in Wind Speed | m/s | 3.0 | 3.0 |
| Cut-out Wind Speed | m/s | 20.0 | 22.0 |
| Rated Wind Speed | m/s | 11.0 | 11.5 |
| Rated Voltage | V | 690 | 690 |

The project adopts turbine-transformer units to boost voltage from 690V to 35 kV. All the turbine-transformers are linked with the 35 kV suspension lines and are connected to West Beidaqiao Substation, which boosts the voltage from 35kV to 330 kV. The electricity will then be boosted to 750kV through Anxi Substation and be transmitted to NWPG through the 750kV transmission line.

The electricity supplied to the grid can be monitored by $M_{11}$ (main meter) and $M_{12}$ (back up meter) installed at the West Beidaqiao Substation, and the electricity imported from the grid can be monitored by both $M_{11}$ (main meter), $M_{12}$ (back up meter) in the West Beidaqiao Substation and $M_{21}$ in the project site. The net electricity supplied to the grid is the difference of the electricity supplied to the grid and the electricity imported from the grid. On average, the project activity is expected to operate 2,296 hours per years, which corresponds to output net power of 461,464 MWh to NWPG annually. The plant load factor (PLF) is 26.2%. The simplified flow diagram is shown in the following figure:

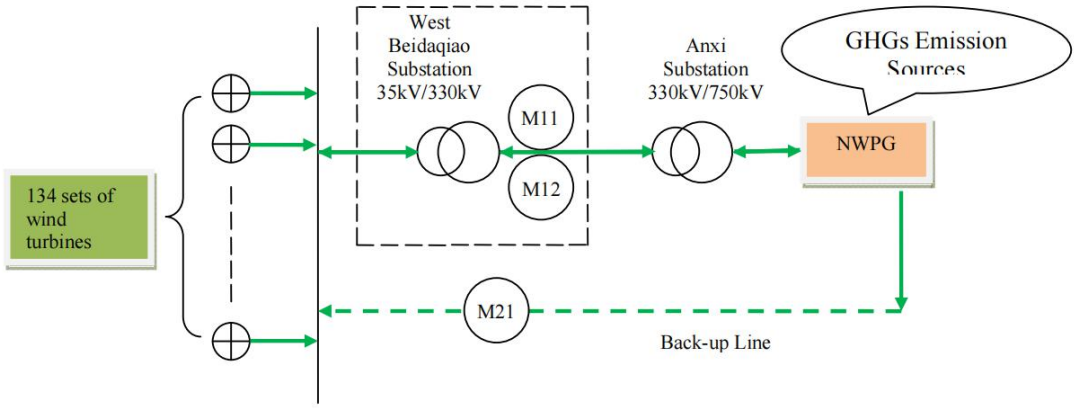


Figure 1. The technology flow diagram of the Project

## 1.12 Project Location

The project is located in Guazhou County, Jiuquan City, Gansu Province, China, about 18km northwest away from Guazhou County. The geographical coordinates of the project is the North Latitude of +40.6025°and the East Longitude of +95.8037°as shown in figure 2.


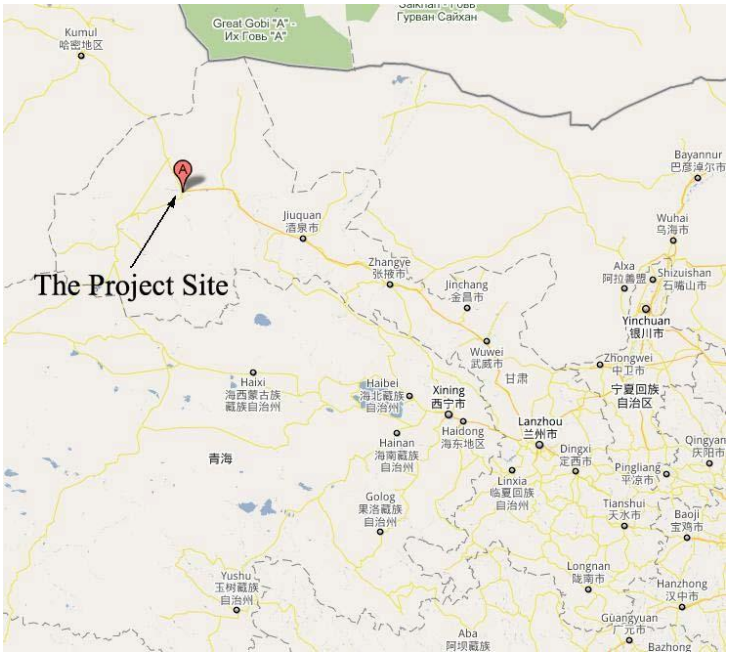


Figure2. The geographic location of the Project

## 1.13 Conditions Prior to Project Initiation

Electricity delivered to the grid (NWPG) by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources. It is the same as the baseline scenario.

## 1.14 Compliance with Laws, Statutes and Other Regulatory Frameworks

The project is in the field of renewable energy. The Environmental Impact Assessment (EIA) report was approved by Gansu Environmental Protection Administration on 06/08/2008, and the Feasibility Study Report of the project was approved by National Development and Reform Commission (NDRC) on 21/04/2009. The project has got LoA from China DNA on 16/08/2011. 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.

This project is also in line with current laws and regulations, such as Safe Production Law of the People's Republic of China. Regulation on the Quality Management of Construction Projects, etc.

## 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 a CDM project in UNFCCC on 29/09/2011 (UNFCCC Ref. 4254) with renewable crediting period. The first 7- year renewable crediting period under CDM is from 29/09/2011 to 28/09/2018. 197,617 CERs from 29/09/2011 - 28/06/2012 have been issued under CDM mechanism.

### 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 has been registered as a CDM project in UNFCCC on 29/09/2011 (UNFCCC Ref. 4254) with renewable crediting period. The first 7-year renewable crediting period under CDM is from 29/09/2011 to 28/09/2018.

The credits from 29/09/2011 to 28/06/2012 have been issued under CDM mechanism.

The project has not been counted or used under GS project or under any other voluntary carbon crediting scheme. In the future, the emission reductions that apply for issuance under VCS will

not be issued under CDM or GS project or under any other voluntary carbon crediting scheme. The project does not involve in ETS or other binding limits.

The project proponent is not part of any emission trading program. The net GHG emission reductions from the project will not be used for compliance with emission trading programs or to meet binding limits on GHG emissions. The project activity has not participated in any other GHG programs.

China has a national emissions trading scheme only cover the high-emission industries, such as thermal power generation, petrochemical, chemical, building materials, iron and steel, non-ferrous, paper, aviation and other key emission industries that emitted at least 26,000 tons of CO2e/year[1]. And the project activity is not included the mandatory emission control scheme and there is no emission cap enforced for the project owner according to the enforced company list[2] in public information. Hence, it is confirmed that the emission reductions will not be double counted.

### 1.16.2 Other Forms of Environmental Credit

The project has been registered as a CDM project in UNFCCC on 29/09/2011 (UNFCCC Ref. 4254) with renewable crediting period. The first 7-year renewable crediting period under CDM is from 29/09/2011 to 28/09/2018.

The credits from 29/09/2011 to 28/06/2012 have been issued under CDM mechanism.

The project does not apply for other forms of environmental credit.

## 1.17 Sustainable Development Contributions

The contributions of this project to the sustainable development of the host country and project site are summarized as follows:

As the wind power plants of the project will generate clean and renewable electricity without GHG emission, the project can help local areas in reducing GHG emissions and replacing some part of the electricity from coal-fired power plants. The project also helps decrease the local environmental pollution caused by coal burning, which has remarkable environmental benefits. The estimated annual GHG emission reductions of the project activity are 359,630 tCO2e/yr in the second VCS crediting period. Thus, the project achieved SDG 13 Climate Action[3].

[1] http://www.mee.gov.cn/xxgk2018/xxgk/xxgk05/202103/t20210330_826728.html

[2] http://mee.gov.cn/xxgk2018/xxgk/xxgk03/202012/W020201230736907682380.pdf

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

During the 2nd VCS crediting period, 461,464 MWh of electricity from renewable sources will be supplied to the power grid annually. The project makes good use of the local wind resource to solve the difficulties of lack of power and unstable voltage, which help improve local life quality. Thus, the project achieved SDG 7 Affordable and Clean Energy[4].

During the construction, operation, and maintenance of this project, the project, directly and indirectly, generates more job opportunities, which helps improve local employment and reduce local poverty. Thus, the project achieved SDG 8 Decent Work and Economic Growth[5].

## 1.18 Additional Information Relevant to the Project

### Leakage Management

N/A.

### Commercially Sensitive Information

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

### Further Information

There's not any further information.

# 2 SAFEGUARDS

## 2.1 No Net Harm

The project does not bring negative environmental and socio-economic impacts.

## 2.2 Local Stakeholder Consultation

To ensure the sustainability of the project which is one of the key requirements of CDM project, the project owner has carried out a stakeholder investigation around the project site in April 2009. The stakeholder investigating summary is shown as below:

In 28/04/2009, a public stakeholder consultation was held by the developer. the project and the CDM procedures were introduced in detail to the publics on the meeting, and 45

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

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

questionnaires were distributed and 43 of the distributed questionnaires had been returned. The meeting participants includes: residents in the neighbouring area, governmental officials, staff from the project owner company, and other related persons.

The questions in the questionnaires including:

- What do you think is there any air pollution/water pollution /noise/electromagnetic interference? If any, what's the extent?

- What do you think the influence on the conditions of the local ecosystem?

- What do you think the influence on your life and income?

- What do you think the influence on local employment?

- What do you think the influence on local power distribution?

- What do you think the influence on the local economic development?

- From the perspective of environmental protection and residents' interest, do you have any suggestions about the project construction and operation?

50 questionnaires had been delivered and 50 of them had been collected, 90% support the construction of the project; other 5% shows that they are indifferent to the construction of the project. Over 95% think the positive influences will be brought to the local economic/social/cultural development.

The residents and local government are all very supportive to the project. No negative comments have been received on the project. The result of the stakeholder investigation with answers to the mainly cared issues was put up in the neighbouring area lasted for one month, and no objection or any more comments have been received.

In order for on-going communicate with local stakeholders, the project owner put a grievance notebook on the bulletin board outside the company office. Anyone can put their comments on the book. Since this project has been operated for several years, all local stakeholders know the telephone of the office. When people has comments on the project, he or she can call the project owner directly and leave message.

## 2.3 Environmental Impact

The EIA of the proposed project was completed by Resource and Environment & Quality Evaluation Research Center of Lanzhou University and approved by Gansu Environmental Protection Administration.

The summary of this evaluation is as following:

1. Noise

The noises will be produced by the constructing equipments and transporting vehicle during construction period. The construction will be arranged by daylight mostly, and there is no residential area and industrial and mining enterprises a few kilometres around the project site, so the constructing noise will not interrupt the residents and the noise will disappear when the project finishes construction. The measurements as arranging the transport time reasonably, limited the speed and no tooting of the vehicles in some environmental sensitive area will be carried out to reduce the noise impact of the transporting vehicle. The low-noise wind turbines will be employed to reduce the noise impact during operation period.

2. Air Pollution

The Powder and dust produced in the constructing process are the main factor for the air pollution during construction period. Sprinkling, covering the raw material and so on will be carried out to reduce the impact to lowest. The tail gas of transporting vehicles and constructing equipments will impact on part environment, but the impact will be over when the project finishes construction.

3. Wastewater

The wastewater during construction period involves equipment washing wastewater and domestic sewage. The evaporation tank will be built to treat the wastewater. When the project finishes construction, the evaporation tank will be buried. In the operation period, the domestic sewage will be drained into the water storage pit after treatment. Then it will be used for factory virescence. Therefore, there is no impact on the water environment.

4. Solid waste

The solid wastes include living garbage and construction garbage during construction period. The solid waste will be transported to the Guazhou County landfill. The smeary solid wastes will be set on fire or collected to treat. When the project finishes construction, the solid waste will be cleaned in time. The oilskin will be collected and sent to the hazardous waste treatment and disposal company during the operation period, so it will not impact on the environment.

5. Ecological environment

The impact on the ecological environment is mainly happened during construction period. The excavation, transport and the storage of equipments and materials will lead to the destruction of vegetation and changes of earth's surface structure. The construction area will be strictly arranged and will carry out the environment protecting and recovery measurements.

The project site is in the Gobi desert which is not the birds migrating channel, so there is no harm for the birds.

6. Conclusion

After the above measurements performed, the negative impacts on environment will be minimized below the requirements of laws and regulations during the construction and

operation periods. Furthermore, as renewable power project, the proposed project can reduce the consumption of fossil fuel sources and GHG emission. Besides, the project will become the special scenery in the Gobi desert and will improve the development of the local tourism.

According to EIA, no significant environmental impacts are discovered by the project participants or the host party. Gansu Environmental Protection Administration has approved the EIA in 06/08/2008.

## 2.4 Public Comments

No public comments were received during the public comment period.

## 2.5 AFOLU-Specific Safeguards

This is not an AFOLU project. Therefore, this section is not applicable..

# 3 APPLICATION OF METHODOLOGY

## 3.1 Title and Reference of Methodology

The approved methodology applied in the project activity is ACM0002 – " Grid-connected electricity generation from renewable sources (version 20.0)[6].

Related tools are:

-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

The criteria and assessment of ACM0002 (version 20.0) are in the following table.

| Criteria | Assessment |
|---|---|
| This methodology is applicable to grid-connected renewable energy power generation project activities that: | the project is the installation of a wind power |

[6] https://cdm.unfccc.int/methodologies/DB/XP2LKUSA61DKUQC0PIWPGWDN8ED5PG

| | |
|---|---|
| (a) Install a Greenfield power plant;<br>(b) Involve a capacity addition to (an) existing plant(s);<br>(c) Involve a retrofit of (an) existing operating plants/units;<br>(d) Involve a rehabilitation of (an) existing plant(s)/unit(s); or<br>(e) Involve a replacement of (an) existing plant(s)/unit(s). | project. Therefore, a) is applicable. |
| The methodology is applicable under the following conditions:<br>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;<br>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. | the project activity includes a wind power plant. Therefore, a) is applicable. |
| In case of hydro power plants, one of the following conditions shall apply:<br>(a) the project activity is implemented in existing single or multiple reservoirs, with no change in the volume of any of the reservoirs; or<br>(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<br>(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<br>(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 $W/m^2$, all of the following conditions shall apply:<br>(i) The power density calculated using the total installed capacity of the integrated project, as per equation (8), is greater than 4 $W/m^2$;<br>(ii) Water flow between reservoirs is not used by any other hydropower unit which is not a part of the project activity;<br>(iii) Installed capacity of the power plant(s) with power density lower than or equal to 4 $W/m^2$ shall be:<br>a. Lower than or equal to 15 MW; and | Not applicable. the project is a wind power project, not hydro power plant. |

| | |
|---|---|
| b. Less than 10 per cent of the total installed capacity of integrated hydro power project. | |
| In the case of integrated hydro power projects, project proponent shall:<br>(a) 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<br>(b) 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 of five years prior to the implementation of the CDM project activity. | Not applicable. the project is a wind power project, not an integrated hydro power project. |
| The methodology is not applicable to:<br>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;<br>b) Biomass fired power plants/units | The project activity does not involve switching from fossil fuel to renewable energy sources at the site of the project activity.<br>The project is not a biomass fired power plant/unit. |
| 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 not retrofit, rehabilitation, replacement, or capacity addition project. |

The criteria and assessment of "Tool to calculate the emission factor for an electricity system (version 07.0)" are in the following table.

| Criteria | Assessment |
|---|---|
| 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). | Applicable. the project generates electricity to national grid. This tool is used to calculate the OM, BM and CM. |
| Under this tool, the emission factor for the project electricity | Since the project activity is |

| | |
|---|---|
| system can be calculated either for grid power plants only or, as an option, can include off-grid power plants. In the latter case, two sub-options under the step 2 of the tool are available to the project participants, i.e. option IIa and option IIb. If option IIa is chosen, the conditions specified in "Appendix 1: Procedures related to off-grid power generation" should be met. Namely, the total capacity of off-grid power plants (in MW) should be at least 10 per cent of the total capacity of grid power plants in the electricity system; or the total electricity generation by off-grid power plants (in MWh) should be at least 10 per cent of the total electricity generation by grid power plants in the electricity system; and that factors which negatively affect the reliability and stability of the grid are primarily due to constraints in generation and not to other aspects such as transmission capacity. | grid connected, this condition is applicable and the emission factor has been calculated accordingly. |
| 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. | Not applicable. the project is not located in annex I country. |
| Under this tool, the value applied to the $CO_2$ emission factor of biofuels is zero. | Not applicable. the project is a wind power project and does not involve emissions from biofuels. |

Applicability conditions of "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation (version 03.0)" are in the following table.

| Criteria | Assessment |
|---|---|
| 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:<br><br>(a) Scenario A: Electricity consumption from the grid. The electricity is purchased from the grid only, and either no captive power plant(s) is/are installed at the site of electricity consumption or, if any captive power plant exists on site, it is either not operating or it is not physically able to provide electricity to the electricity consumer;<br><br>(b) Scenario B: Electricity consumption from (an) off-grid fossil fuel fired captive power plant(s). One or more fossil fuel fired captive power plants are installed at the site of the electricity consumer and supply the consumer with electricity. The captive power plant(s) is/are not connected to the electricity grid; or<br><br>(c) Scenario C: Electricity consumption from the grid and (a) fossil fuel fired captive power plant(s). One or more fossil fuel fired captive power plants operate at the site of the electricity consumer. The captive power plant(s) can provide electricity to the electricity consumer. The captive power plant(s) is/are also connected to the electricity grid. Hence, the electricity consumer can be provided with electricity from the captive power plant(s) and the grid. | Applicable. The electricity consumption lies to Scenario A: Electricity consumption from the grid. The electricity is purchased from the grid only, and no captive power plant is installed at the site of electricity consumption.. |

| | |
|---|---|
| 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:<br>(a) Scenario I: Electricity is supplied to the grid;<br>(b) Scenario II: Electricity is supplied to consumers/electricity consuming facilities; or<br>(c) Scenario III: Electricity is supplied to the grid and consumers/electricity consuming facilities. | Applicable. The project scenario lies to Scenario I: Electricity is supplied to the grid. |
| 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 accounts for CO2 emissions. | There is no captive renewable power generation technologies installed to provide electricity in the project activity, in the baseline scenario or to sources of leakage. |

Applicability conditions of "Assessment of the validity of the original/current baseline and update the baseline at the renewal of the crediting period" (version 03.0.1) are in the following table.

| Criteria | Assessment |
|---|---|
| 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 | Applicable. The baseline in this PD is at the renewal of the crediting period. The baseline is assessed by the procedure of this tool. |

The applicability criteria stated in methodology ACM0002 (Version 20.0) and the tools are met on the basis of the reasons above.

For standardized baseline, it's not applicable.

## 3.3 Project Boundary

According to the methodology ACM0002, the spatial extent of the project boundary includes the project power plant/unit and all power plants/units connected physically to the electricity system that the CDM project power plant is connected to.

According to 2019 Baseline Emission Factors for Regional Power Grids in China issued by the Ministry of Ecology and Environment of P.R.China (China DNA) on 29/12/2020, NWPG consists of Shaanxi Power Grid, Gansu Power Grid, Qinghai Power Grid, Ningxia Power Grid, Xinjiang Power Grid.

The GHG emission sources included in or excluded from the project boundary are as follows:

Table 3. GHG emission sources of the project

| Source | | Gas | Included? | Justification/Explanation |
|---|---|---|---|---|
| Baseline | Emissions from fossil fuels fired power plants supplying to the Northwest China Power Grid | $CO_2$ | Included | Main emission source. |
| | | $CH_4$ | Excluded | Minor emission source. |
| | | $N_2O$ | Excluded | Minor emission source. |
| Project | Emissions caused by the project activity | $CO_2$ | Excluded | According to ACM0002 (Version 20.0), project emission is excluded as a wind power project. |
| | | $CH_4$ | Excluded | |
| | | $N_2O$ | Excluded | |

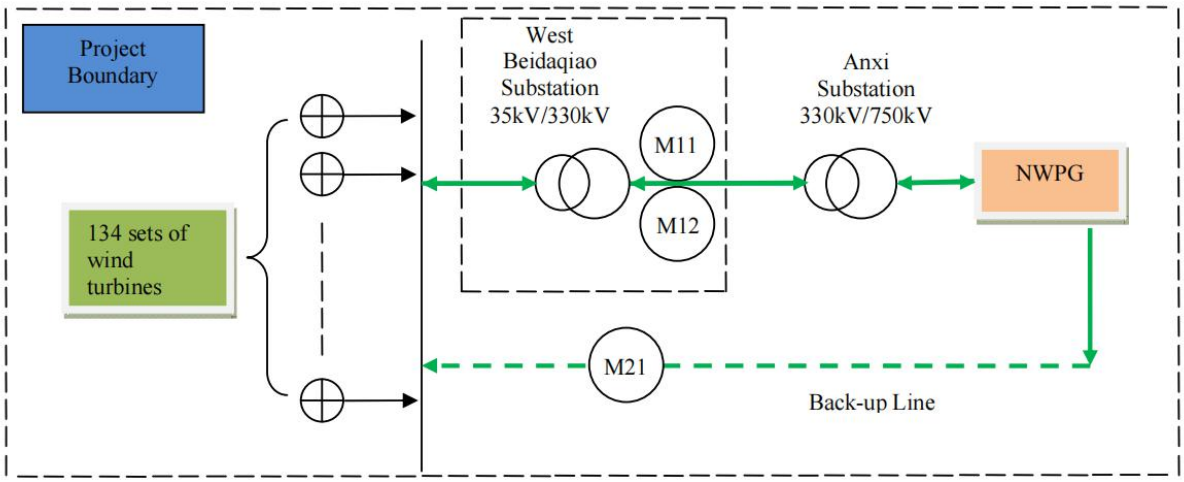


Figure 3. Flow diagram of the project boundary

## 3.4 Baseline Scenario

The baseline scenario of the project is electricity delivered to NWPG by the project that would otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources into the grid. According to the methodology ACM0002 (version 20.0), the baseline emissions are the electricity produced by the project multiplied by the emission factor of NWPG.

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

According to the Methodological Tool "Assessment of the validity of the original/current baseline and update the baseline at the renewal of the crediting period" (version03.0.1), the stepwise procedure as follows should be adopted to assess the continued validity of the baseline and to update the baseline:

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

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

There are no new national and/or sectoral policies that could affect the baseline scenario during the renewal of the crediting period. Although national policies favour the development of renewable energy sources, total renewable resources based power generation accounts for less than 50% of total generation of the NWPG in the latest 5 years respectively. Hence in the absence of the project activity electricity would still have been generated in the existing fossil fuel power plants or by the addition of new fossil fuel power plants connected to the NWPG.

Step 1.2: Assess the impact of circumstances

Firstly, the baseline scenario identified at the validation of the project activity was the continuation of the current practice without any investment;

Secondly, the mainly investment environment or market characteristics especially the feed-in tariff, the policy in terms of market access permit have no significant change which would impacts the current baseline. The current practice for the baseline emissions is still the GHG emitted by NWPG: the equivalent electricity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources within the NWPG;

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

The current baseline scenario is the continuation of the current practice. In the absence of the project, the electricity would have been supplied by NWPG, and it will not request an investment by the project proponent or third party. So, this step is not applicable.

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

Since there are some parameters, which were determined at the start of the first crediting period and not monitored during the first crediting period, are not valid anymore, therefore, the current baseline emissions needs to be updated for the second crediting period according to this tool.

Before the time of requesting renewal of the crediting period, the china DNA has issued the latest Notice "2019 Baseline Emission Factors for Regional Power Grids in China" on 29/12/2020[7], so the emission factor of NWPG is updated for the second crediting period according to this Notice.

[7] http://www.mee.gov.cn/ywgz/ydqhbh/wsqtkz/202012/t20201229_815386.shtml

In summary, the emission factor of NWPG and all values have been updated to the latest data for the second crediting period according to this Notice.

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. 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

As mentioned in step 1.4 above, all parameters regarding the grid emission factor calculation have been updated for this second crediting period. More details can be seen in section 4.

## 3.5 Additionality

According to VCS standard 4.1, 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 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"[8], thus the same deviation method has been adopted in the first and second crediting periods of the project by the Chinese DNA.

# 4 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

## 4.1 Baseline Emissions

According to the methodology, the baseline emissions include only $CO_2$ emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity. The methodology assumes that all project electricity generation above baseline levels would have been generated by existing grid-connected power plants and the addition of new grid-connected power plants. The baseline emissions are calculated as follows:

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

where

| | |
|---|---|
| BEy | Baseline emissions in year y (t $CO_2$/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 "Tool to calculate the emission factor for an electricity system" ($tCO_2$/MWh) |

**Calculation of $EG_{PJ,y}$**

As the project activity is the installation of a new grid-connected renewable power plant/unit at a site where no renewable power plant was operated prior to the implementation of the project activity, the following applies:

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

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) |

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

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

The baseline emission factor ($EF_y$) is calculated as a combined margin ($EF_{grid,CM,y}$), consisting of the combination of operating margin ($EF_{grid,OM,y}$) and build margin ($EF_{grid,BM,y}$) factors according to the following seven steps defined in the "Tool to calculate the emission factor for an electricity system".

Data for the calculations are based on official public data on 2019 China Regional Power Grid Baseline Emission Factors[9].

**Step 1. Identify the relevant electricity systems**

For determining the electricity emission factors, identify the relevant project electricity system.

China DNA has published a delineation of the project electricity system and connected electricity systems, therefore these delineations are used in accordance with the Tool:

- the project electricity system is the North China Power Grid (ECPG), consisting of six provincial grids:Beijing, Tianjin, Heibei, Shanxi, Shandong and Inner Mongolia.

For the purpose of this tool, the reference system is the project electricity system. Hence electricity transfers from a connected electricity system to the project electricity system are defined as electricity imports, and electricity transfers from the project electricity system to connected electricity systems are defined as electricity exports.

For the purpose of determining the build margin emission factor, the spatial extent is limited to the project electricity system, except where recent or likely future additions to the transmission capacity enable significant increases in imported electricity. In such cases, the transmission capacity may be considered a build margin source.

There are no recent or likely future additions to transmission capacity that would enable significant increases in imported electricity; the data that imports are relatively small and have not changed significantly in the period covered. Therefore, the transmission capacity is not considered a build margin source.

For the purpose of determining the operating margin emission factor, use one of the following options to determine the $CO_2$ emission factor(s) for net electricity imports from a connected electricity system:

(a) 0 $tCO_2/MWh$; or

(b) The weighted average operating margin (OM) emission rate of the exporting grid, determined as described in Step 4 (d) below; or

[9] http://www.mee.gov.cn/ywgz/ydqhbh/wsqtkz/202012/t20201229_815386.shtml

(c) The simple operating margin emission rate of the exporting grid, determined as described in Step 4 (a), if the conditions for this method, as described in Step 3 below, apply to the exporting grid; or

(d) The simple adjusted operating margin emission rate of the exporting grid, determined as described in Step 4 (b) below.

Following the calculations of China DNA, the simple operating margin option (b) is used to calculate the $CO_2$ emission factors for net electricity imports ($EF_{grid,import,y}$).

For imports from connected electricity systems located in Annex-I country(ies), the emission factor is 0 tonnes $CO_2$ per MWh.

There are no imports from Annex-I country (ies).

Electricity exports should not be subtracted from electricity generation data used for calculating and monitoring the electricity emission factors.

Electricity exports from the project electricity system to the connected electricity system are not subtracted from electricity generation data used for calculating and monitoring the electricity emission factors.

**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.

Following the calculations of the DNA and the availability of statistical data availability, Option I is chosen.

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

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

(a) Simple OM; or

(b) Simple Adjusted OM; or

(c) Dispatch data analysis OM; or

(d) Average OM

According to the Tool, the simple OM method (option a) can only be used if low-cost / must-run resources constitute less than 50% of total grid generation in: 1) average of the five most recent years, or 2) based on long-term averages for hydroelectricity production.

This criterion is met and therefore the project participants chose to use the simple OM method (option a).

The Simple OM emissions factor can be calculated using either ex-ante or ex-post data vintages. the project participants have chosen to use the ex-ante option, and $EF_{grid,OM,y}$ is fixed for the duration of the second crediting period.

Ex ante option: If the ex-ante option is chosen, the emission factor is determined once at the validation stage, thus no monitoring and recalculation of the emissions factor during the crediting period is required. For grid power plants, use a 3-year generation-weighted average, based on the most recent data available at the time of submission of the CDM-PDD to the DOE for validation.

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

(a) Simple OM

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

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.

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 (i.e. if Option I has been chosen in Step 2).

The criteria for Option B are met, as (a) the necessary data for Option A is not available as indicated in the calculations of the DNA, (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) Option I is chosen in Step 2.

<u>Option B – Calculation based on total fuel consumption and electricity generation of the system</u>

According to the Tool, where Option B is used, 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 total fuel consumption of the project electricity system, as follows:

$$EF_{grid,OMsimple,y} = \frac{\sum_i FC_{i,y} \times NCV_{i,y} \times EF_{CO_2,i,y}}{EG_y} \quad (3)$$

Where:

| | |
|---|---|
| $EF_{grid,OM\ simple,y}$ | Simple operating margin $CO_2$ emission factor in year y ($tCO_2/MWh$) |
| $FC_{i,y}$ | The 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 |

On the basis of the data available, the three-year average operating margin emission factor is calculated by the DNA as a full-generation-weighted average of the emission factors.

$EF_{grid,OM\ simlpe,y}$ =0.8922$tCO_2/MWh$

**Step 5. Calculate the build margin (BM) emission factor**

In terms of vintage of data, the project participants chose Option 1, the ex-ante option (as for the OM calculation), and $EF_{grid,BM,y}$ is fixed for the duration of the second crediting period:

Option 1: ex-ante. For the first crediting period, calculate the build margin emission factor ex-ante based on the most recent information available on units already built for sample group m at the time of CDM-PDD submission to the DOE for validation. For the second crediting period, the build margin emission factor should be updated based on the most recent information available on units already built at the time of submission of the request for renewal of the crediting period to the DOE. For the third crediting period, the build margin emission factor calculated for the second crediting period should be used. This option does not require monitoring the emission factor during the crediting period.

The latest statistical data available (from the China Power Yearbook) is used by the DNA to determine the most recent year from which the added generation capacity is equal to or just exceeds 20% of the latest statistic. The added generation capacity is the sample group of power units m used to calculate the build margin.

The sample group of power units m used to calculate the build margin consists of the set of power capacity additions in the electricity system that comprise 20% of the system generation (in MWh) and that have been built most recently. This option is chosen as it comprises larger annual generation than the five units built most recently.

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

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

Where:

| | |
|---|---|
| $EF_{grid,BM,y}$ | Build margin $CO_2$ emission factor in year y(t $CO_2$/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 | The most recent historical year for which power 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, a deviation of TOOL07 (07.0) is adopted following the clarifications[10] given by the CDM EB concerning the BM emission factor calculation:

(1) The CDM EB suggested 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) The EB agreed the use of capacity additions during last 1 ~ 3 years for estimating the build margin emission factor for grid electricity.

(3) The EB also agreed to 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” $EG_{m,y}$ is estimated according to their total capacity and the average utilization hours, as the following equation:

[10] “Request for clarification on use of approved methodology AM0005 for several projects in China”, the EB’s guidance on DNV deviation request.

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

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

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 |
| m | grouped new power plant |
| y | The most recent year for which the generation data is available. For the calculation of BM in 2019, y = 2017 |

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:

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

| | |
|---|---|
| $CAP_m$ | 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 ECPG, namely, Shanghai City, Jiangsu Province, Zhejiang Province, Anhui Province and Fujian Province |
| 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 ECPG |
| 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 4 shows the procedure to determine the sample group of power units m.

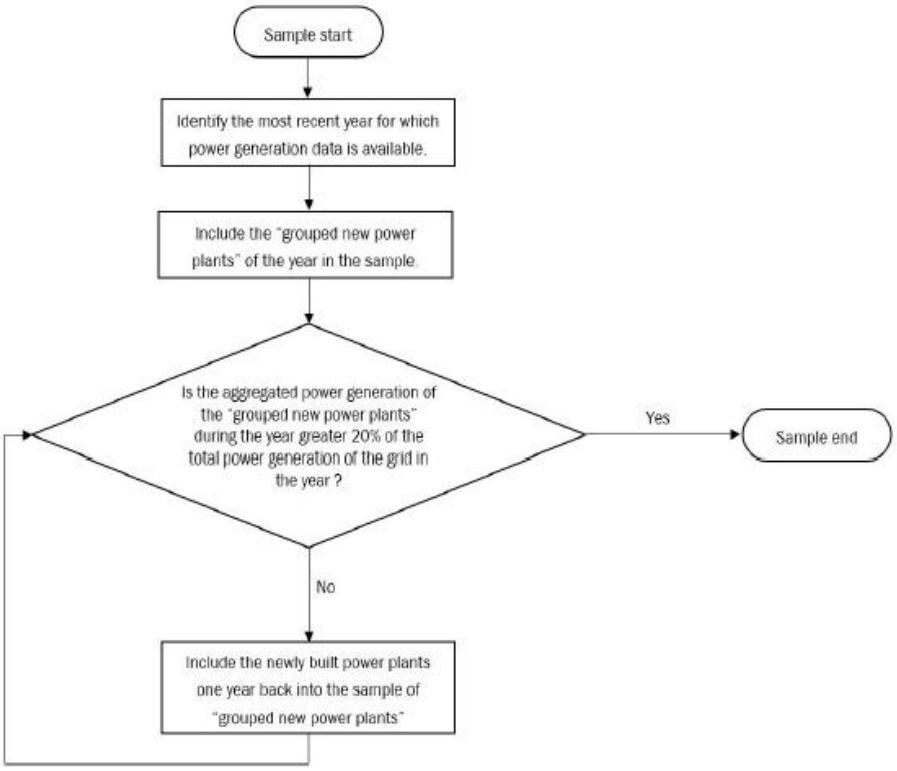


Figure 4 Procedure to determine the sample group of power units m used for the BM emission factor calculation

The emission factors of each fuel type are determined according to the Option A2 in the TOOL07, as the following equation:

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

| | |
|---|---|
| $EF_{EL,m,y}$ | $CO_2$ emission factor of power unit m in year y ($tCO_2/MWh$) |
| $EF_{CO2,m,i,y}$ | Average $CO_2$ emission factor of fuel type i used in power unit m in year y ($tCO_2/GJ$) |
| $\eta_{m,y}$ | 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:

$$EF_{best,m,y} = \frac{EF_{CO_2,m,i,y} \times 3.6}{\eta_{best,y}} \quad (8)$$

Where:

| | |
|---|---|
| $EF_{best,m,y}$ | Emission factor of power unit m with the best technology commercially available in year y ($tCO_2/MWh$) |
| $\eta_{best,y}$ | 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 $tCO_2e/MWh$.

**Step 6. Calculation of 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:

- the project activity is located in a Least Developed Country (LDC) or in a country with less than 10 registered projects at the starting date of validation; and
- The data requirements for the application of step 5 above cannot be met.

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

Weighted average CM

The combined margin emissions factor is calculated as follows:

$EF_{grid,CM,y} = w_{OM} \times EF_{grid,OM\ simple,y} + w_{BM} \times EF_{grid,BM,y}$

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

Where:

| | |
|---|---|
| $EF_{grid,BM,y}$ | Build margin $CO_2$ emission factor in year y ($tCO_2/MWh$) |
| $EF_{grid,OM\ simple,y}$ | Simple operating margin $CO_2$ emission factor in year y ($tCO_2/MWh$) |
| $w_{OM}$ | Weighting of operating margin emissions factor (%) |
| $w_{BM}$ | Weighting of build margin emissions factor (%). |

The default weights are used, i.e. for the wind farm projects in the first crediting period and the subsequent crediting periods, $w_{OM}$ = 0.75 and $w_{BM}$ = 0.25.

On the basis of these weights for the second crediting period, the combined margin emission factor is calculated, and are fixed ex-ante for the duration of the second crediting period as follows:

| | $CO_2$ emission factor ($tCO_2/MWh$) | Weighting |
|---|---|---|
| Simple operating Margin Emissions Factor ($EF_{grid,OM\ simple,y}$) | 0.8922 | 0.75 |
| Build Margin Emissions Factor ($EF_{grid,\ BM,y}$) | 0.4407 | 0.25 |
| Baseline Emissions Factor ($EF_{grid,CM,y}$) | 0.779325 | |

Thus,

$BE_y = EG_{facility,y} \times EF_{grid,CM,y} = 461{,}464\ MWh \times 0.779325\ tCO_2/MWh = 359{,}630\ tCO_2$

## 4.2 Project Emissions

According to the methodology, for most renewable energy project activities, PEy = 0. However, the methodology prescribes project emission calculations for geothermal, solar thermal and hydro power plant. the project is a wind power project, therefore, there are no project emissions according to the methodology:

$PE_y = 0$

## 4.3 Leakage

According to the methodology, no leakage is considered for the project activity.

## 4.4 Net GHG Emission Reductions and Removals

Emission reductions are calculated as follows:

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

Where:

| | |
|---|---|
| $ER_y$ | Emission reductions in year y ($tCO_2e/yr$) |
| $BE_y$ | Baseline emissions in year y ($tCO_2/yr$) |
| $PE_y$ | Project emissions in year y ($tCO_2e/yr$) |

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

| Year | Estimated baseline emissions or removals | Estimated project emissions or removals | Estimated leakage emissions | Estimated net GHG emission reductions or removals |
|---|---|---|---|---|

| | ($tCO_2e$) | ($tCO_2e$) | ($tCO_2e$) | ($tCO_2e$) |
|---|---|---|---|---|
| 03/01/2021 - 31/12/2021 (363 days) | 357,659 | 0 | 0 | 357,659 |
| 01/01/2022 - 31/12/2022 | 359,630 | 0 | 0 | 359,630 |
| 01/01/2023 - 31/12/2023 | 359,630 | 0 | 0 | 359,630 |
| 01/01/2024 - 31/12/2024 | 359,630 | 0 | 0 | 359,630 |
| 01/01/2025 - 31/12/2025 | 359,630 | 0 | 0 | 359,630 |
| 01/01/2026 - 31/12/2026 | 359,630 | 0 | 0 | 359,630 |
| 01/01/2027 - 31/12/2027 | 359,630 | 0 | 0 | 359,630 |
| 01/01/2028 - 31/12/2028 | 359,630 | 0 | 0 | 359,630 |
| 01/01/2029 - 31/12/2029 | 359,630 | 0 | 0 | 359,630 |
| 01/01/2030 - 31/12/2030 | 359,630 | 0 | 0 | 359,630 |
| 01/01/2031 - 02/01/2031 (2 days) | 1,971 | 0 | 0 | 1,971 |
| Total | 3,596,300 | 0 | 0 | 3,596,300 |

# 5 MONITORING

## 5.1 Data and Parameters Available at Validation

| Data / Parameter | $EF_{grid,OM\ simple,y}$ |
|---|---|
| Data unit | $tCO_2/MWh$ |
| Description | Simple operating margin $CO_2$ emission factor in year y |
| Source of data | "2019 Baseline Emission Factors for Regional Power Grids in China" issued by China DNA [11] |
| Value applied | 0.8922 |
| Justification of choice of data or description of measurement methods and procedures applied | Official public data from Chia DNA |

[11] http://www.mee.gov.cn/ywgz/ydqhbh/wsqtkz/202012/W020201229610353816665.pdf

| | |
|---|---|
| Purpose of Data | Calculation of baseline emissions |
| Comments | / |

| | |
|---|---|
| Data / Parameter | $EF_{grid,BM,y}$ |
| Data unit | $tCO_2/MWh$ |
| Description | Build margin $CO_2$ emission factor in year y |
| Source of data | "2019 Baseline Emission Factors for Regional Power Grids in China" issued by China DNA [12] |
| Value applied | 0.4407 |
| Justification of choice of data or description of measurement methods and procedures applied | Official public data from MEE |
| Purpose of Data | Calculation of baseline emissions |
| Comments | / |

| | |
|---|---|
| Data / Parameter | $w_{OM}$ |
| 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 | 75 |
| Justification of choice of data or description of measurement methods and procedures applied | Based on the requirements of "Tool to calculate the emission factor for an electricity system" (Version 07.0) |
| Purpose of Data | Calculation of baseline emissions |
| Comments | / |

| | |
|---|---|
| Data / Parameter | $w_{BM}$ |

[12] http://www.mee.gov.cn/ywgz/ydqhbh/wsqtkz/202012/W020201229610354442145.pdf

| | |
|---|---|
| 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 | 25 |
| Justification of choice of data or description of measurement methods and procedures applied | Based on the requirements of"Tool to calculate the emission factor for an electricity system" (Version 07.0) |
| Purpose of Data | Calculation of baseline emissions |
| Comments | / |

## 5.2 Data and Parameters Monitored

| | |
|---|---|
| Data / Parameter | $EG_{facility,y}$ |
| Data unit | MWh |
| Description | Quantity of net electricity generation supplied by the project plant/unit to the grid in year y |
| Source of data | Calculated based on parameters $EG_{export,y}$ and $EG_{import,y}$ |
| Description of measurement methods and procedures to be applied | Calculated based on parameters $EG_{export,y}$ and $EG_{import,y}$ |
| Frequency of monitoring/recording | Measured continuously and recorded monthly |
| Value applied | 461,464 MWh |
| Monitoring equipment | This parameter is monitored through bi-directional main meter $M_{11}$, its backup meter $M_{12}$ and meter $M_{21}$. $M_{11}$ is main meter while $M_{12}$ is back up meter. Both $M_{11}$ and $M_{12}$ are installed at the 330kV West Beidaqiao Substation. $M_{21}$ is installed at the project site. Back up meter $M_{12}$ is used when main meter $M_{11}$ is out of order. The accuracy of meter $M_{11}$ and $M_{12}$ is 0.2S while that of meter $M_{21}$ is 1.0. |
| QA/QC procedures to be | Meters will be examined, tested and calibrated regularly according |

| | |
|---|---|
| applied | to the manufacturer's standards. The data will be double checked by electricity receipts or relevant commercial data. Data will be archived for 2 years following the end of the crediting period by means of electronic and paper backup. |
| Purpose of data | Calculation of baseline emissions |
| Calculation method | $EG_{facility,y} = EG_{export,y} - EG_{import,y}$<br>$EG_{import,y} = EG_{impor1,y} + EG_{import2,y}*(1+0.5\%)$<br>$EG_{export,y}$ is Electricity supplied by the project activity to the grid in year y;<br>$EG_{import,y}$ is Electricity imported from the grid by the project in year y; |
| Comments | / |

| | |
|---|---|
| Data / Parameter | $EG_{export,y}$ |
| Data unit | MWh |
| Description | Electricity supplied by the project activity to the grid in year y |
| Source of data | Monthly Meter Records and electricity receipts |
| Description of measurement methods and procedures to be applied | This parameter is monitored through bi-directional meters $M_{11}$ and $M_{12}$. $M_{11}$ is main meter while $M_{12}$ is back up meter. Both meters are installed at the 330kV West Beidaqiao Substation. Back up meter $M_{12}$ is used when main meter $M_{11}$ is out of order. staff from the project owner will collect the information and data required by the Monitoring Plan. The collected information will be documented and sent to the monitoring office. |
| Frequency of monitoring/recording | Measured continuously and recorded monthly. |
| Value applied | 461,464 MWh/y |
| Monitoring equipment | The electricity is monitored by electricity meters $M_{11}$ (main meter) and $M_{12}$ (back up meter) with national standards. Both meters are installed at the 330kV West Beidaqiao Substation with accuracy of 0.2S. |
| QA/QC procedures to be | The meters will be calibrated by qualified third party according to the relevant regulations. The data will be double checked by |

| | |
|---|---|
| applied | electricity receipts or relevant commercial data. Data will be archived for 2 years following the end of the crediting period by means of electronic and paper backup. |
| Purpose of data | Calculation of baseline emissions |
| Calculation method | / |
| Comments | Uncertainty level of data is low. |

| | |
|---|---|
| Data / Parameter | $EG_{import1,y}$ |
| Data unit | MWh |
| Description | Electricity imported from the grid through the main meter to the project |
| Source of data | Monthly Meter Records and electricity receipts |
| Description of measurement methods and procedures to be applied | This parameter is monitored through bi-directional meters $M_{11}$ and $M_{12}$. $M_{11}$ is main meter while $M_{12}$ is back up meter. Both meters are installed at the 330kV West Beidaqiao Substation. Back up meter $M_{12}$ is used when main meter $M_{11}$ is out of order.<br><br>staff from the project owner will collect the information and data required by the Monitoring Plan. The collected information will be documented and sent to the monitoring office. |
| Frequency of monitoring/recording | Measured continuously and recorded monthly. |
| Value applied | 0 MWh/y |
| Monitoring equipment | The electricity is monitored by electricity meters $M_{11}$ (main meter) and $M_{12}$ (back up meter) with national standards. Both meters are installed at the 330kV West Beidaqiao Substation with accuracy of 0.2S. |
| QA/QC procedures to be applied | The meters will be calibrated by qualified third party according to the relevant regulations. The data will be double checked by electricity receipts or relevant commercial data.<br><br>Data will be archived for 2 years following the end of the crediting period by means of electronic and paper backup. |
| Purpose of data | Calculation of baseline emissions |

| | |
|---|---|
| Calculation method | / |
| Comments | Uncertainty level of data is low. |

| | |
|---|---|
| Data / Parameter | $EG_{import2,y}$ |
| Data unit | MWh |
| Description | Electricity imported from the grid through the backup line to the project |
| Source of data | Monthly Meter Records and electricity sales receipts |
| Description of measurement methods and procedures to be applied | This parameter is continuously monitored through electricity meter $M_{21}$, which is installed at the project site. The accuracy of meter $M_{21}$ is 1.0. |
| Frequency of monitoring/recording | Measured continuously and recorded monthly. |
| Value applied | 0 MWh/y |
| Monitoring equipment | This parameter is monitored through electricity meter $M_{21}$, which is installed at the project site with accuracy of 1.0. |
| QA/QC procedures to be applied | The meter will be calibrated by qualified third party according to the relevant regulations. The data will be double checked by electricity receipts or relevant commercial data.<br><br>Data will be archived for 2 years following the end of the crediting period by means of electronic and paper backup. |
| Purpose of data | Calculation of baseline emissions |
| Calculation method | In the registered CDM PDD, the accuracy of electricity meter $M_{21}$ installed to monitor the electricity imported from the grid via the backup line is 0.5 (the error will not exceed 0.5%). The accuracy of the main meter $M_{21}$ actually installed is 1.0 (the error will not exceed 1.0%). For conservative, the differences between the electricity meters accuracy will be applied in determination of the electricity imported via the backup line. |
| Comments | Uncertainty level of data is low. |

## 5.3 Monitoring Plan

The project adopts the approved consolidated monitoring methodology ACM0002 "Consolidated monitoring methodology for grid-connected electricity generation from renewable sources" (version 20.0) to determine the emission reductions from the net electricity generation from the wind farm. This plan describes in more detail the process.

**1. Monitoring subject**

The main data to be monitored is $EG_{Export,y}$, and $EG_{Import,y}$, $EG_{facility,y}$ used to calculate the emission reduction is calculated as $EG_{Export,y}$,- $EG_{Import,y}$. To assume the annual emission reduction in the PDD, 461,464MWh is used as $EG_{facility,y}$ in accordance with the FSR. The calibration procedure, QA/QC and date management of the proposed project will also be monitored.

**2. Monitoring management structure**

In order to obtain effective monitored data, the project owner will establish a CDM Monitoring Office and designate qualified staffs responsible for all relevant matters, including monitoring, data collection and archiving, QC/QA, and verification. The structure of the CDM Monitoring Office is outlined in Figure 4.

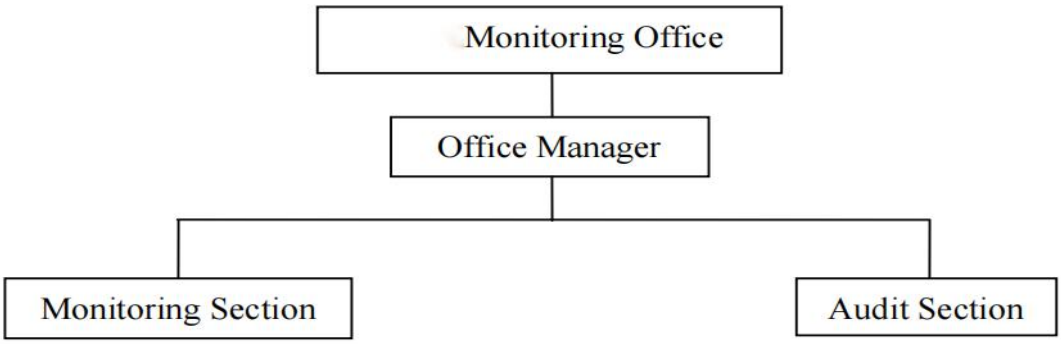


Figure 5. The personnel structure of the project monitoring

The responsibilities of the sections are briefly described as following:

- Office Manager: Manage the work of CDM Monitoring Office; In charge of all relevant matters with the monitoring activity.

- Monitoring Section: Monitor, collect and archive the data according to the Monitoring and

Management Manual.

- Audit Section: Audit the work of the Monitoring Section and execute the QC/QA procedures according to the Monitoring and Management Manual.

**3. Monitoring equipments**

The net electricity supplied to the grid will be monitored through the main meter $M_{11}$ installed at the 330kV West Beidaqiao Substation and the meter $M_{21}$ installed at the project site. The main meter $M_{11}$ is bidirectional, recording both exports to the grid EGexport,y and imports from the grid $EG_{import1,y}$. The back-up meter $M_{12}$ is also installed at the 330kV West Beidaqiao Substation and will be used in case of the main meter is out of order.

The meter $M_{21}$ is to record the electricity imports from the grid ($EG_{import2,y}$) through the backup line. Both the main meter $M_{11}$ and the back-up meter $M_{12}$ are in accuracy of 0.2s, the meter $M_{21}$ is in accuracy of 1.0. The electricity exported to the grid and imported from the grid will be cross-checked with sales receipts.

In the registered CDM PDD, the accuracy of electricity meter $M_{21}$ installed to monitor the electricity imported from the grid via the backup line 0.5 (the error will not exceed 0.5%). The accuracy of the meter $M_{21}$ actually installed is 1.0 (the error will not exceed 1.0%). For conservative, the differences between the electricity meters accuracy will be applied in determination of the electricity imported via the backup line.

The net electricity will be determined by the following formula:

$$EG_{facility,y} = EG_{export,y} - EG_{import1,y} - EG_{import2,y} \times (1+0.5\%)$$

The detail metering system please see the figure 6 below:

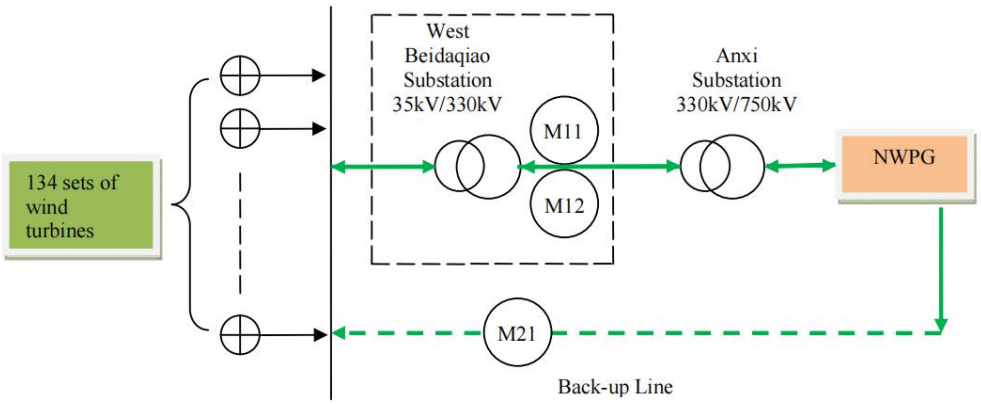


Figure 6. Metering System

**4. Data measurement and collection**

a. The main meter $M_{11}$ and meter $M_{21}$ is read and reported to Northwest Power Grid Company monthly.

b. The backup meter $M_{12}$ is read and reported monthly.

c. The project owner reports the readings, grid data and calculations to the DOE for verification.

**5. QA & QC**

The calibration of meters conducted by qualified organization must comply with national standard and sector regulations regularly to ensure the accuracy. The meters will be calibrated no less than once a year and must be pasted with seal after calibration. The calibration records must be archived together with other monitoring records.

If any errors are detected the party owning the meters shall repair, recalibrate or replace the meter giving the other party sufficient notice to allow a representative to attend during any corrective activity. If the readings of the main meter are beyond allowable error, the backup mete will be used; if the readings of both the main meter and the backup meter are beyond allowable error, the project owner and Power Grid Company shall jointly prepare a reasonable and conservative estimate of the correct reading.

In any case there is any problem for the meters, the relevant third party is responsible to correct the meters.

After handling of the emergency, the project owner must prepare a report regarding the emergency to explain to DOE that the handling method is reasonable.

### 6. Data management

All monitoring data and records will be archived in electronic document. The electronic documents will be backed up in Compact Disc or Hard Disc. The project owners will also keep copies of sales receipts and prepare a monitoring report when necessary, which includes the net electricity generation, the calibration records, the emission reductions calculation and meters' corrective action records. The monitoring data will be verified by the Office Manager once every quarter. If there is anything wrong for the data, the Office Manager will correct the data according to other meters and historical data and write the corrective action records for it. All the electronic and paper documents will be archived during the crediting period and two years after the end of the crediting period or the last issuance of VERs, whichever occurs later.

### 7. Training program

The project owner will entrust 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.

# APPENDIX

N.A.