



CECIC HKC GANSU CHANGMA WIND POWER PROJECT

Document Prepared by Demeter Venture UK Limited

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1 PROJECT DETAILS

1.1 Summary Description of the project

CECIC HKC Gansu Changma Wind Power project (hereinafter referred to as the project) is developed by CECIC HKC Gansu Wind Power Co., LTD.. It is located in Yumen Town, Yumen City, Gansu Province, People's Republic of China. the project involves the installation of 134 sets of wind turbine, each of which has a rated installed capacity of 1,500 kW, providing a total installed capacity of 201 MW. The annual output of the project is estimated to be 431,949 MWh and the electricity will be exported to the 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 430,588 tCO₂e/yr, and are 336,628 tCO₂e/yr during the second crediting period.

The construction of the project began on 16/06/2008. The first wind turbine of the project started commissioning on 21/11/2009. the project was put into full operation on 15/02/2011. The first crediting period is from 21/11/2009 to 20/11/2019 (10years, renewable). the project operated normally in the first crediting period. the project is applying for the crediting period renewal and the second crediting period is expected from 21/11/2019 to 20/11/2029 (10years).

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 CO₂ 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 134 turbines, each of which have a capacity of 1.5 MW, with a total capacity of 201 MW.

Eligibility Criteria

N/A as this is not a grouped project.

1.5 Project Proponent

Organization name	CECIC HKC Gansu Wind Power Co., LTD.
Contact person	Lv Xin
Title	Project manager
Address	12F, A Building Jieneng Mansion, No.42 Xizhimen North Street, Haidian District, Beijing, 100082
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1.6 Other Entities Involved in the project

Organization name	Demeter Venture UK Limited
Role in the project	Project participant
Contact person	Susan Lu
Title	Manager
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1.7 Ownership

The approval of Environmental Impact Assessment (EIA), Feasibility Study Report (FSR), and Letter of Approval for the project as a CDM Project issued by China National Development and Reform Commission, established the project ownership of CECIC HKC Gansu 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

21/11/2009. (It is the date when the first turbine was commissioned, which is also the first date that generates GHG emission reductions.)

1.9 Project Crediting Period

The first crediting period under VCS is from 21/11/2009 to 20/11/2019 (10years, renewable). Therefore, the total crediting period under VCS would have been from 21/11/2009 to 20/11/2039 (30 years). However, the project was registered under CDM on 24/09/2011. And the total crediting period under CDM is from 24/09/2011 to 23/09/2032 (21years). According to VCS standard, the total crediting period under VCS is from 21/11/2009 to 23/09/2032.

The project is applying for the second crediting period, which is from 21/11/2019 to 20/11/2029.

1.10 Project Scale and Estimated GHG Emission Reductions or Removals

Project Scale	
Project	
Large project	✓

Year	Estimated GHG emission reductions or removals (tCO ₂ e)
21/11/2019-31/12/2019 (41days)	37,813
01/01/2020-31/12/2020	336,628
01/01/2021-31/12/2021	336,628

01/01/2022-31/12/2022	336,628
01/01/2023-31/12/2023	336,628
01/01/2024-31/12/2024	336,628
01/01/2025-31/12/2025	336,628
01/01/2026-31/12/2026	336,628
01/01/2027-31/12/2027	336,628
01/01/2028-31/12/2028	336,628
01/01/2029-20/11/2029 (324days)	298,815
Total estimated ERs	3,366,280
Total number of crediting years	10
Average annual ERs	336,628

1.11 Description of the project Activity

The project installed 134 sets of wind turbine, each of which has a rated installed capacity of 1,500kW, providing a total installed capacity of 201MW. The estimated electricity delivered to NWPG by the project is 431,949MWh per year and the average annual operating hours is 2,149h with a power load factor of 24.53%.

The project employs turbines manufactured by China's Dongfang Steam Turbine Manufacture. Key technical parameters of main equipments in the project are shown in the following table 1.

Table 1. Key technical parameters of main equipments in the project

Item	FD77A/1500
1. Data for Unit	
Rated capacity (kW)	1500
Number of unit	134
Capacity control method	Pitch-controlled
Turbine diameter (m)	77
Hub height (m)	70
Cut in wind speed (m/s)	3.0

Rated wind speed (m/s)	12.5
Cut out wind speed (m/s)	20
Wind speed limit (m/s)	53.3
Technical lifetime (y)	20
Material of blade	GRP
Blade tip speed (m/s)	69.6
2. Generator	
Type of generator	Double-fed induction generator
Rated capacity (kW)	1500
Output Voltage (V)	690
Rated speed (rpm)	1000-1800 (+10.0%)

The electricity generated by the project is exported to the NWPG, via a 35kV/110kV transformer substation located within the project site. The technical process in the project can be shown as following diagram:

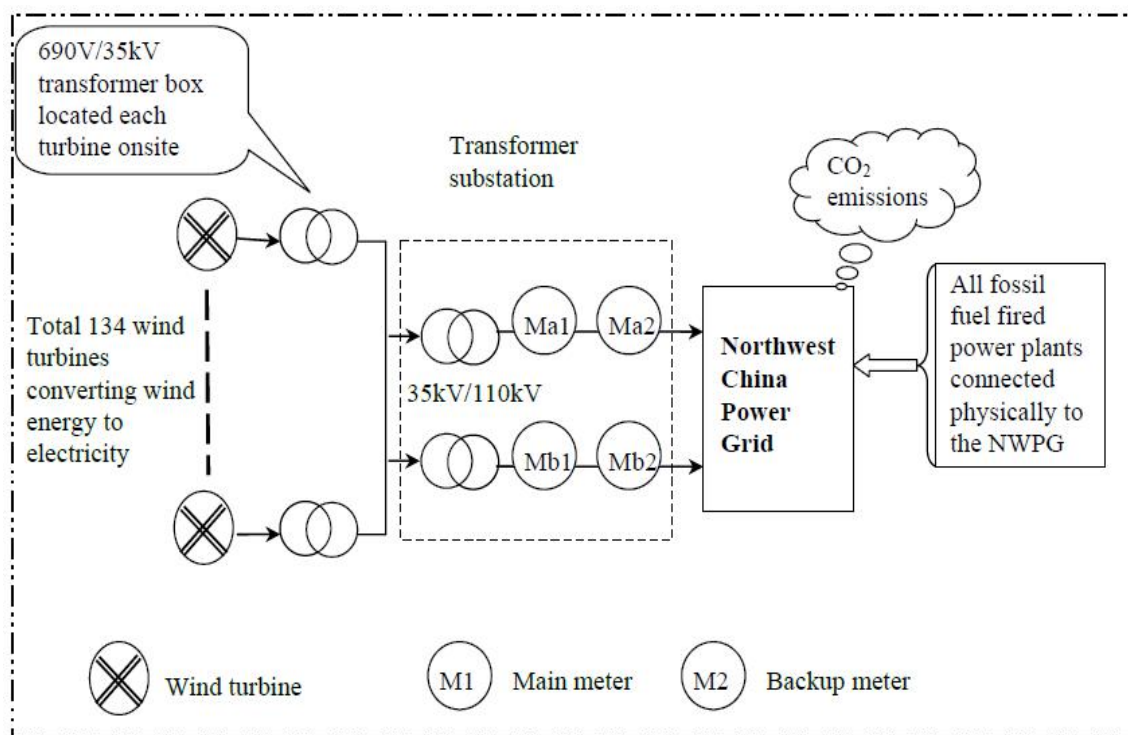


Figure 1. The technology flow diagram of the project

1.12 Project Location

The project is located at 7-10 km southwest of Yumen Town, Yumen City, Gansu Province in the People's Republic of China. It is located at Latitude between +40.1417 and +40.2572, Longitude between +96.8583 and +96.9575.. Figure 2 shows the location of the project.

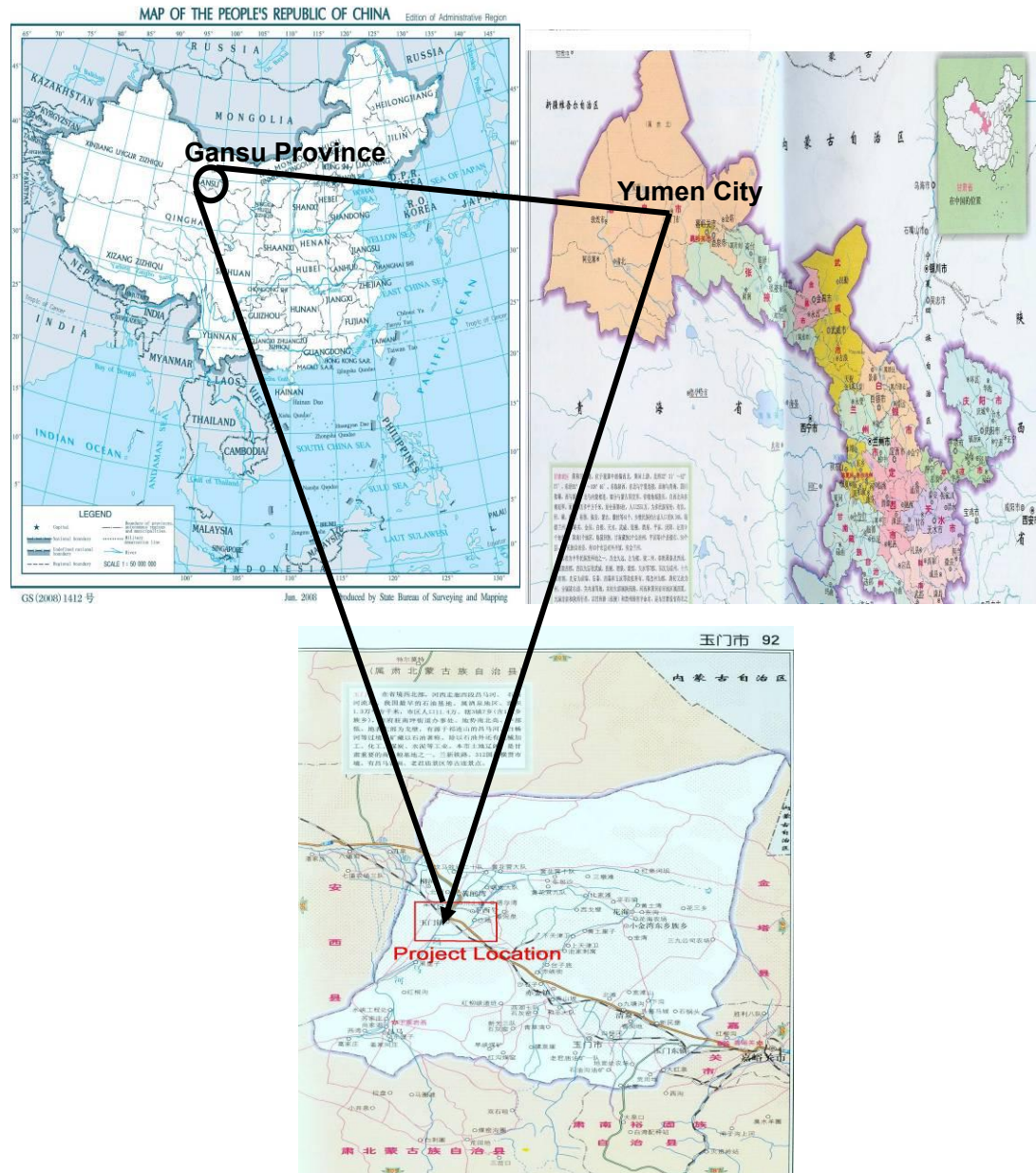


Figure2. Location of the project

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 Provincial Environmental Protection Bureau on 06/11/2007, and the Feasibility Study Report of the project was approved by National Development and Reform Commission on 17/06/2008. The project has got LOA from China DNA on 30/04/2009. 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.

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 24/09/2011 (UNFCCC Ref. 3670), for which a renewable crediting period of 3×7 years will be used under the CDM GHG Program. The first 7-year renewable crediting period under CDM is from 24/09/2011 to 23/09/2018.

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 24/09/2011 (UNFCCC Ref. 3670). The first 7-year renewable crediting period under CDM is from 24/09/2011 to 23/09/2018.

The credits from 24/09/2011 to 31/12/2015 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.

1.16.2 Other Forms of Environmental Credit

The project has been registered as a CDM project in UNFCCC on 24/09/2011 (UNFCCC Ref. 3670). The first 7-year renewable crediting period under CDM is from 24/09/2011 to 23/09/2018.

The credits from 24/09/2011 to 31/12/2015 have been issued under CDM mechanism.

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

1.17 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.

Sustainable Development

The project will 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 generated employment opportunities for local contractors and suppliers, while operation and maintenance of the plant creates additional long term employment opportunities for skilled professionals within CECIC. For the project, CECIC directly hired 27 new employees, while 300 more new employment opportunities were created for local people through construction companies for the project.

Reduction in GHG emissions: Currently, most of the electricity in the region is generated through conventional fossil fuel based thermal power plants. 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, displaces electricity generated by these fossil fuel based thermal plants, therefore reducing GHG emissions.

Reduction of fossil fuel use: the project activity reduces reliance on imported fossil fuels, contributes to increasing China's energy security, and also improves local air quality as it reduces the emissions of SO₂ and NO_x associated with fossil fuel use.

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 improves its supply while contributing to steady and reliable economical growth in the region.

In addition, the project helps the Chinese government to achieve the goal it set itself under the Renewable Energy Law. The Law states that the country is committed to increase the share of renewable energy use in the country's energy mix to 10% by 2010 and 30% by 2030, in order to realize the sustainable development of the economy and society. It is also consistent with the government's National Renewable Energy Development Strategy and Plan (NREDSP) which sets the goal of increasing the share of renewable energy in primary energy consumption to 10%.

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

The local stakeholder's meeting was held in Yumen County on 06/03/2008. 44 participants attended the meeting including local residents, builders and members of the local authorities. the project CECIC introduced the proposed 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 survey includes the following sections:

- (i) Project introduction;
- (ii) Respondents' basic information and education level;
- (iii) Questions;

Do you consider your current living, studying and working environment to be quiet?

Do you think that the project will have a negative 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 installation, waste water 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 proposed project?

(iv) Space for the respondents' signature and date.

Summary of the comments received

(i) Stakeholder Meeting

Every stakeholder expressed their comments for the proposed project. To date, no negative comments have been received. 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 below the national standard. The proposed Project site is located in the Gobi desert area. 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.

•Improve the living condition of local residents

the project will create new employment opportunities through the project construction and operation. the project will also purchase the raw materials for construction and other supplies from the local market. Therefore, the local people will benefit from the project.

(ii) Questionnaire Survey

The survey had a 100% response rate with all questionnaires returned. The key findings of the survey and the summary of the consultation are as following:

- 100% of respondents agree with the development and construction of the project.
- 100% of the respondents believe that the proposed project will have no negative impact on their living, studying and working environments.
- 100% of the respondents believe that the project implementation will have a positive impact on their lives.

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

All the concerns and suggestions were summarized below. The number provided after each comments corresponds to CECIC's response given in table 2 below.

Table 2. SUMMARY OF SURVEY (part of stakeholder's meeting)

	Gender	Age	Occupation	Do you think the project will affect the surrounding environment (air, noise and water)?	What do you concern the most during the project construction and operation?	Do you agree with development of this project?	Any environmental protection measurements should be considered?	Suggestions to project developer
1	M	28	Employee	Yes	- Noise: 4 - Electromagnetic: 2	agree	- Protect vegetation: 10 - Greening the project area after construction: 10 - Reduce dust: 3	strengthening the support to local government: 11
2	F	37	Employee	Yes	- Noise: 4 - Air pollution: 3	agree	Suggest building special roads for big trucks to avoid the heavy vehicles damage the Gobi plants: 8	- Construction waste should be dealt properly: 6 - The damage made to the Gobi plants by heavy vehicles should be restored as soon as the construction finished; build special construction-use-only roads: 8
3	M	32	Employee	Yes	- Air pollution: 3 - Electromagnetic: 2	agree	- Disturb the ground surface as less as possible to reduce fugitive dust: 3 & 7 - Equipment maintenance should be carried out as planned: 1 - Use surface water instead of groundwater: 12	- Reduce road occupation, restore the land that temporarily occupied: 7 - Give financial support to local environmental protection, use the profit made from emission reduction: 11
4	F	31	Employee	Not sure	- Air pollution: 3 - Equipment safety: 1 - Electromagnetic: 2	agree	Hardening the road surface to avoid pollution: 7, 8 & 10	Suggest developer to register local company, pay local tax and employ local labor. Participate and support local public welfare: 9, 11

5	M	35	Employee	Yes	• Wastewater discharge: 5	agree	• Improve wastewater treatment: 5 • Vehicles carrying heavy equipments should keep distance from residential area and town centre: 8	Protect the road and bridge during construction and pay the repair fee if there is any damage incurred: 8
6	F	22	Other	Yes	• Noise: 4 • Equipment safety: 1	agree	• Use environment friendly material: 13 • Take measures to reduce noise: 4 • Conduct environmental effect assessment beforehand: 14	Improve the economic development and employment in Yumen: 9
7	M	53	Employee	No	• Air pollution: 3	agree		
8	M	29	Employee	Yes	• Equipment safety: 1	agree		
9	F	35	Worker	Yes	• Air pollution: 3	agree		
10	M	46	Employee	No	• Equipment safety: 1 • Wastewater discharge: 5	agree		
11	M	29	Employee	No	• Equipment safety: 1 • Electromagnetic: 2	agree		
12	M	40	Employee	No	• Equipment safety: 1	agree		
13	M	23	Employee	Yes	• Noise: 4 • Equipment safety: 1	agree	• Soil-water protection: 7 & 5 • Vegetation protection: 10	
14	M	48	Other	No	• Equipment safety: 1 • Electromagnetic : 2	agree	Centralized construction and avoid farm land: 7	Develop the project as Yumen is your second home: Not relevant
15	F	21	Worker	No	• Noise: 4 • Air pollution: 3	agree		
16	M	36	Employee	No	• Equipment safety: 1 • Electromagnetic: 2	agree		
17	F	28	Employee	No	• Noise: 4 • Air pollution: 3 • Wastewater discharge: 5	agree		

18	M	45	Employee	No	• Equipment safety: 1	agree		
19	M	56	Employee	No	• Air pollution: 3	agree	Ground surface greening should be included in construction plan: 10	Ground environmental reform should be done properly: 7 & 10
20	F	25	Employee	No	• Electromagnetic: 2	agree		
21	M	36	Employee	No	• Noise: 4	agree		
22	M	41	Farmer	No	• Equipment safety: 1	agree		
23	F	39	Farmer	No	• Electromagnetic: 2	agree		
24	M	46	Employee	No	• Equipment safety: 1	agree		
25	M	36	Farmer	No	• Electromagnetic: 2	agree	Waste in construction site should be treated properly: 6	
26	M	41	Employee	No	• Landscape destruction: 7	agree	Build construction-use-only road to protect environment: 8	
27	F	29	Farmer	Not sure	• Electromagnetic: 2	agree		
28	M	39	Farmer	Yes	• Equipment safety: 1	agree		
29	M	36	Farmer	No	• Noise: 4	agree		
30	M	32	Farmer	No	• Air pollution: 3 • Landscape destruction: 7	agree		
31	M	32	Farmer	Yes	• Noise: 4 • Wastewater discharge: 5 • Electromagnetic: 2	agree		
32	M	38	Farmer	No	• Air pollution: 3 • Landscape destruction: 7	agree		
33	M	48	Farmer	No	• Landscape destruction: 7	agree		
34	M	45	Farmer	No	• Equipment safety: 1	agree		
35	M	40	Farmer	No	• Equipment safety: 1 • Wastewater discharge: 5	agree		
36	F	35	Employee	No	• Air pollution: 3	agree		

37	M	51	Woker	No	• Noise: 4 • Air pollution: 3 • Wastewater discharge: 5	agree		
38	M	28	Farmer	No	• Noise: 4 • Air pollution: 3 • Wastewater discharge: 5	agree		
39	M	29	Farmer	No	• Electromagnetic: 2	agree		
40	M	32	Employee	Yes	• Air pollution: 3 • Wastewater discharge: 5 • Electromagnetic: 2	agree	Reduce electromagnetic interference and wastewater discharge, and strengthening greening: 2, 5 & 10	Construction should be carried out as planned: Not relevant
41	F	34	Other	Yes	• Noise: 4 • Wastewater discharge: 5 • Landscape destruction: 7	agree		
42	M	43	Farmer	No	• Equipment safety: 1 • Electromagnetic: 2 • Landscape destruction: 7	agree		
43	M	49	Farmer	No	• Equipment safety: 1 • Electromagnetic: 2	agree		
44	M	36	Farmer	No	• Noise: 4 • Equipment safety: 1 • Electromagnetic: 2	agree		

Consideration of comments received

Table 4 indicates the issues raised by the stakeholders, and the response or action from CECIC on each issue.

Table 4. Responses to comments received by Stakeholders

Issues	Actions taken by CECIC
1. Equipment safety and maintenance	Wind turbine and hub are the key equipment used for the project. the project will install efficient and reliable turbines manufactured by Dongfang Steam Turbine Manufacture. In addition, the control system will be imported from EU, which makes the project very safe. CECIC will conduct regular maintenance in accordance with manufacture's specification.
2. Electromagnetic	Radiation of electromagnetism arising from generators, transformer substations and transmission lines is considered insignificant in terms of intensity, and is unlikely to have a negative impact on residents' health because of the long distance between project site and the nearest residential area. Meanwhile, the radiation intensity of high voltage transformer equipments is lower than 3.5kV/m, which is much lower than the requirement of national standards (GB16203-1996).
3. Air pollution and dust	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. 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.
4. Noise	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. As the proposed project is far away from any residential area, effects of noise pollution on the surrounding environment are not significant.
5. Waste water	The waste water generated during the construction includes washing water from machines and waste water from the project office. Since the project site is located in the Gobi desert area, the waste water will be reused on the construction site or as fertilizer. During operation, the waste water 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 waste water will be used for on-site greening and road spreading. The treated waste water quality will meet the requirement of the Fields Irrigation Water Standard (GB 5084-1992), therefore, it has no negative impact on the surrounding environment.
6. 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 87 kg per day during construction, which will be reduced to 15 kg per day during operation. This waste will be properly collected and delivered to the local county for disposal.
7. Landscape destruction	the project is located in the Gobi desert area with sparse vegetation. the project construction could exacerbate the soil erosion and blown sand hazards. Through minimizing the construction area, back filling 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. Furthermore, there is no farmland or residential area near the project site, therefore, damage to such farmland or residential areas are considered minimum.

8. Impact of heavy vehicles	All the vehicles used for the project meet all the regulations and standards required by the law. Therefore, the project would not cause excess wear and tears to the road. Since the project is located in the Gobi desert, damage caused by such heavy vehicles at the project site is considered minimum, while these vehicles will avoid driving in city or close to residential area to minimize the impact of surrounding communities. In addition, CECIC will plant fast growing plants upon completion of the plant, which will restore any damages caused by the project.
9. Local development	the project has created new employment opportunities as stated in the Section A.2. Doing the construction, the construction companies hire over 300 local employees specifically for the project. In addition, generated electricity will reduce grid's power shortage and supporting regional economical activities. Finally, through the project, CECIC will be paying VAT to local government, which will benefit local government while enhancing economic activity of the surrounding communities.
10. Protection of vegetation and Greening	the project is located in the Gobi desert area with sparse vegetation and impact to vegetation is considered minimum. In addition, CECIC will plant fast growing plants upon completion of the plant, which will result in a better vegetation condition than before the project.
11. Support to the local government, welfare, and environmental protection	CECIC will pay all the required _VAT in accordance with the tax law. However, it is not role of CECIC to support local government, welfare, and environmental protection agency beyond its obligation under the law. Nonetheless, the CECIC will support the local community by creating new employment opportunities.
12. Use of water resource	The project will not consume large volume of waste, therefore, impact on water resource is not relevant.
13. Construction material	All the material used for the project meets all the regulations and standards required.
14. Environmental Impact Assessment	As shown in the section D above, CECIC has conducted EIA and Gansu Environment Protection Bureau approved the project, based on the EIA.

As shown in the table 3, most of concerns were related to environmental impact. The project has received EIA approval and has taken necessary measures to minimize these impacts.



Image 1. Stakeholder's Meeting



Image 2. Stakeholder's Meeting

In order for on-going communicate with local stakeholders, the project owner put a grievance notebook in 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

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 Gansu Province Environment and Science Design Institute and has been approved by the Environmental Protection Bureau of Gansu Province, indicating that the proposed 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. 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. As the proposed project is far away from any residential area, 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 87 kg per day during construction, which will be reduced to 15 kg per day during operation. This waste will be properly collected and delivered to the local county for disposal.

- Impact on Waste Water:

The waste water generated during the construction includes washing water from machines and waste water from the project office. Since the project site is located in the Gobi desert area, the waste water will be reused on the construction site or as fertilizer. During operation, the waste water 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 waste water will be used for on-site greening and road spreading. The treated waste water 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 located in the Gobi desert area with sparse vegetation. The Project construction could exacerbate the soil erosion and blown sand hazards. 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.

- Impact on Radiation of Electromagnetism:

Radiation of electromagnetism arising from generators, transformer substations and transmission lines is considered insignificant in terms of intensity, and is unlikely to have a negative impact on residents' health because of the long distance between project site and the nearest residential area. Meanwhile, the radiation intensity of high voltage transformer

equipments is lower than 3.5kV/m, which is much lower than the requirement of national standards (GB16203-1996).

In conclusion, the project will not have a significant negative impact on the surrounding environment.

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)”¹.

Related tools are:

- Tool to calculate the emission factor for an electricity system (version 07.0)
- Tool for the demonstration and assessment of additionality (version 07.0.0)
- 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: (a) Install a Greenfield power plant;	the project is the installation of a wind power project. Therefore, a) is

¹ <https://cdm.unfccc.int/methodologies/DB/XP2LKUSA61DKUQC0PIWPGWDN8ED5PG>

(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).	applicable.
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 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: (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/m²; 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/m²; 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/m²; (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 is a wind power project, not hydro power plant.
In the case of integrated hydro power projects, project proponent shall: (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 (b) Provide an analysis of the water balance covering the water fed to power	Not applicable. the project is a wind power project, not an integrated hydro power project.

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.	
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 activity does not involve switching from fossil fuel to renewable energy sources at the site of the project activity. 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 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.	Since the project activity is 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 “Tool for the demonstration and assessment of additionality” (version 07.0.0) are in the following table.

Criteria	Assessment
Once the additionally tool is included in an approved methodology, its application by project participants using this methodology is mandatory.	Applicable. The additionally tool is included in the approved methodology ACM0002 (version 20.0) which is adopted by this renewal PD.

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 China (China MEE), NWPG consists of Shaanxi Power Grid, Gansu Power Grid, Qinghai Power Grid, Ningxia Power Grid and 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	CO ₂	Included	Main emission source.
	CH ₄	Excluded	Excluded for simplification. This is conservative
	N ₂ O	Excluded	Excluded for simplification. This is conservative
Project	CO ₂	Excluded	According to ACM0002 (Version 20.0), project emission is excluded as a wind power project.
	CH ₄	Excluded	
	N ₂ O	Excluded	

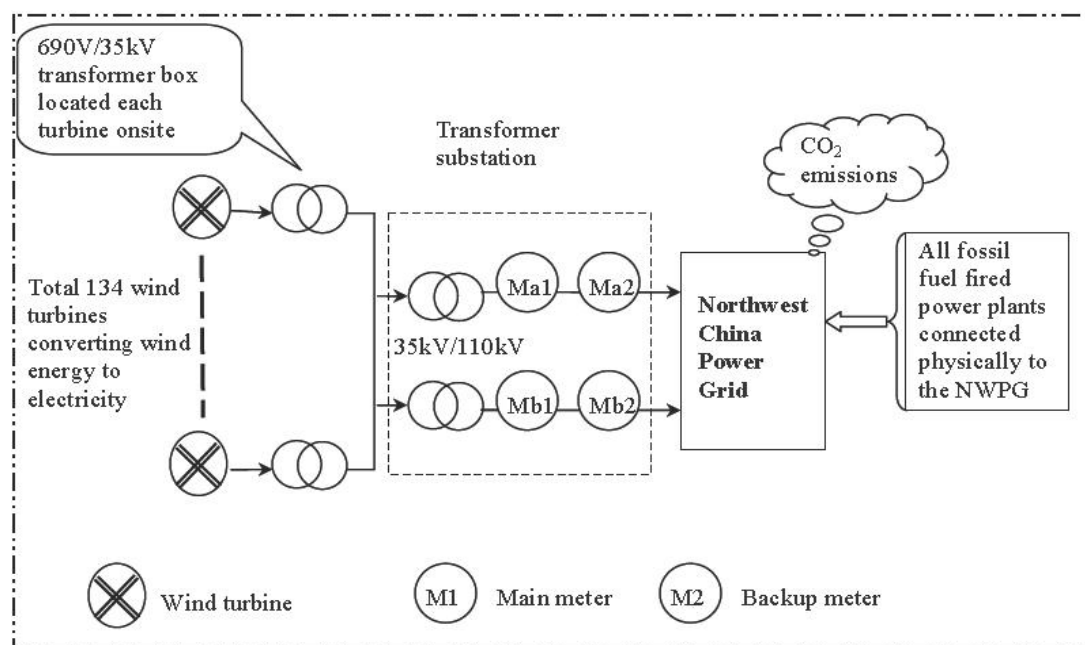


Figure 3. Flow diagram of the project boundary

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” (version 03.0.1), 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 29/12/2020², so the emission factor of NWPG is updated for the second crediting period according to this Notice.

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 4.0, a full reassessment of additionality is not required.

² http://www.mee.gov.cn/ywgz/xdqhbh/wsqtz/202012/t20201229_815386.shtml

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.

3.6 Methodology Deviations

There are no methodology deviations for this project.

4 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

4.1 Baseline Emissions

According to the methodology, the baseline emissions include only CO₂ 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

BE_y	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 $EF_{grid,CM,y}$

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 Factors³.

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 Northeast China Power Grid (NWP), consisting of five provincial grids: Shanxi, Gansu, Qinghai, Ningxia and Xinjiang.

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.

³ http://www.mee.gov.cn/ywgz/ycqhbh/wsqtz/202012/t20201229_815386.shtml

For the purpose of determining the operating margin emission factor, use one of the following options to determine the CO₂ emission factor(s) for net electricity imports from a connected electricity system:

- (a) 0 tCO₂/MWh; or
- (b) The weighted average operating margin (OM) emission rate of the exporting grid, determined as described in Step 4 (d) below; or
- (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 CO₂ 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 CO₂ 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.

Option B – Calculation based on total fuel consumption and electricity generation of the system

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:

$EF_{grid,OMsimple,y}$	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)
$EF_{CO_2,i,y}$	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.

$$EF_{grid,OMsimple,y} = 0.8922 \text{ tCO}_2/\text{MWh}$$

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 ($\text{t CO}_2/\text{MWh}$)
$EG_{m,y}$	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

The CO_2 emission factor of each power unit m ($EF_{EL,m,y}$) should be determined as per the guidance in step 4 (a) for the simple OM, using options A1, A2 or A3, using for y the most recent historical year for which power generation data is available, and using for m the power units included in the build margin.

Due to the limited availability of data on individual power units, the DNA uses the deviation above to calculate the build margin emission factor and the CO_2 emission factor of thermal power units as follows.

The added generation capacity is taken instead of generation in formula (4) above, as with the determination of the group of plant included in the build margin. Therefore, the calculation of $EG_{grid,BM,y}$ is as follows:

$$EF_{grid,BM,y} = \frac{\sum_m (CAP_{m,y} \times EF_{EL,m,y})}{\sum_m CAP_{m,y}} = \sum_m Share_{CAP,m,y} \times EF_{EL,m,y} \quad (5)$$

Where:

$EF_{grid,BM,y}$	Build margin CO ₂ emission factor in year y (t CO ₂ /MWh)
$CAP_{m,y}$	Added generation capacity by plant type m in year y (MW)
$EF_{EL,m,y}$	CO ₂ emission factor of plant type m in year y (tCO ₂ /MWh)
$Share_{CAP,m,y}$	Share of added generation capacity by plant type m in year y (%)
m	Plant type included in the build margin (thermal, hydro, nuclear, other)
y	The most recent historical year for which electricity generation data is available

The CO₂ emission factor of plant types other than thermal power plants is taken as zero.

The CO₂ emission factor of thermal power plants is the weighted average emission factor of the best thermal power plant technologies commercially available in China, as required by the approved deviation, using option A2.

Using the equation of option A2, the CO₂ emission factor of advanced (best commercially available) power plants using fuel type i can be calculated as follows:

$$EF_{m,Adv,y} = \frac{EF_{CO_2,m,y} \times 3.6}{\eta_{m,y}} \quad (6)$$

Where:

$EF_{m,Adv,y}$	CO ₂ emission factor of advanced power plants using fuel m in year y (tCO ₂ /MWh)
$EF_{CO_2,m,y}$	Average CO ₂ emission factor of fuel type m in year y (tCO ₂ /GJ)
$\eta_{m,y}$	Average net energy conversion efficiency of advanced power plants using fuel type m in year y (%)
m	Fuel type of thermal plant (coal/solid, oil/liquid, gas)
y	The relevant year as per the data vintage chosen

The weighted average CO₂ emission factor of thermal power plants is weighted on the basis of the emissions from each of these fuel types in the latest year for which data is available, and using the average net energy conversion efficiency for each fuel type of the best technologies commercially available in China.

$$EF_{thermal,y} = \sum_m (EF_{m,Adv,y} \times \lambda_{m,y}) \quad (7)$$

Where:

$EF_{thermal,y}$	Weighted average CO ₂ emission factor of thermal power plants in year y (tCO ₂ /MWh)
$EF_{m,Adv,y}$	CO ₂ emission factor of advanced power plants using fuel type m in year y (tCO ₂ /MWh)

$\lambda_{m,y}$	Share of emissions of fuel type m in year y (%)
m	Fuel type of thermal plant (coal/solid, oil/liquid, gas)
y	The relevant year as per the data vintage chosen

The build margin emission factor is calculated by the DNA using this methodology:

$$EF_{grid,BM,y} = 0.4407 \text{ tCO}_2/\text{MWh}.$$

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:

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

$$EF_{grid,CM,y} = \omega_{OM} \times EF_{grid,OM,y} + \omega_{BM} \times EF_{grid,BM,y} \quad (8)$$

Where:

$EF_{grid,BM,y}$	Build margin CO ₂ emission factor in year y (tCO ₂ /MWh)
$EF_{grid,OM,y}$	Operating margin CO ₂ emission factor 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
Operating Margin Emissions Factor (EF _{grid,OM,y})	0.8922	0.75
Build Margin Emissions Factor (EF _{grid, BM,y})	0.4407	0.25
Baseline Emissions Factor (EF _{grid,CM,y})	0.7793	

Thus,

$$BE_y = EG_{\text{facility},y} \times EF_{\text{grid,CM},y} = 431,949 \text{ MWh} \times 0.7793 \text{ tCO}_2/\text{MWh} = 336,628 \text{ tCO}_2$$

4.2 Project Emissions

According to the methodology, for most renewable energy project activities, $PE_y = 0$. 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:

$$ER_y = BE_y - PE_y \quad (9)$$

Where:

ER_y Emission reductions in year y (t CO₂e/yr)

BE_y Baseline emissions in year y (t CO₂/yr)

PE_y Project emissions in year y (t CO₂e/yr)

Thus,

$$ER_y = BE_y - PE_y = 336,628 \text{ tCO}_2\text{e} - 0 \text{ tCO}_2\text{e} = 336,628 \text{ tCO}_2\text{e}$$

Year	Estimated baseline emissions or removals (tCO ₂ e)	Estimated project emissions or removals (tCO ₂ e)	Estimated leakage emissions (tCO ₂ e)	Estimated net GHG emission reductions or removals (tCO ₂ e)
21/11/2019-31/12/2019 (41days)	37,813	0	0	37,813
01/01/2020-31/12/2020	336,628	0	0	336,628
01/01/2021-31/12/2021	336,628	0	0	336,628
01/01/2022-31/12/2022	336,628	0	0	336,628
01/01/2023-31/12/2023	336,628	0	0	336,628
01/01/2024-31/12/2024	336,628	0	0	336,628
01/01/2025-31/12/2025	336,628	0	0	336,628
01/01/2026-31/12/2026	336,628	0	0	336,628
01/01/2027-31/12/2027	336,628	0	0	336,628
01/01/2028-31/12/2028	336,628	0	0	336,628
01/01/2029-20/11/2029 (324days)	298,815	0	0	298,815
Total	3,366,280	0	0	3,366,280

5 MONITORING

5.1 Data and Parameters Available at Validation

Data / Parameter	EF _{grid,OM,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 ⁴
Value applied	0.8922
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	$EF_{grid,BM,y}$
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 ⁵
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	Based on the requirements of “Tool to calculate the emission factor for an electricity system” (Version 07.0)

⁴ <http://www.mee.gov.cn/ywgz/ymqhbh/wsqtgz/202012/W020201229610353816665.pdf>

⁵ <http://www.mee.gov.cn/ywgz/ymqhbh/wsqtgz/202012/W020201229610354442145.pdf>

data or description of measurement methods and procedures applied	
Purpose of Data	Calculation of baseline emissions
Comments	/

Data / Parameter	WBM
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	$EG_{\text{facility},y}$
Data unit	MWh/yr
Description	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y.
Source of data	Direct measurement
Description of measurement methods and procedures to be applied	Measurement will be performed continuously with electricity meters, and it will be recorded monthly. Data will be archived for 2 years following the end of the crediting period by means of electronic and paper backup.
Frequency of monitoring/recording	Measured continuously and recorded monthly.
Value applied	431,949 MWh per year at full capacity. $EG_{\text{facility},y}$ is electricity net of exports and imports, and is estimated as 431,949 MWh.

Monitoring equipment	The electricity is monitored by electricity meters with national standards.
QA/QC procedures to be applied	Meters will be examined, tested and calibrated regularly according to the manufacturer's standards. Monitoring data are counter-checked by receipt of electricity sales.
Purpose of data	Calculation of baseline emissions
Calculation method	$EG_{\text{facility},y} = EG_{\text{export},y} - EG_{\text{import},y}$ $EG_{\text{export},y}$: Quantity of electricity exported to the grid by the project. $EG_{\text{import},y}$: Quantity of electricity imported from the grid by the project.
Comments	/

5.3 Monitoring Plan

The monitoring plan is established according to the request of approved baseline and monitoring methodology ACM0002 (Version 20.0).

Purpose

The monitoring methodology clearly describes how to identify and collect the necessary data. The following is a summary list of the main items to be monitored:

The operational and management structure to be adopted by CECIC in implementing the monitoring plan for the project activity is outlined in the Figure 4 below.

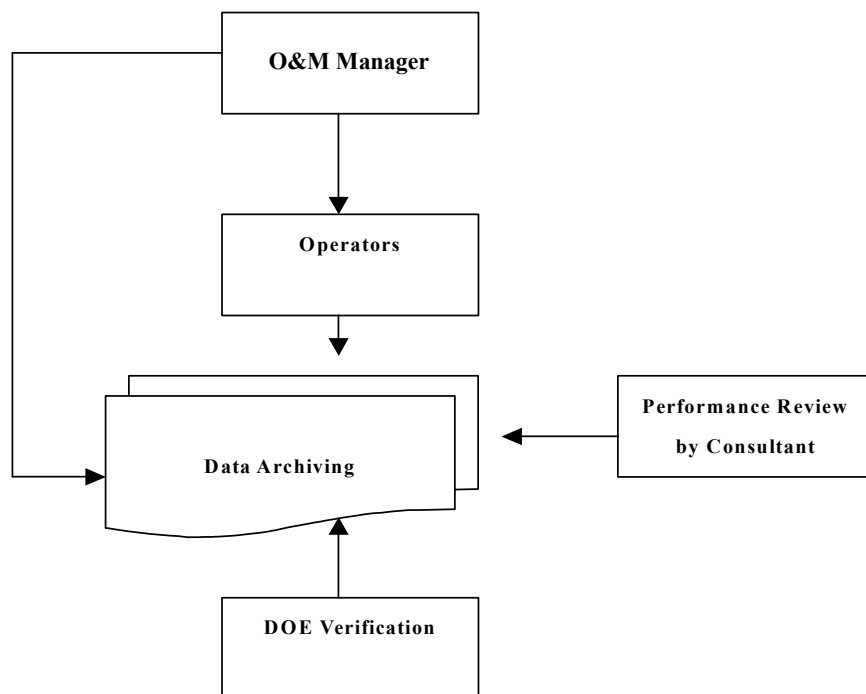


Figure 4. Operational and management structure for monitoring the project activity

The performance of the Project will be reviewed and analyzed by the consultant on a regular basis.

Metering

The power generated by the project and supplied to the grid will be monitored at the following points using electricity meters:

Both the main meter(s) and backup meter(s) have been installed at high voltage side of 35kV/110kV substation, located within the site, as described in the section 3.3 The main meter(s) will be used to monitor electricity exchanged between the project and the grid continuously and reported monthly.

The data from the electricity meters can be cross-checked with the Electricity Transaction notes or sales receipts for the electricity.

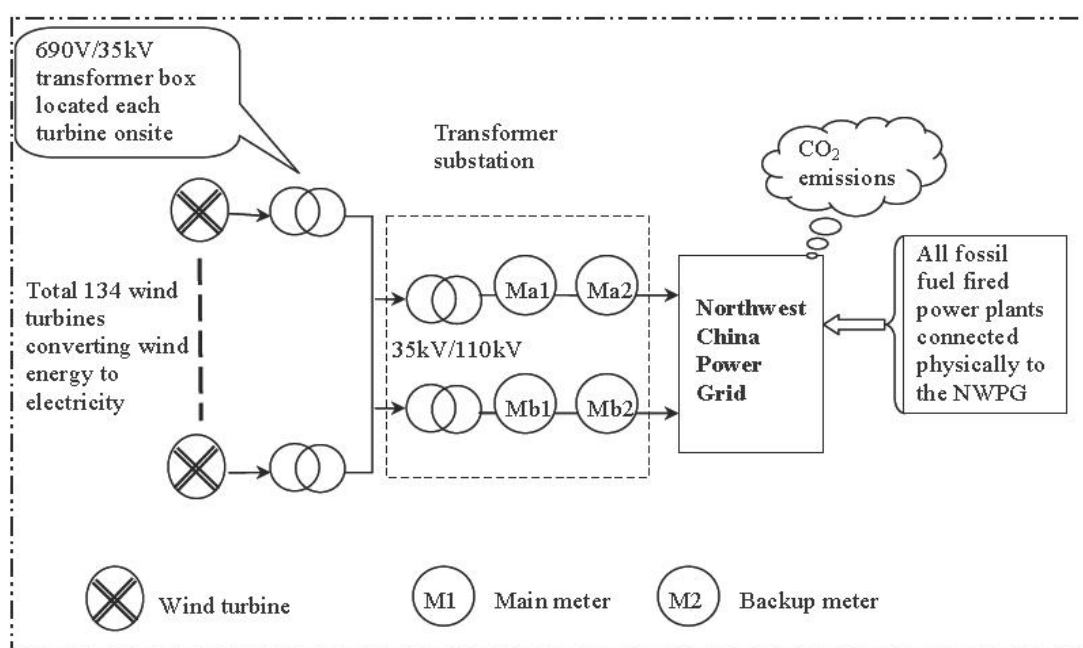


Figure 5. Flow diagram of the metering

Calibration

The metering equipment will be calibrated and checked at least once a year 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

The metering equipment 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. Both 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. It will also comply with the national standards Technical Administrative Code of Electric Energy Metering (DL/T 448-2016) and Alternating Current Static Watt-hour Meters for Active Energy, with accuracy of no less than 0.5S (GB/T 17883-1999).

Procedure

When reading error of either 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 must be informed before the calibration and all the record should be kept by the CECIC.

When the main meter detects the error beyond the allowable range or inconsistency, the backup meter, located within the site, will be used. In case that both meters detect errors, CECIC shall repair the meter, recalibrate, or replace, while giving the grid company sufficient notice to allow their representative to attend during any corrective activities. When this happens, the net power generated is calculated by reading the backup meter. In case where both meters fail, CECIC and the grid company should formulate reasonable and conservative estimation based on historical or the nearest month power generation data. Also, CECIC should provide the evidence to testify the method is reasonable and conservative.

Data

All data collected as part of monitoring should be archived electronically and be kept for at least 2 years after the end of the last crediting period. 100% of data is to be monitored.