



**Verified Carbon
Standard**

SHANXI XIYANG CMM POWER GENERATION PROJECT



柏能新能源
CYPRESS NEW ENERGY

Document Prepared by (Baineng New Energy (Shen Zhen) Co., Ltd)

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1 PROJECT DETAILS

1.1 Summary Description of the Project

Shanxi Xiyang CMM Power Generation Project (hereinafter referred to as the Project) will utilize the low concentration coal mine methane (CMM) from Fenghui coal mine for power generation to supply electricity to the coal mine where the Project is located and to North China Power Grid(NCPG) if there is any electricity surplus. The Project is located in Dazhai Town, Xiyang County, Jinzhong City, Shanxi Province, China. The Project Owner is Shanxi Xiyang Fenghui coal industry Co., Ltd. Power Plant.

Prior to the implementation of the project, Fenghui coal mine was equipped with CMM extraction facilities and all extracted CMM was vented into the atmosphere directly; the electricity consumed at coal mines was imported from North China Power Grid(NCPG); the heat was provided by waste coal boilers. For CMM treatment and heat supply, baseline scenario is the same as the scenario existing prior to the implementation of the project activity. For electricity supply, the NCPG provides the equivalent amount of electricity produced by the Project in the baseline.

The purpose of the project is to utilize the extracted CMM with low concentration methane concentration to produce electricity. No coal bed methane (CBM) or ventilation air methane (VAM) utilization is involved. Eleven sets of CMM power generators will be installed with a total installed capacity of 24MW (12*2MW), destroying 42.14 million m³ of methane annually. The expected annual exported electricity will be 163,987 MWh, which will be supplied to the coal mine first through the electricity distribution network in Fenghui coal mine area, and then to North China Power Grid(NCPG) if there is any electricity surplus, replacing the electricity that would otherwise have been purchased from the NCPG and displace part of the electricity generated by NCPG dominated by fossil fuel-fired power plants. The waste heat from the generators will be recovered by waste heat boilers to provide free hot water to the coal mines, which was provided by waste coal fired boilers before the implementation of the Project. However, to be conservative, emission reductions will not be claimed for this part.

The emissions reduction of the Project comes from two sources: 1) Methane (CH₄) emissions as a result of the previously vented gas that will be captured and destroyed in the project scenario; 2) CO₂ emissions from the production of the equivalent amount of electricity replaced by the Project that would otherwise have been purchased from the NCPG. It is estimated that in the 10 years crediting period of the project (from 01-December-2022 to 30-November-2032), the expected average annual GHG emission reduction will be 827,531 tCO₂e, with the total emission reduction of 8,275,310 tCO₂e.

The Project contribute to sustainable development in the following ways:

- Achieving significant GHG emission reductions and other air pollutant reductions by methane destruction;
- Displacing part of the grid electricity mainly generated by fossil fuel combustion, thus reducing the emission of CO₂ and other air pollutants;
- Creating new job opportunities.

1.2 Audit History

Audit type	Period	Program	VVB name	Number of years
Validation	08-Mar-2024 - 1-Dec-2024	Verified Carbon Standard	CTI Certification Co., Ltd.	/
Verification	/	/	/	/
Total	/	/	/	/

1.3 Sectoral Scope and Project Type

Sectoral scope ¹	Sectoral Scope 1: Energy industries Sectoral Scope 8: Mining/mineral production
Project activity type	Non-AFOLU project. Non- grouped project

1.4 Project Eligibility

1.4.1 General eligibility

The scope of the VCS Program includes:

1) The seven Kyoto Protocol greenhouse gases: The emissions reduction of the project comes from two sources: 1) Methane (CH₄) emissions as a result of the previously vented gas that will be captured and destroyed in the project scenario; 2) CO₂ emissions from the production of the equivalent amount of electricity replaced by the Project that would otherwise have been purchased from the NCPG and displace part of the electricity generated by NCPG if the electricity is surplus dominated by fossil fuel-fired power plants. Thus, the project applicable to this scope.

¹ Projects, activities, or methodologies may be developed under any of the 16 VCS sectoral scopes: <https://verra.org/programs/verified-carbon-standard/vcs-program-details/#sectoral-scopes>

2) Ozone-depleting substances: Not applicable as the project does not involve ozone-depleting substances.

3) Project activities supported by a methodology approved under the VCS Program through the methodology approval process: not applicable as the project is not supported by a methodology approved under the VCS Program through the methodology approval process.

4) Project activities supported by a methodology approved under a VCS approved GHG program, unless explicitly excluded under the terms of Verra approval: The methodology ACM0008 (Version 08) of the project utilized is a methodology approved under CDM Program, that is a VCS approved GHG program.

5) Jurisdictional REDD+ programs and nested REDD+ projects as set out in the VCS Program document Jurisdictional and Nested REDD+ (JNR) Requirements: Not applicable.

The project is to utilize the extracted CMM with low concentration methane concentration to produce electricity, which is apparently not a project that generates GHG emissions primarily for the purpose of their subsequent reduction, removal or destruction.

The project does not belong to the excluded project activities in Table 1 of VCS Standard 4.5.

Thus, the project is eligible under the scope of VCS program.

1.4.2 AFOLU project eligibility

Not applicable as the project is a non AFOLU project.

1.4.3 Transfer project eligibility

Not applicable as the project is not transfer project nor CPAs seeking registration.

1.5 Project Design

The project has been designed to include a single installation of an activity.

Grouped Project Design

Not applicable as the project is not a grouped project.

1.6 Project Proponent

Organization name	Shanxi Xiyang Fenghui coal industry Co., Ltd. Power Plant
Contact person	Jianchun Qin

Title	General Manager
Address	Mahui Village, Dazhai Town, Xiyang County, Jinzhong City, Shanxi Province, China
Telephone	+86 035-44131669
Email	921899974@qq.com

1.7 Other Entities Involved in the Project

Organization name	Baineng New Energy (Shenzhen) Co.,Ltd.
Role in the project	Consultant
Contact person	Zexu Zhang
Title	Project Manager
Address	Room 302, No.2815 Longteng Avenue, Shanghai
Telephone	+86 13916000152
Email	project@cypressenergy.cn

1.8 Ownership

The project owner of the project is Shanxi Xiyang Fenghui coal industry Co., Ltd.Power Plant . The approval of Environmental Impact Assessment (EIA), Feasibility Study Report (FSR), and the business license of the project owner are evidence for legislative right. Besides, the Equipment purchasing contract, and the purchasing power agreement are the evidence for the ownership of the plant, equipment and power generating.

1.9 Project Start Date

Project start date	01-December-2022
Justification	As per 3.8 of VCS Standard (Version 4.5), the project startdate of a non-AFOLU project is the date on which the projectbegan generating GHG emission reductions or removals. The project activity is a non-AFOLU project and started operationon 01-December-2022, therefore, the project start date is 01- December-2022.

1.10 Project Crediting Period

Crediting period	☐ <i>Seven years, twice renewable</i> ☒ <i>Ten years, fixed</i> ☐ <i>Other (state the selected crediting period and justify how it conforms with the VCS Program requirements)</i>
Start and end date of first or fixed crediting period	01-December-2022 to 30-November-2032

1.11 Project Scale and Estimated GHG Emission Reductions or Removals

Indicate the estimated annual GHG emission reductions/removals (ERRs) of the project:

- ☐ < 300,000 tCO₂e/year (project)
☒ ≥ 300,000 tCO₂e/year (large project)

Complete the table below for the first (if renewable) or fixed crediting period:

Calendar year of crediting period	Estimated GHG emission reductions or removals (tCO ₂ e)
01-Dec-2022 - 31-Dec-2022	70,283 ²
01-Jan-2023 - 31-Dec-2023	827,531
01-Jan-2024 - 31-Dec -2024	827,531
01-Jan-2025 - 31-Dec-2025	827,531
01-Jan-2026 - 31-Dec -2026	827,531
01-Jan-2027 - 31-Dec -2027	827,531
01-Jan-2028 - 31-Dec-2028	827,531
01-Jan-2029 - 31-Dec-2029	827,531
01-Jan-2030 - 31-Dec-2030	827,531
01-Jan-2031 - 31-Dec-2031	827,531

² The estimated annual ERs are 827,531 tCO₂e, the period from 01-December-2022 to 31-December-2022 accounts for 31days year, thus the estimated ERs during 01-December-2022 to 31-December-2022 are calculated as 827,531 tCO₂e/yr × 31/365 yr = 70,283 tCO₂e. Detailed calculation process is included in the ER spreadsheet

01-Jan-2032 - 31-Nov-2032	757,248 ³
Total estimated ERRs during the first or fixed crediting period	8,275,310
Total number of years	10
Average annual ERRs	827,531

1.12 Description of the Project Activity

Twelve sets of CMM power generators with total capacity of 24 MW will be installed to utilize CMM for power generation. The amount of pure methane destructed is estimated to be 42.14 million Nm³ per year, and the annual exported electricity is 163,990 MWh.

The technical process of the Project is shown in Figure 1-1. The low concentration CMM is delivered through methane extraction pumps to pre-treatment system for safety treatment, and then goes into the gas engines for power generation. The generated electricity is for internal coal mine consumption. The waste heat from the generators will be recovered by the waste heat boilers to provide hot water to coal mines.

The specifications of power generators are shown in Table 1-1. After site survey and taking advice from professional experts, the preparation organization of feasibility study report determined the annual operating hours to be 7,200 hours in the FSR, and thus the plant load factor (PLF) is 0.8219⁴.

The equipment employed in the project is all imported without technology transfer. As shown in Figure 1-1, the Project will install gas analyzers and flow meters to respectively monitor the methane concentration and CMM volume sent to the CMM power plants. Electricity meters will be installed to monitor the electricity exported to coal mines. Detailed monitoring information can be found in section 5.3.

The emission reduction of the project comes from two sources: 1) CH₄ emission as a result of venting gas that will be captured and destroyed in the project scenario; 2) CO₂ emission from the production of equivalent amount of electricity replaced by the Project that would otherwise be purchased from NCPG.

³ The estimated annual ERs are 827,531 tCO₂e, the period from 1-January-2032 to 30-November-2032 accounts for 334 days year, thus the estimated ERs during 1-January-2032 to 30-November-2032 are calculated as 827,531 tCO₂e/yr × 334/365 yr = 757,248 tCO₂e. Detailed calculation process is included in the ER spreadsheet

⁴ 0.8219=7,200 hours/8,760 hours

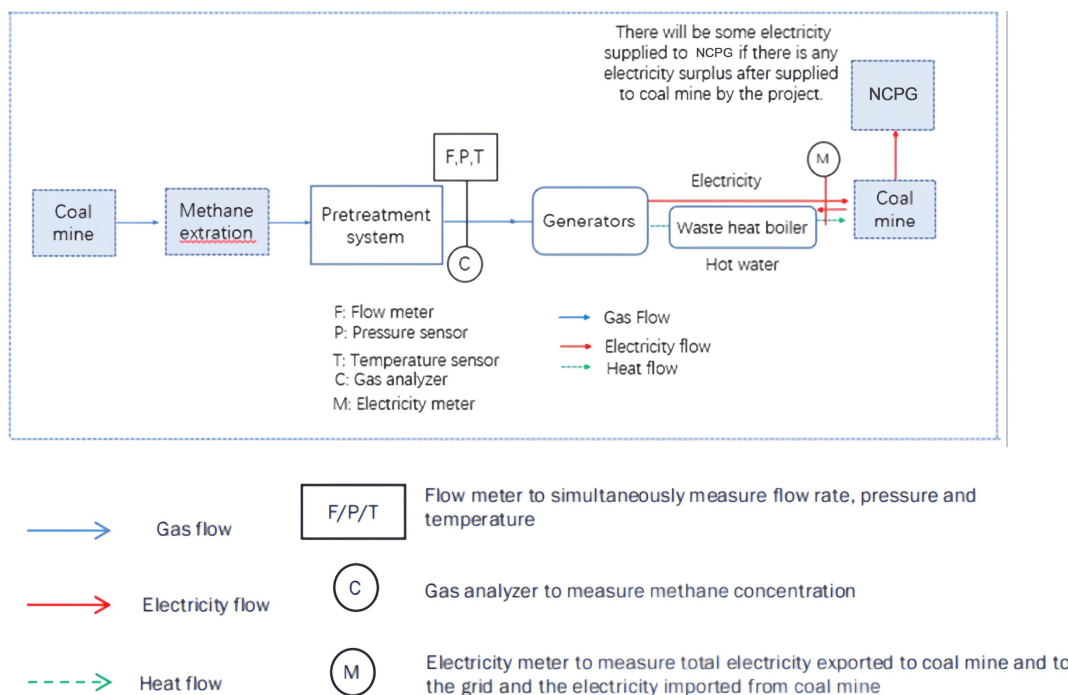


Figure 1-1 Project production processes

Table 1-1 Generator Specifications

Type	G3520C
Supplier	Caterpillar
Quantity	12
Rated power (kW)	2000
Rated current (A)	138
Rated voltage (V)	10500
Rotate speed (rpm)	1500
Frequency (Hz)	50
Power factor	0.8
Lifetime (year)	10

1.13 Project Location

The Project is located in Mahui Village, Dazhai Town, Xiyang County, Jinzhong City, Shanxi Province, People's Republic of China. The geographical coordinates for the project site are east longitude 113°37'23" and north latitude 37°32'34".

The geographic locations of the involved coal mines are shown in Figure 1-2.



Figure 1-2 Location of the project

1.14 Conditions Prior to Project Initiation

The scenario existing prior to the start of the implementation of the project activity is: 1) all the low concentration CMM extracted from the coal mines in the Project would be vented into the atmosphere; 2) the NCPG provided the equivalent amount of electricity produced by the project (as discussed above, the electricity generated by the Project will only replace electricity from NCPG) and 3) heat was provided by waste coal boilers (emission reductions due to heat replacement will not be claimed).

For CMM treatment and heat supply, baseline scenario is the same as the scenario existing prior to the implementation of the project activity. For electricity supply, the NCPG provides the equivalent amount of electricity produced by the Project in the baseline.

1.15 Compliance with Laws, Statutes and Other Regulatory Frameworks

The project complies with all Chinese relevant laws and regulations. Mainly include:

1. Renewable Energy Law of the People's Republic of China⁵;

According to the article 2 and 4 of this law, the State lists the development and utilization of nonfossil energy such as wind energy, solar energy, hydro energy, biomass energy, geothermal energy, and ocean energy as a priority area for energy development. CMM power generation belongs to non-fossil energy, so the utilization of CMM belongs to the field encouraged by the State. Thus, the project complies with this law.

2. Opinions of the General Office of the State Council on Further Accelerating the Extraction and Utilization of Coalbed Methane (Coal Mine Gas)⁶;

According to the paragraph 3 article 8 of this regulation, in order to adapt to the new situation of coal mine gas prevention and control and the development of coalbed methane industrialization, State encourage the CMM utilization for power generation. Thus, this project belongs to the field encouraged by the State and complies with this regulation.

3. Chinese National Coalmine Safety Regulation⁷;

4. In order to reduce the occurrence of major accidents in coal mines, the government has formulated these regulations. This project uses coal mine gas to generate electricity, effectively utilizes coal mine gas and reduces the risk of coal mine explosion, so the project complies with this regulation. Notice of the National Development and Reform Commission on the issuance of the twelfth Five-Year Plan for The Development and Utilization of Coalbed Methane (Coal Mine Gas)⁸.

In order to speed up the development and utilization of coalbed methane (coal mine gas), ensure the safe production of coal mines, increase the supply of clean energy, promote energy conservation and emission reduction, this Notice was published. This project utilizes the coal mine gas for power generation, which complies with this Notice.

The project obtained the approval letters from governmental authorities: Xiyang County Bureau of Energy, Jinzhong City Bureau of Ecology and Environment. The two approvals well

⁵ http://www.gov.cn/ziliao/flfg/2005-06/21/content_8275.htm

⁶ http://www.gov.cn/zhengce/content/2013-09/18/content_2540.htm

⁷ <https://www.mem.gov.cn/fw/flfgbz/gz/>

⁸ https://www.ndrc.gov.cn/xxgk/zcfb/ghwb/201112/t20111231_962121.html?code=&state=123

demonstrate that local government permits the construction of the project. Consequently, the project is compliance with laws, status and other regulatory frameworks.

1.16 Double Counting and Participation under Other GHG Programs

1.16.1 No Double Issuance

Is the project receiving or seeking credit for reductions and removals from a project ac

Activity under another GHG program?

☐ Yes ☒ No

1.16.2 Registration in Other GHG Programs

Is the project registered or seeking registration under any other GHG programs?

☐ Yes ☒ No

1.16.3 Projects Rejected by Other GHG Programs

Has the project been rejected by any other GHG programs?

☐ Yes ☒ No

1.17 Double Claiming, Other Forms of Credit, and Scope 3 Emissions

1.17.1 No Double Claiming with Emissions Trading Programs or Binding Emission Limits

Are project reductions and removals or project activities also included in an emissions trading program or binding emission limit? See the VCS Program Definitions for definitions of emissions trading program and binding emission limit.

☐ Yes ☒ No

The project is not included in any emissions trading program or any other mechanism that includes GHG allowance trading. The GHG emission reductions and removals generated by the project will not be used for compliance under such programs or mechanisms.

The project does not reduce GHG emissions from activities that are included in an emissions trading program or any other mechanism that includes GHG allowance trading. In fact, China's national emissions trading scheme (ETS) only includes high-emission and energy intensive industries which are categorized as key emission enterprises by the provincial government⁹, and the project proponent is not included in the list of key emission enterprises in the national

⁹ https://www.gov.cn/zhengce/zhengceku/202402/content_6930138.htm

carbon emissions transaction quota management in 2022 in Shanxi Province¹⁰. The project proponent and the project activity will not be included in the national ETS; no emission cap will be enforced on the project proponent or the project activity, nor can the project proponent participate in carbon transactions in the national ETS. Therefore, 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.

Besides, the project proponent had signed a declaration of “No Double Counting Statement” and declaration of “Not involved in other GHG scheme” to promise that no double count emissions reductions will appear in the project. Hence, it is confirmed that the emission reductions will not be double counted.

1.17.2 No Double Claiming with Other Forms of Environmental Credit

Has the project activity sought, received, or is planning to receive credit from another GHG-related environmental credit system? See the VCS Program Definitions for definition of GHG-related environmental credit system.

☐ Yes ☒ No

1.17.3 Supply Chain (Scope 3) Emissions

Do the project activities specified in Section 1.12 affect the emissions footprint of any product(s) (goods or services) that are part of a supply chain?

☐ Yes ☒ No

1.18 Sustainable Development Contributions

The project activity implemented by the project owner can contribute to sustainable development as defined by and tracked against the United Nations Sustainable Development Goals (SDGs).

SDG 7 Affordable and Clean Energy: The project captures and utilizes coal mine gas for power generation and accordingly substitute equivalent electricity from thermal power. This contributes to achieve China’s stated sustainable development priorities “By 2030, the proportion of non-fossil energy consumption will reach about 25%”.

SDG 8 Decent Work and Economic Growth: The project activity can provide employment opportunities for the operation of the project activity. This contributes to one of China’s actions for promoting sustainable developing: “by 2030, achieve full and productive employment and

¹⁰ https://sthjt.shanxi.gov.cn/gggs/gsl/202210/t20221021_7292506.shtml

decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value”.

SDG 13 Climate Action: The project is to utilize the extracted CMM with low concentration methane concentration to produce electricity to avoid methane emissions. This contributes to achieve one of China’s stated sustainable development priorities “Actively adapt to climate change and strengthen resistance capacity to climate risks in agriculture, forestry, water resources and other key fields, as well as cities, coastal regions and ecologically vulnerable areas”.

1.19 Additional Information Relevant to the Project

1.19.1 Leakage Management

There is no leakage management plan and implementation of leakage and risk mitigation measure for the project.

1.19.2 Commercially Sensitive Information

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

1.19.3 Further Information

Not applicable.

2 SAFEGUARDS AND STAKEHOLDER ENGAGEMENT

2.1 Stakeholder Engagement and Consultation

2.1.1 Stakeholder Identification

Stakeholder Identification

The stakeholders information is described below:

Item		Distribution		Quantity	Percentage
Gender	Male			30	60%
	Female			20	40%

	Age	<30	12	24%
		31-40	25	50%
		41-50	6	12%
		>50	7	14%
	Education	Junior high school or below	25	50%
		Senior high school	13	26%
		College or above	12	24%
	Occupation	Management personnel	4	8%
		Worker	15	30%
		Farmer	20	40%
		Civil servant	7	14%
		Unspecified	4	8%
Legal or customary tenure/access rights	NA.			
Stakeholder diversity and changes over time	The project has no impact on thesocial, economic, and cultural diversity within stakeholder groups.			
Expected changes in well-being	The project is expected to improve local environment, provide work opportunities.			
Location of stakeholders	Villages and coal mine nearby and local government.			
Location of resources	Villages and coal mine nearby and local government.			

2.1.2 Stakeholder Consultation and Ongoing Communication

Date of stakeholder consultation	08-Sep-2021
Stakeholder engagement	Local stakeholder consultation was conducted by project owner

process	during the project preparation stage. 50 questionnaires were distributed to local residents and government officials on 08-Sep-2021. The questionnaire was designed to assess the project impacts on the local environment and social economic development.			
Consultation outcome	Questions	Attitude or Opinion	Amount	Percentage
	1.Do you know about the proposed project?	Quite much	38	76%
		Heard of	10	20%
		Nothing	2	4%
	2.What is your attitude towards the project construction?	Supportive	46	92%
		Against	0	0%
		Indifferent	4	8%
	3.What is the most probable environmental impact do you think the project will cause after the construction finish? (multiple choice)	None	38	76%
		Air pollution	1	2%
		Water pollution	0	0%
		Noise pollution	2	4%
		Harm to indigenous animals and plants	0	0%
		No idea	9	18%
	4.Do you think the project operation will bring about more benefits than loss?	Yes	44	88%
		No	2	4%
		About the same	4	8%

	5.Are you willing to participate in the project construction or operation?	Yes	40	80%
		No	2	4%
		Indifferent	8	16%
	6.What influence do you think the project will bring about to you and your family?	Positive	44	88%
		None	6	12%
		Negative	0	0%
	7.Do you think the project operation will affect the production safety of the coal mine?	Positive effect	47	94%
		None	3	6%
		Negative effect	0	0%
	As per answers to questionnaires above, local stakeholders are supportive of construction of the project. A majority of surveyed stakeholders think the project will improve local economic development without adverse environmental impact. The survey shows that the stakeholders are supportive to the project.			
Ongoing communication	In order to collect the opinions of local stakeholders during the project operation period, the project owner will set up an ongoing communication mechanism by holding stakeholder meetings, distributing questionnaires or communicating with stakeholders by phone or others.			
Stakeholder input	No negative comments were received and the project design was not updated			

2.1.3 Free Prior and Informed Consent

Obtaining consent	The project was approved by two authoritative government agencies, the local Development and Reform Commission and the Ecological and Environmental Protection Bureau. In addition, in a questionnaire survey of stakeholders, no one objected to the construction of the project. There is no
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	on going or unresolved conflicts.
Outcome of FPIC	Local stakeholders are supportive of construction of the project. A majority of surveyed stakeholders think the project will improve local economic development without adverse environmental impact. The survey shows that the stakeholders are supportive to the project. here is no objection.

2.1.4 Grievance Redress Procedure

Development process	PP prepared the process which was supplied to stakeholders and suggestions were collected. The process was modified and reassessed by stakeholders before final developed.
Grievance redress procedure	After receiving the opinions of the stakeholders, the project owner will conduct a preliminary review, and after the preliminary review finds that the problem exists, a meeting will be held in the group. The meeting will invite the company's senior leaders and stakeholders representatives to participate in the meeting, and discuss the solution together. If they are not satisfied with the company's solution, the stakeholder can still file a lawsuit or report it to the competent government authority.

2.1.5 Public Comments

Besides, as per section 3.18 of the VCS Standard (Version 4.5), all projects are subject to a 30-day public comment period. The date on which the project is listed on the project pipeline marks the beginning of the project's 30-day public comment period. This project will be open for public comment on the verra website. The project shall be listed, and comments shall be incorporated later.

Comments received	Actions taken

2.2 Risks to Stakeholders and the Environment

	Risks identified	Mitigation or preventative measure taken
Risks to stakeholder participation	No risk identified	The mechanism for on-going communication with local stakeholders has been set up.
Working conditions	No risk identified	Requirements for working conditions have been described in the project design and management manual.
Safety of women and girls	No risk identified	Workers including women will be employed during construction and operation period and the project has no impact to safety of children.
Safety of minority and marginalized groups, including children	No risk identified	The project captures and utilizes coal mine gas for power generation and has no impact to safety of minority and marginalized groups, including children.
Pollutants (air, noise, discharges to water, generation of waste, release of hazardous materials)	No risk identified	Measures has been identified in EIA of the project to mitigate environment pollution caused by construction and operation of the project, which will be implemented as per environment pollution related laws and regulations and supervised by local government.

2.3 Respect for Human Rights and Equity

2.3.1 Labor and Work

Discrimination and sexual harassment	A search for keywords related to sexual harassment on https://www.court.gov.cn/index.html, a website of the Supreme People's Court of the People's Republic of China, did not find any information; Baidu, China's largest search engine, also failed to find any information. At present, Chinese residents generally use "we media" (such as Tiktok and Weibo) to disseminate information, and there are no negative reports about the project owners. The company has established strict internal systems and will always operate in accordance with the legal requirements of China.
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Management experience	The project is equipped with master students and experienced senior technical personnel, with rich practical experience and theoretical level
Gender equity in labor and work	There is little difference in the number of male and female employees in the project. At present, the ratio of men to women is 14/16, and their salaries are all at the same level
Human trafficking, forced labor, and child labor	All employees are recruited through open recruitment, and all are enrolled in China's social security system. In addition, China's tax authorities, audit departments, fire safety departments, police departments, environmental protection departments will conduct regular and random spot checks on the project site, so the project is unlikely to employ child labor or other victims.

2.3.2 Human Rights

The project has a strict labor schedule and does not violate any employee rights. In addition, China has established a sound labor arbitration and litigation mechanism to fully protect the rights and interests of workers.

2.3.3 Indigenous Peoples and Cultural Heritage

The project captures and utilizes coal mine gas for power generation to improve the local environment and will encourage employees to preserve and protect cultural heritage as part of project activities.

2.3.4 Property Rights

Rights to territories and resources	The project captures and utilizes coal mine gas for power generation to improve the local and resources environment and has no legal or customary tenure/access rights to territories, property, including collective and/or conflicting rights, held by stakeholders.
Respect for property rights	The project captures and utilizes coal mine gas for power generation to improve the local and resources environment and has no legal or customary tenure/access rights to territories, property, including collective and/or conflicting rights, held by stakeholders.

2.3.5 Benefit Sharing

Process used to design the benefit sharing plan	The project does not impact property rights.
Summary of the benefit sharing plan	The project does not impact property rights.
Approval and dissemination of benefit sharing plan	The project does not impact property rights.

2.4 Ecosystem Health

	Risks identified	Mitigation or preventative measure taken
Impacts on biodiversity and ecosystems	No risk identified	The project captures and utilizes coal mine gas for power generation which will not cause any natural risks. According to the environmental impact assessment, the surrounding area of the project is mostly wasteland, so there is no impact on the ecological environment of vegetation. During the excavation and leveling phase of construction, appropriate protection measures have been taken to prevent human activities, vehicle operation, trampling, and debris from interfering with and damaging biodiversity and ecosystems. Moreover, with a series of ecological protection and restoration measures implemented in parallel with the construction of the project, a new ecosystem centered on the factory and surrounded by shelterbelts has been formed, thereby improving the ecosystem and biodiversity of the site and surrounding areas.
Soil degradation and soil erosion	No risk identified	The excavation construction during project construction will disturb the

		original landform. According to the environmental impact assessment, the construction site of the project is equipped with covering, shielding, compaction and other protective measures, which can prevent soil wind and water erosion to a certain extent.
Water consumption and stress	No risk identified	The waste water generated by the project is collected by the sedimentation tank and used for greening, etc., and is not discharged.
Usage of fertilizers	No risk identified	The project does not involve the use of fertilizer, so it is not applicable.

2.4.1 Rare, Threatened, and Endangered species

Is the project located in or adjacent to habitats for rare, threatened, or endangered species?

☐ Yes

☒ No

2.4.2 Introduction of species

Species introduced	Classification	Justification for use	Adverse effects and mitigation
/	/	/	/

2.4.3 Ecosystem conversion

Not applicable as the project is not a ARR, ALM, WRC or ACoGS project.

3 APPLICATION OF METHODOLOGY

3.1 Title and Reference of Methodology

The following methodology and tools are applicable to the project activity.

Type (methodology, tool or module).	Reference ID, if applicable	Title	Version

Methodology	ACM0008	Abatement of methane from coal mines	08.0
Tool	02	Combined tool to identify the baseline scenario and demonstrate additionality	07.0
Tool	05	Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation	03.0
	07	Tool to calculate the emission factor for an electricity system	07.0
Tool	24	Common practice	03.1
Tool	27	Investment analysis	12.0

3.2 Applicability of Methodology

Methodology ID	Applicability condition	Justification of compliance
ACM0008	This methodology applies to project activities that aim for the use and/or destruction of the methane extracted/obtained from a working or abandoned coal mine(s). The project activities include any of the following methods to treat the methane captured: (a) The methane is destroyed without energy production, for example through flaring; (b) The methane is used to produce energy. This may include electricity, heat, vehicle fuel, etc.	Applicable. The project uses the low concentration coal mine methane (CMM) from Fenghui coal mine for power generation to supply electricity to the coal mines where the Project is located. Therefore, the project is applicable to condition (b).
	Emission reductions can be claimed for displacing or avoiding energy from other sources	Applicable. The emissions reduction of the project comes from two sources: 1) Methane (CH₄) emissions as a result of the previously vented gas that will be captured and destroyed in the project scenario; 2) CO₂ emissions

		from the production of the equivalent amount of electricity replaced by the Project that would otherwise have been purchased from the NCPG.
	Methane used in the project activities shall be extracted using the following techniques: (a) Surface drainage boreholes to capture coal bed methane (CBM) or methane from open cast mines; (b) Underground boreholes in the mine, surface goaf wells, underground boreholes, gas drainage galleries or other goaf gas capture techniques, including gas from sealed areas, to capture coal mine methane (CMM); (c) Mine ventilation system to dilute and remove ventilation air methane (VAM); (d) Surface drainage boreholes in the case of sealed abandoned mines or ventilation system in the case of ventilated mines to capture abandoned mine methane (AMM).	Applicable. The project uses CMM from Underground boreholes in the mine to capture pre mining CMM and surface goaf well, underground boreholes, gas drainage galleries or other goaf gas capture techniques, including gas from sealed areas, to capture coal mine methane (CMM). The Project activity does not involve the extraction or utilization of CBM, VAM or AMM. Therefore, the project is applicable to condition (b).
	The remaining share of the methane, to be diluted for safety reason, may still be vented.	Applicable. The project involves the capture and utilization of CMM for power generation at the operational Fenghui coal mine where the baseline is the total atmospheric release of the methane. The remaining unused share of the methane is vented for safety reasons.
	In the case of open cast mines, in addition to the conditions listed above, project activities should meet the following requirements: (a) The mines should have had a working mining concession for at least three years prior to the start of project;	Applicable. The Fenghui coal mine the project involved is not a case of open cast mine.

	(b) Only pre-mining drainage from wells placed within the area to be mined are eligible for crediting; (c) For the calculation of emission reductions, all provisions for CBM should be followed for the open cast mine methane.	
	The methodology does not apply to project activities with any of the following features: (a) Capture/use of virgin coal bed methane, e.g. methane extracted from coal seams for which there is no valid coal mining concession; (b) Use CO₂ or any other fluid/gas to enhance CBM drainage before mining takes place; (c) Methane extraction from abandoned mines that are flooded due to regulation.	The project does not involve the extraction or utilization of CBM. The project does not use CMM from open cast mining, or abandoned mines.
	The methodology does not apply to project activities that involve use and/or destruction of CBM or OCM if the baseline scenario identification resulted in partial use and/or destruction of CBM or OCM.	The project does not involve use and/or destruction of CBM or OCM.
	Emission reductions due to the use and/or destruction of CBM or OCM cannot be claimed if surface drainage to capture CBM or methane from open cast mine(s) is used within the project boundaries prior to the implementation of the project activity.	The project does not involve use and/or destruction of CBM or OCM.
	This methodology applies to project activities that aim for the use and/or destruction of the methane extracted/obtained from a working or abandoned coal mine(s). The project activities include any of the following methods to treat the methane captured: (a) The methane is destroyed without energy production, for example through flaring; (b) The methane is used to produce energy. This may include electricity, heat, vehicle fuel, etc.	Applicable. The project uses the low concentration coal mine methane (CMM) from Fenghui coal mine for power generation to supply electricity to the coal mines where the Project is located. Therefore, the project is applicable to condition (b).

Combined tool to identify the baseline scenario and demonstrate additionality	The tool is applicable to all types of proposed project activities. However, in some cases, methodologies referring to this tool may require adjustments or additional explanations as per the guidance in the respective methodologies. This could include, inter alia, a listing of relevant alternative scenarios that should be considered in Step 1, any relevant types of barriers other than those presented in this tool and guidance on how common practice should be established	Applicable. The project is a CMM power generation project.
Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation	If emissions are calculated for electricity consumption, the tool is only applicable if one out of the following three scenarios applies to the sources of electricity consumption: (a) Scenario A: Electricity consumption from the grid. 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; (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 (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. Only when the project is out of operation or abnormal operation, there is a small amount of electricity consumed by the project from the coal mine which is supplied by North China Power Grid(NCPG) (Scenario A).

	This tool can be referred to in methodologies to provide procedures to monitor amount of electricity generated in the project scenario, only if one out of the following three project scenarios applies to the recipient of the electricity generated: (a) Scenario I: Electricity is supplied to the grid; (b) Scenario II: Electricity is supplied to consumers/electricity consuming facilities; or (c) Scenario III: Electricity is supplied to the grid and consumers/electricity consuming facilities.	Applicable. The electricity generated by the project is supplied to the coal mine and the surplus electricity is delivered to NCPG (Scenario III).
	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.	No captive renewable power generation technologies are installed to provide electricity in the project activity, in the baseline scenario or to sources of leakage.
Tool to calculate the emission factor for an electricity system	This tool may be applied to estimate the OM, BM and/or CM when calculating baseline emissions for a project activity that substitutes grid electricity that is where a project activity supplies electricity to a grid or a project activity that results in savings of electricity that would have been provided by the grid (e.g. demand-side energy efficiency projects)	Applicable. The project utilizes the low concentration coal mine methane (CMM) from Fenghui coal mine for power generation to supply electricity to the coal mine that would otherwise be purchased from NCPG. Therefore the tool is applied to estimate the OM, BM and /or CM when calculating baseline emissions for the project.
	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 suboptions under the step 2 of the tool are available	In the host country as off-grid power generation is not significant. Therefore, emission factor for the project electricity system is

	to the project participants, i.e. option II a and option II b. If option II a 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.	calculated only for the grid power plants. Thus, this applicability criterion is satisfied.
	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.	Applicable. The project electricity system is located in a non-Annex I country.
	Under this tool, the value applied to the CO ₂ emission factor of biofuels is zero.	The project is not involved in biofuels.
Common practice	This methodological tool is applicable to project activities that apply the methodological tool “Tool for the demonstration and assessment of additionality”, the methodological tool “Combined tool to identify the baseline scenario and demonstrate additionality”, or baseline and monitoring methodologies that use the common practice test for the demonstration of additionality.	Since the project activity is using “Combined tool to identify the baseline scenario and demonstrate additionality”, the tool is applicable.
	In case the applied approved baseline and monitoring methodology defines approaches for the conduction of the common practice test that are different from those described in this methodological tool, the requirements contained in the methodology shall prevail.	The baseline and monitoring methodology refers to “Combined tool to identify the baseline scenario and demonstrate additionality”. It required that the latest version of the “Methodological tool: Common practice” available on the UNFCCC website shall

		be applied. Therefore, this tool is applicable.
Investment analysis”	This methodological tool is applicable to project activities that apply the methodological tool “Tool for the demonstration and assessment of additionality”, the methodological tool “Combined tool to identify the baseline scenario and demonstrate additionality”, the guidelines “Non-binding best practice examples to demonstrate additionality for SSC project activities”, or baseline and monitoring methodologies that use the investment analysis for the demonstration of additionality and/or the identification of the baseline scenario.	Since the project activity is using “Combined tool to identify the baseline scenario and demonstrate additionality”, the tool is applicable.
	In case the applied approved baseline and monitoring methodology contains requirements for the investment analysis that are different from those described in this methodological tool, the requirements contained in the methodology shall prevail.	The baseline and monitoring methodology refers to “Combined tool to identify the baseline scenario and demonstrate additionality”. Therefore, this tool is applicable.

3.3 Project Boundary

The spatial extent of the project boundary comprises:

(a) The coal mine from where the methane is extracted;

For the project, the Fenghui coal mine is the coal mine from where the methane extracted.

(b) All equipment installed and used for the extraction, purification, compression, and storage of methane and transport to an off-site user;

For the project, there is no equipment for compression, CMM storage and transport to offsite user. Facilities for CMM drainage and extraction were installed prior to the implementation of the project activity. They are owned by the coal mine and are used primarily to maintain underground mining safety. Since they are not installed and used as part of the project activity, they are not considered in both the investment analysis and baseline calculations.

(c) Facilities that are installed and used as part of the project activity for flaring, flameless oxidation, captive power and heat generation, gas production and transportation;

For the project, CMM delivery system, power generation units and waste heat recovery units installed and used in the Project.

(d) Power plants connected to the electricity grid, where the project activity exports power to the grid and emission reductions are claimed for the displacement of grid emissions, as per the definition of project electricity system and connected electricity system given in the latest version of the “Tool to calculate the emission factor for an electricity system”.

For the project, CCPG and ECPG supply electricity to CSPG, thus power plants connected to CSPG, CCPG and ECPG were included in the project boundary.

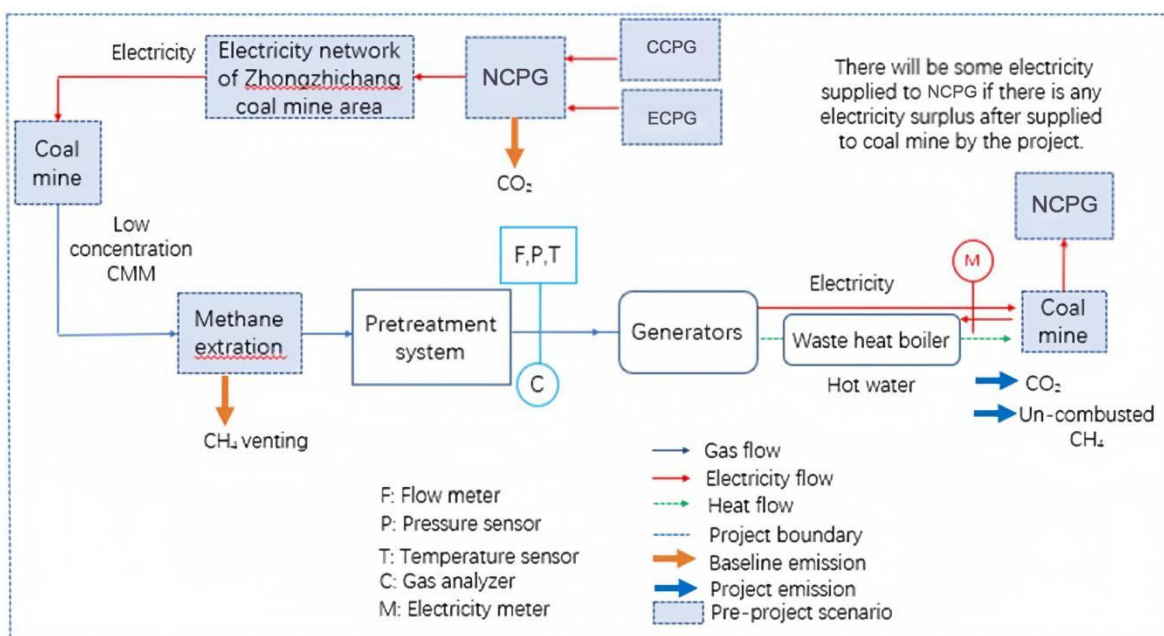


Figure 3-1 Project boundary

The main emission sources and gases included in the project boundary are listed in Table 6 below:

Table 3-1 Emission sources included in or excluded from the project boundary

Source		Gas	Include d?	Justification/Explanation
Baseline scenario	Methane emissions as a result of venting	CH ₄	Y	Main emission source. All CMM captured and sent to electricity generators would be vented in the baseline scenario.
	Emissions from	CO ₂	N	No flaring or energy use in the

Source		Gas	Include d?	Justification/Explanation
	destruction of methane in the baseline			baseline scenario.
		CH ₄	N	Excluded for simplification.
		N ₂ O	N	Excluded for simplification.
	Electricity generation (electricity provided to the grid and/or to the captive user), heat and vehicle fuel use	CO ₂	Y	Only included if the project activity is to replace electricity from the grid, and emission reductions are claimed for such displacement.
		CH ₄	N	Excluded for simplification.
		N ₂ O	N	Excluded for simplification.
Project scenario	On-site electricity and fuel consumption due to the project activity, including transport of the gas	CO ₂	Y	Electricity consumed when the Project is shutdown. During operation, all auxiliary demand can be met by electricity generated.
		CH ₄	N	Excluded for simplification. This emission source is assumed to be very small.
		N ₂ O	N	Excluded for simplification. This emission source is assumed to be very small.
	Emissions from methane destruction	CO ₂	Y	Emissions from the combustion of CMM in gas engines in the project activity will be considered.
	Fugitive emissions of unburned methane	CH ₄	Y	Unburned methane from gas engines will be considered.
	Fugitive methane emissions from on-site equipment	CH ₄	N	Excluded for simplification. This emission source is assumed to be very small.

3.4 Baseline Scenario

According to methodology ACM0008, the latest approved version of the “Combined tool to identify the baseline scenario and demonstrate additionality” is applied to identify the baseline scenario.

Step 0: Demonstration whether the proposed project activity is the first-of-its-kind

The project activity is not the first-of-its-kind.

Step 1: Identification of alternative scenarios

This Step serves to identify all alternative scenarios to the proposed CDM project activity(s) which can be the baseline scenario.

Sub-step 1a: Define alternative scenarios to the proposed project activity

This project description identifies all alternative scenarios that provide the same output (service or product) as the proposed VCS project activity from following aspects.

Options to handle methane

According to ACM0008 (version 08.0), the baseline scenario alternatives should include all feasible options to handle methane to comply with safety regulations. These alternatives may include, inter alia:

A1: Extraction of methane prior to the mining (CBM/OCM);

A2: Extraction of methane during and after the mining (CMM);

A3: Extraction of methane through ventilation during the mining;

A4: Extraction of methane from the abandoned mine;

A5: Possible combinations of options A1 to A4 with the relative shares of gas specified.

Options to deal with methane

The baseline scenario alternatives should include all feasible options to deal with methane. These options could include:

B1 Venting of methane;

B2 Flaring of methane;

B3 Use of methane for energy production, e.g. electricity generation, heat generation, vehicle fuel, gas production, etc.

B4 Possible combinations of options B1 to B3 with the relative shares of gas specified.

Options for energy production

All possible options to generate electricity at the coal mines in the Project include:

- P1. Equivalent quantity of electricity supply from NCPG;
- P2. The proposed project activity not undertaken as a VCS project activity;
- P3. Construction of a coal-fired captive power plant with equivalent power supply; or construction of a captive power plant using other fossil fuels;
- P4. Power generation using renewable energy resources e.g. hydro, solar or wind power.

Sub-step 1b. Consistency with mandatory applicable laws and regulations:

Any options for CMM management and use that do not meet with local legal or regulatory requirements should be eliminated.

a. Eliminate options to handle methane

According to the Chinese National Coalmine Safety Regulation (2016), the coal mine must have a complete independent ventilation system and gas drainage system to ensure the safety production of underground. Therefore, the pumping system must be established in this project. Moreover, under normal circumstances, the pre-mining and post-mining extraction are carried out through the same set of pumping system, so it is difficult to separate the pre-mining and postmining extraction areas. Therefore, it is not in accordance with the regulations to carry out premining extraction, during and post-mining extraction separately, and the combination of the two methods must be adopted. Otherwise, the concentration of methane through ventilation during the mining is below 1% to ensure the safety production of underground, it cannot be used for electricity generation. And since the Fenghui coal mine is not an abandoned mine, thus, option A1, A2, A3 and A4 is hence excluded.

In conclusion, option A5 possible combinations of options A1 to A2 is in compliance with legal and regulatory requirements to handle methane.

b. Eliminate options to deal with methane

The extracted CMM utilized in the project is low concentration methane, which is below 30%. According to the Chinese National Coalmine Safety Regulation (2016), CMM with methane concentration below 30% is prohibited to be used for safety consideration. However, since then, the technology of low concentration CMM utilization has been increasingly developed and widely applied in China. Currently low concentration methane utilization technology is rapidly maturing in China and CMM with a methane concentration above 6% can be safely used for power generation with domestically available technology. On 21-January-2010, the Decision on the Revision of Certain Aspects of the <Coalmine Safety Regulation> was released by the State Administration of Work Safety, stating that CMM with methane concentration of below 30% is forbidden to be combusted directly, but can be either vented or utilized for power generation by internal combustion engines.

According to the above regulations, flaring of methane with direct combustion of methane concentration of below 30% is prohibited. Therefore, Option B2 is eliminated.

Regarding option B3 Use of methane for energy production, e.g. electricity generation, heat generation, vehicle fuel, gas production, etc

The heat demand of the mining area has been able to be met by the boiler of the waste heat boiler of the unit, and there is no additional heat demand, no need for additional heating, so option B3 use of methane for heat generation is excluded.

The concentration and flow of CMM in coal mines are unstable, and the CMM gas sold to the high-pressure natural gas pipeline network should be purified to CH₄ concentration greater than 95%. The project is located in Xiyang County, the construction of pipeline project and investment are relatively large. Therefore, it is not suitable to transport to gas pipelines to be used as fuel for vehicles or gas production. Meanwhile, according to “the Urban Gas Specification” (GB50028-93), as urban gas, methane concentration of CMM should reach 36.8%~78.9%. so option B3 use of methane for energy generation, e.g. vehicle fuel, gas production is excluded.

As option B4 possible combinations of options B1 to B3 with the relative shares of gas specified, according to analyse above, the possible combinations are option B1 venting of methane and option B3 use of methane for electricity generation. However, it is contradictory for methane venting and methane use for electricity, thus, option B4 is excluded.

In conclusion, options B1 venting of methane and B3 use of methane for electricity generation are the applicable scenarios in compliance with legal and regulatory requirements.

c. Eliminate options for energy production

This project is to build a 24 MW CMM-fired power plant. According to Chinese power regulation, the construction of coal-fired power plant with a capacity of 135MW or below is prohibited in the national grid coverage area. Therefore, construction of a power plant with the same capacity as the Project using coal, diesel oil or natural gas as fuel would be prohibited. Option P3 is hence excluded.

In conclusion, options P1, P2 and P4 for energy production are in compliance with legal and regulatory requirements.

As above, the baseline alternative options that are technically feasible and comply with all legal and regulatory requirements are listed below:

Scenario ID	CMM extraction	CMM treatment	Energy production
Scenario 1 (A5+B1+P1)	Combinations of options A1 to A2	Venting	Equivalent quantity of electricity supply from NCPG
Scenario 2 (A5+B1+P2)	Combinations of options A1 to A2	Venting	The proposed project activity not undertaken as a VCS

			project activity
Scenario (A5+B1+P4)	3	Combinations of options A1 to A2	Venting
Scenario (A5+B3+P1)	4	Combinations of options A1 to A2	Use of methane for electricity production
Scenario (A5+B3+P2)	5	Combinations of options A1 to A2	Use of methane for electricity production
Scenario 6 (A5+B3 + P4)		Combinations of options A1 to A2	Use of methane for electricity production

Step 2: Barrier analysis

Step 2a: Identify barriers that would prevent the implementation of alternative scenarios

Scenario 1: This is the continuation of business as usual and thus faces no barrier. It remains as a possible baseline scenario alternative.

Scenario 2: This is a conflicted scenario for the methane is venting conflicted with methane utilized for electricity generation.

Scenario 3: This scenario involves electricity generation using renewable energy sources. The Fenghui mining area, however, is shortage of hydropower, wind power and geothermal resources. In addition, the project site is located in coal mine area, no adequate rice, corn, cotton, peanut or any other biomass materials supplied for a biomass power.

Scenario 4: This is a conflicted scenario for use of methane for electricity production conflicted with equivalent quantity of electricity supply from NCPG.

Scenario 5: This is the project activity not implemented as a VCS project. This scenario faces investment barriers, which will be discussed in section 3.5.

Scenario 6: As shown scenario 3. The electricity generation using renewable energy sources in local area is facing kinds of barrier.

Step 2b: Eliminate alternative scenarios which are prevented by the identified barriers Based on step 2a, scenarios 2, 3, 4 and 6 are excluded, the scenarios to form the baseline scenario alternative that do not face barriers are:

Scenario ID	CMM extraction	CMM treatment	Energy production
Scenario 1 (A5+B1+P1)	Combinations of options A1 to A2	Venting	Equivalent quantity of electricity supply from NCPG
Scenario 5 (A5+B3+P2)	Combinations of options A1 to A2	Use of methane for electricity production	The proposed project activity not undertaken as a VCS project activity;

There are no barriers identified that would prevent the implementation of either of the two alternative scenarios above. Therefore, neither of the two combined scenarios is eliminated by the step 2. The two combined scenarios need to be further discussed in section 3.5 Step 3.

3.5 Additionality

3.5.1 Regulatory Surplus

Is the project registered or seeking registration in an UNFCCC Annex 1 or Non-Annex 1 country?

☐ Annex 1 country

☒ Non-Annex 1 country

Are the project activities mandated by any law, statute, or other regulatory framework?

☐ Yes

☒ No

3.5.2 Additionality Methods

Investment Analysis

According to “Combined tool to identify the baseline scenario and demonstrate additionality”, the objective of Step 3 is to compare the economic or financial attractiveness of the alternative scenarios remaining after Step 2 by conducting an investment analysis. The latest approved version of the “Methodological tool: Investment analysis”, shall be considered when applying this step.

The alternative scenarios of the project include:

Scenario 1 is the business as usual scenario, venting CMM does not create economic benefits, but no investment required for this scenario.

Scenario 5 is CMM used for electricity generation, i.e., implement the Project without VCS. For Scenario 1, no investment is needed for the project developer, then use either the NPV or the IRR as financial indicators in the analysis”. The IRR is chosen as the financial indicators by the project.

According to clause 1.11 of “Interim Rules on Economic Assessment Electrical Engineering Retrofit Projects”, for greenfield or retrofit projects in Chinese electric power industry, the financial benchmark is 8% for project IRR (after tax)¹¹ or 10% for equity IRR (after tax). This project is a power generation plant, and the benchmark 8% for the project IRR can be applied to the project. In addition, this benchmark is also applied in the investment analysis of the Feasibility Study Report (FSR). The project FSR was approved by Development and Reform Commission (DRC) of Jinzhong City.

Comparison of IRR for the project and the financial benchmark:

The main parameters for calculation of financial indicators are shown in the following table:

Table 3-2 Main parameters for financial analysis calculation

Item	Unit	Value	Source
Installed capacity	MW	24	FSR
Total static investment	CNY	193,980,000	FSR
Working capital	CNY	1,720,000	FSR
Annual operating hour	Hour	7,200	FSR
Plant load factor	%	80%	FSR
Annual electricity generation	MWh/year	172,800	FSR
Power self-consumption ratio	%	5.1%	FSR
Annual electricity exported	MWh/year	163,987	FSR
Electricity Tariff (including VAT)	CNY/kWh	0.448	FSR
Income tax	%	25	FSR
Value added tax (electricity)	%	17	FSR
Municipal maintenance and construction tax	% of VAT	5	FSR
Surcharge for education	% of VAT	5	FSR

¹¹ P74 Table 2.13-2, Economic Evaluation Method and Parameters for Construction Projects issued by National Development and Reform Commission (DRC) and Ministry of Construction in 2006 (The third Edition).

Depreciation period		Year	15	FSR
Scrap value of fixed assets		%	5	FSR
Annual operation and management (O&M) cost	Total	CNY	40,402,177	FSR
	Annual maintenance cost	CNY	9,699,000	FSR
	Annual staff salary and welfare	CNY	7,595,000	FSR
	Annual insurance cost	CNY	969,900	FSR
	Annual material cost	CNY	9,019,301	FSR
	Annual other cost	CNY	13,118,976	FSR
Project operational lifetime		Year	10	FSR
Expected VER Price		CNY/tCO ₂ e	21	Estimated

Table 9 below shows the difference between the Project IRR, with and without the revenue from carbon.

Table 3-3 Comparison of financial indicators with and without the revenue from carbon

Item	Without the revenue from carbon	Benchmark rate	With the revenue from carbon
Project IRR (after tax)	2.17%	8%	12.11%

Sensitivity analysis

The sensitivity analysis is conducted to check whether, under reasonable deviations in four major financial parameters, the Project would remain financially unattractive, i.e. the Project IRR without the revenue from carbon would remain below the benchmark IRR. The four major financial parameters that significantly affect the Project IRR are:

- Total static investment
- Electricity tariff
- Annual O&M cost
- Annual Electricity exported

The impacts of the above parameters on the Project IRR were analyzed. The results of sensitivity analysis of the four indicators are shown in Table 10 and Figure 4.

Table 3-4 Sensitivity analysis of Project IRR to different financial parameters

Hypothetic change	-10%	-5%	0	5%	10%
Total Static Investment	4.44%	3.29%	2.17%	1.06%	-0.01%
Electricity Tariff	-3.04%	-0.17%	2.17%	4.16%	6.00%
Annual O & M Cost	4.74%	3.51%	2.17%	0.68%	-1.03%
Annual Electricity Exported	-0.96%	0.72%	2.17%	3.48%	4.69%

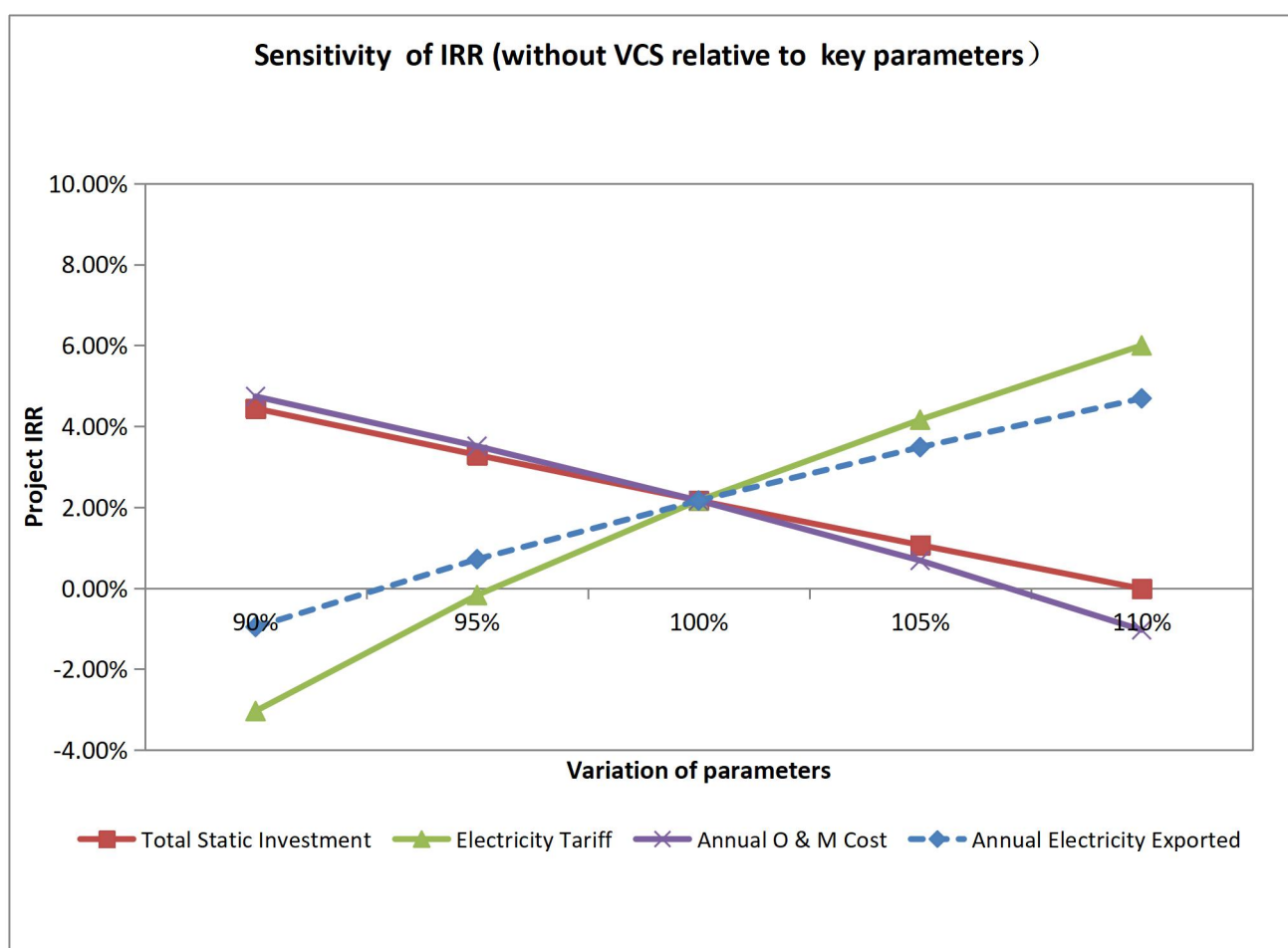


Figure 3-2 Sensitivity analysis of financial indicators of the Project

Table 11 below shows the necessary change in the four major parameters required for the Project IRR without VCUs revenue to reach the benchmark rate, ceteris paribus. All the speculated changes are clearly too large to be realistic.

Table3-5 Critical Point Analysis

Hypothetic Project IRR	Necessary Change in Total Static Investment Alone	Necessary Change in Electricity Tariff Alone	Necessary Change in Annual O&M Cost Alone	Necessary Change in Annual Electricity Exported Alone
Benchmark Rate 8%	-23.04%	15.67%	-23.91%	24.40%

Total static Investment

The Project IRR would reach the benchmark rate of 8% when the total static investment decreases by -23.04%. The static total investment mainly includes equipment purchase cost, installation cost and construction cost. Judging from the growth rate in fixed asset investment, the fixed asset investment has been rising in recent five years (the growth rate was 6.2%, 5.9%, 5.1%, 2.7% and 4.9%). Therefore, it is impossible that the total static investment can be reduced by 18.33% to make the IRR to cross the benchmark.

Electricity Tariff

The Project IRR would reach the benchmark rate of 8% when the tariff increased by 15.67% up to 0.518 CNY/kWh. According to electricity purchase contract, the actual electricity tariff of the project is 0.487 RMB/kwh, therefore, it is unlikely that the tariff would increase by 15.67%.

Annual O&M cost

The Project IRR would reach the benchmark when the Annual O&M cost decreases by 23.91%. Considering about the composition of the Annual O&M cost, the analysis focuses mainly on following items:

Raw material expenses. Based on statistics released by 2022 National Bureau of Statistics of China¹², producer price indices for purchasing goods are increasing in recent five years (108.1, 104.1, 99.3, 97.7 and 111.0) and therefore will not cause significant decrease. Wages and welfare. Based on statistics released by 2022 National Bureau of Statistics of China¹³, the index of wages keep increasing in recent five years (110.0, 110.9, 109.8, 107.6 and 109.7). Therefore, there will not be decrease by 23.91% happened on wages and welfare.

Therefore, the IRR can't reach the benchmark by reducing annual O&M cost.

Annual electricity exported

¹² <https://data.stats.gov.cn/easyquery.htm?cn=C01>

¹³ <https://data.stats.gov.cn/easyquery.htm?cn=C01>

The expected annual electricity generation of the project is 172,800 MWh (i.e., $172,800\text{MWh}=24.0\text{MW} \times 7,200\text{h}$), 5.1% of which will be used for Internal consumption, thus the expected annual electricity exported for the project is 163,987MWh (i.e., $163,990\text{MWh}=172,800\text{MWh} \times (1-5.1\%)$). The annual electricity exported for the Project is determined by a qualified third party based on 1) generator performance and 2) availability and stability of CMM supply. The generators cannot be ignited when the CMM concentration fall below 8%. In addition, at times of low concentration of CMM or fluctuation of CMM volume, some of the generators will only run at partial loads, essentially reducing the effective operation hour assuming full load. Actually, because of instability in CMM power supply, some of generators also run at partial loads. Hence, there is a little possibility that the annual electricity exported can be increased 24.40% to make IRR to reach the benchmark.

Based on the Investment Analysis, the alternative that the project activity not undertaken as a VCS project activity is not financially attractive to the project owner, and it is thus not baseline scenario.

Only one alternative scenario (Scenario 1) is left.

Step 4: Common practice analysis

The Guidelines on “Common Practice (version 03.1)” is followed as below.

Sub-step 4-1: Calculate applicable capacity or output range as +/-50% of the total design capacity or output of the project activity

The total installation capacity of the Project is 24.0 MW. Range of +/- 50% of the capacity is from 12.0 MW to 36.0 MW.

Sub-step 4-2: Identify similar projects (both CDM and non-CDM) which fulfill all of the following conditions:

(a) The projects are located in the applicable geographical area. Since CMM projects located in the same province/region have similar grid structure, geological and transportation conditions and economic development, thus, only the projects located in Shanxi Province, P. R. China are chosen.

(b) The projects apply the same measure as the project activity. Thus, only the projects provided power generation based on CMM are chosen.

(c) The projects use the same energy source/fuel and feedstock as the proposed project activity, if a technology switch measure is implemented by the proposed project activity. Thus, only the projects use CMM are chosen.

(d) The plants in which the projects are implemented produce goods or services with comparable quality, properties and applications areas (e.g., clinker) as the proposed project plant. Thus, only projects with electricity generation are chosen.

(e) The capacity or output of the projects is within the applicable capacity or output range calculated in Step sub-step 4-1. Thus, only projects have a capacity of 12.0MW –36.0MW are chosen.

(f) The projects started commercial operation before the project design document is published for global stakeholder consultation or before the start date of proposed project activity, whichever is earlier for the project activity. Thus, only the projects started commercial operation before 1-December-2022 are chosen.

Sub-step 4-3: Within the projects identified in Sub-step 4-2, identify those that are neither registered CDM/VCS/CCER project activities, project activities submitted for registration, nor project activities undergoing validation. Note their number N_{all} .

For this sub-step, publicly available sources, China Electric Power Yearbook, the website of Shanxi Provincial Development and Reform Commission¹⁴, UNFCCC website¹⁵, Verra website¹⁶, website of Clean Development Mechanism in China¹⁷ and China Certified Emission Reduction Exchange Info-Platform¹⁸ are consulted. No projects in Shanxi Province which fulfill all the conditions in Sub-step 4-2 and Sub-step 4-3 have been identified; therefore, $N_{all} = 0$.

Sub-step 4-4: Within similar projects identified in Sub-step 4-3, identify those that apply technologies that are different to the technology applied in the proposed project activity. Note their number N_{diff} .

Since $N_{all} = 0$, N_{diff} is also 0.

Sub-step 4-5: Calculate factor $F = 1 - N_{diff}/N_{all}$ representing the share of similar projects (penetration rate of the measure/technology) using a measure/technology similar to the measure/technology used in the proposed project activity that deliver the same output or capacity as the proposed project activity.

According to TOOL02 (version 03.1), the project activity is a “common practice” within a sector in the applicable geographical area if the factor F is greater than 0.2 and $(N_{all} - N_{diff})$ is greater than 3.

¹⁴ <https://news.bjx.com.cn/topics/wasifadian/>

¹⁵ <https://cdm.unfccc.int/Projects/projsearch.html>

¹⁶ <https://registry.terra.org/app/search/VCS/All%20Projects>

¹⁷ <https://cdm.ccchina.org.cn/>

¹⁸ <https://cdm.ccchina.org.cn/ccer.aspx>

For the Project, since $N_{all} = 0$ and $N_{diff} = 0$, $N_{all} - N_{diff} = 0$, less than 3. Therefore, the project activity is not a “common practice”.

Outcome of Step 4:

Based on the analysis above, the baseline scenario of the project is:

Combination of e, a and P1: Methane extraction: Combinations of methane extraction of prior to, during and after the mining; Fenghui coal mine was equipped with CMM extraction facilities and all extracted CMM was vented into the atmosphere directly; The electricity consumed at coal mine was supplied from North China Power Grid(NCPG) which is dominated by fossil fuel-fired power plants.

Therefore, the proposed project is additional.

3.6 Methodology Deviations

There is no methodology deviation for the project.

4 IMPLEMENTATION STATUS

4.1 Baseline Emissions

Baseline emissions are determined in two steps:

Step A. Determination of methane eligible for crediting

For the project, all captured CMM is eligible for crediting.

Step B. Determination of baseline emissions.

Baseline emissions would have occurred due to methane destruction, methane venting and use of other fossil fuels that are displaced by methane under the project activity. Baseline emissions due to venting should be discounted in case host country has regulations in place that are restricting the release of methane into the atmosphere.

$$BE_y = BE_{MD,y} + BE_{MR,y} + BE_{Use,y} \quad (1)$$

Where:

BE_y	Baseline emissions in year y (t CO ₂ e)
$BE_{MD,y}$	Baseline emissions from destruction of methane in the baseline scenario in year y (tCO ₂ e)
$BE_{MR,y}$	Baseline emissions from release of methane into the atmosphere in year y that is avoided by the project activity (tCO ₂ e)

$BE_{Use,y}$ Baseline emissions from the production of power replaced by the project activity in year y (tCO₂e)

Methane destruction in the baseline

The baseline scenario does not involve any flaring or usage of CMM, therefore, there is no methane destruction in the baseline. So, destruction of methane in the baseline scenario ($BE_{MD,y}$) is 0.

Methane venting in the baseline

The amount of methane that would have been emitted to the atmosphere in the baseline scenario shall be determined as follows:

$$BE_{MR,y} = \sum_i \sum_s (MT_{PJ,s,i,y} - MT_{BL,s,i,y}) \times GWP_{CH4} \quad (2)$$

Where:

$BE_{MR,y}$ Baseline emissions from release of methane into the atmosphere in year y that is avoided by the project activity (tCO₂e)

$MT_{PJ,s,i,y}$ Baseline emissions from release of methane into the atmosphere in year y that is avoided by the project activity (tCO₂e)

$MT_{BL,s,i,y}$ Methane from source s captured and destroyed by use i in the project activity in year y (t CH₄);

i Use of methane (flaring, power generation, etc.)

s Source of methane that would have been captured, sent to and destroyed by use i in the baseline scenario in the year y. This may include eligible CBM, CMM, VAM, eligible AMM and eligible OCM

GWP_{CH4} Global warming potential of methane (t CO₂e/t CH₄)

In the baseline scenario, there is no CMM captured and destroyed, thus $MT_{BL,s,i,y}$ is 0;

Thus,

$$BE_{MR,y} = \sum_i \sum_s (MT_{PJ,s,i,y}) \times GWP_{CH4} \quad (3)$$

Baseline emissions from the production of power, heat or vehicle fuels

The baseline emissions from displacement of power or heat generation, or supply of vehicle fuels are given by the following equation:

$$BE_{use,y} = \sum_k (EG_{use,k,y} \times EF_{k,y}) \quad (4)$$

Where:

$BE_{use,y}$	Baseline emissions from energy displaced by the project activity in year y (tCO ₂ e)
$EG_{use,k,y}$	Energy of type k displaced by the project activity in year y (energy unit);
$EF_{k,y}$	Baseline emissions factor for energy type k production in year y (t CO ₂ /energy unit)
k	Energy type displaced by the project activity

The waste heat from the generators of the project will be recovered by waste heat boilers to provide free hot water to the coal mines, which was provided by waste coal fired boilers before the implementation of the Project. However, to be conservative, emission reductions will not be conservative, emission reductions will not be claimed for this part. And for the project is not involved emission reduction from supply of vehicle fuels. Thus, in this part, the project is just involved the baseline emissions from the production of power.

Baseline emissions factor for power generation

According to the methodology ACM0008 (version 08.0), the emission factor for displaced

electricity is calculated as per the latest version of methodological tool “Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation” (version 03.0), the parameter $EG_{use,k,y}$ in this PD is equivalent to the quantity of electricity generated and supplied by the project power plant to the grid in year y ($EG_{PJ,grid,y}$) in the tool. According to this tool, for the project is in the case of Scenario A: Electricity consumption from the grid, the project participants choose Option A1: Calculate the combined margin emission factor of the applicable electricity system, using the procedures in the latest approved version of the “Tool to calculate the emission factor for an electricity system” (version 07.0) ($EF_{k,y} = EF_{grid,CM,y}$).

According to “Tool to calculate the emission factor for an electricity system” (version 07.0). The following six steps are applied to determine OM, BM, and CM used for calculating the project baseline emissions:

Step 1. Identify the relevant electricity systems

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

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

Option 2. A delineation of the project electricity system defined by the dispatch area of the dispatch centre responsible for scheduling and dispatching electricity generated by the project activity. Where the dispatch area is controlled by more than one dispatch centre, i.e. layered dispatch area, the higher level area shall be used as a delineation of the project electricity system (e.g. where regional dispatch centres are required to comply with dispatch orders of the national dispatch centre then area controlled by the national dispatch centre shall be used);

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

The Chinese DNA has published a delineation of the project electricity system and connected electricity systems, Option 1 is applied for the project. According to the delineations, the North China Power Grid(NCPG) is identified as the relevant electric power system of the project, which includes Beijing, Hebei, Shandong, Nei Monggol Autonomous Region, Shanxi, Tianjin Power Grids. According to the “2021 Baseline Emission Factors for Regional Power Grids in China”, There is net electricity imported from the Central China Power grid (CCPG) and East China Power Grid (ECPG) to the North China Power grid(NCPG). Therefore, Central China Power grid (CCPG) and East China Power Grid (ECPG) are chosen as the connected electric power system.

Step 2. Choose whether to include off-grid power plants in the project electricity system (optional) Project participants may choose between the following two options to calculate the operating margin and build margin emission factor:

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

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

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

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

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

- (a) Simple OM, or
- (b) Simple adjusted OM, or
- (c) Dispatch data analysis OM, or
- (d) Average OM.

As the low-cost / must-run resources constituted less than 50% of total electricity generation of North China Power Grid in recent five years. The Simple OM (a) method is selected and the following data vintage is chosen to calculate the emission factor:

Ex-ante option: use a 3-year generation-weighted average, based on the most recent data available, without requirement to monitor and recalculate the emissions factor during the crediting period. And according to the tool, the emission factor is determined once at the validation stage, thus monitoring and recalculation of the emissions factor during the crediting period is required.

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

Based on the analysis of the step 3, the simple OM method is used to calculate the NCPG OM emission factor in this step. The simple OM emission factor is calculated as the generation weighted average CO₂ emissions per unit net electricity generation (tCO₂/MWh) of all generating power plants serving the system, not including low-cost/must-run power plants/units.

The simple OM may be calculated by one of the following two options:

Option A: Based on the net electricity generation and a CO₂ emission factor of each power unit; or

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

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

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

$$EF_{grid,OMsimple,yL,eL,y} = \frac{\sum_k (FC_{i,y} \times NCV_{i,y} \times EF_{CO2,i,y})}{EG_y} \quad (5)$$

Where:

$EF_{grid,OMsimple,y}$	Simple operating margin CO ₂ emission factor in year y (tCO ₂ e/MWh)
$FC_{i,y}$	Amount of fuel type i consumed in the project electricity system in year y (mass or volume unit)
$NCV_{i,y}$	Baseline emissions factor for energy type k production in year y (t CO ₂ /energy unit)

$EF_{CO_2,i,y}$	CO ₂ emission factor of 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 fuel types combusted in power sources in the project electricity system in year y
y	The three most recent years for which data is available at the time of submission of the VCS-PDD to the DOE for validation.

Based on the most recent available data published by China DNA at the time of this PD submission, the three-year average operating margin emission factor is calculated as a full-generation-weighted average of the emission factors. Details of the calculations and data follow the published data from the Chinese DNA¹⁹, which uses official national statistics.

$$EF_{grid,OMsimple,y} = 0.9714 \text{ tCO}_2/\text{MWh}$$

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

As per Section 6.5 of Tool 07 (version 07.0), in terms of vintage of data, project participants can choose between one of the following two options:

(a) Option 1 - For the first crediting period, calculate the build margin emission factor ex ante based on the most recent information available on units already built for sample group m at the time of CDM- PDD submission to the DOE for validation. For the second crediting period, the build margin emission factor should be updated based on the most recent information available on units already built at the time of submission of the request for renewal of the 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;

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

¹⁹ <http://www.ditan.com/static/upload/file/20231121/1700533899201781.pdf>

In line with 2021 Baseline Emission Factors for Regional Power Grids in China, Option 1 is chosen for the project; the BM emission factor is calculated ex ante based on the most recent information available on units already built for sample group m at the time of this project description submission. The sample group of power units m used to calculate the build margin should be determined as per the following procedure, consistent with the data vintage selected above:

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

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

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

Identify the date when the power units in SET_{sample} started to supply electricity to the grid. If none of the power units in SET_{sample} started to supply electricity to the grid more than 10 years ago, then use SET_{sample} to calculate the build margin. In this case ignore Steps (d), (e) and (f). Otherwise:

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

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

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

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

The BM emissions factor is the generation-weighted average emission factor (tCO₂/MWh) of all power units *m* during the most recent year *y* for which electricity generation data is available, calculated as follows:

$$EF_{grid,BM,y} = \frac{\sum_m (EG_{m,y} \times EF_{EL,m,y})}{\sum_m EG_{m,y}} \quad (6)$$

Where:

$EF_{grid,BM,y}$	Build margin emission factor of NCPG (t CO ₂ /MWh)
$EG_{m,y}$	Net quantity of electricity generated and delivered to the grid by power unit <i>m</i> in year <i>y</i> (MWh)
$EF_{EL,m,y}$	Baseline emissions factor for energy type <i>k</i> production in year <i>y</i> (t CO ₂ /energy unit)
$EF_{CO2,i,y}$	CO ₂ emission factor of power unit <i>m</i> in year <i>y</i> (t CO ₂ /MWh)
<i>m</i>	Power units included in the build margin
<i>y</i>	The most recent year for which the generation data is available

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 provinces *A* and in the year *t*:

$$EG_{m,y} = CAP_m \times H_{m,y} \quad (7)$$

Where:

$EG_{m,y}$	Annual net electricity generation the unit <i>m</i> in year <i>y</i> (MWh)
CAP_m	Installed capacity of the unit <i>m</i> (MW)
$H_{m,y}$	Utilization hour of the unit <i>m</i> in the year <i>y</i> (h), determined according to the average utilization hour of the same type of unit in the same province
<i>y</i>	The most recent year for which the generation data is available. For the calculation of BM in 2021, <i>y</i> = 2019
<i>m</i>	grouped new power plant

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

$$CAP_m = CAP_{A,t,k} \quad (8)$$

Where:

CAP_m	Installed capacity of the unit m (MW), with m representing the specified combination of A, t, and k
$CAP_{A,t,k}$	Total installed capacity of fuel type k power plants located in the province A and in the year t
A	Provinces covered by the NCPG, namely, Beijing City, Hebei Province, Shandong Province, Nei Monggol Autonomous Region, Shanxi Province, Tianjin City.
t	Years related to the grouped new power plants, for the 2019 calculation, t represents 2019, 2018, 2017.... Until the aggregated electricity generation of the grouped new power plants reaches 20% of the total electricity generation of the NCPG
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 5: 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:

$$EF_{EL,m,y} = \frac{EF_{CO2,m,i,y} \times 3.6}{\eta_{m,y}} \quad (9)$$

Where:

$EF_{EL,m,y}$	CO ₂ emission factor of power unit m in year y (t CO ₂ /MWh)
$EF_{CO2,m,i,y}$	Average CO ₂ emission factor of fuel type i used in power unit m in year y (t CO ₂ /GJ)
$\eta_{m,y}$	Average net energy conversion efficiency of power unit m in year y (ratio)
m	All power units serving the grid in year y except low-cost / must-run power units
3.6	Conversion factor (GJ/MWh)

Among the fuel types, the emission factors of hydro, nuclear, wind, solar, other thermal and others are 0. Concerning the emission factors of coal, gas, oil and waste incineration, the formula (9) takes the following form due to conservativeness:

$$EF_{best,m,y} = \frac{EF_{CO2,m,i,y} \times 3.6}{\eta_{best,y}} \quad (10)$$

Where:

$EF_{best,m,y}$	Emission factor of power unit m with the best technology commercially available in year y (t CO ₂ /MWh)
$\eta_{best,y}$	Power generation efficiency of the best technology commercially available in year y
m	Power units serving the grid with coal, gas, oil or waste incineration in year y

Based on the most recent available data published by China DNA at the time of this PD submission, the three-year average operating margin emission factor is calculated as a full-generation-weighted average of the emission factors. Details of the calculations and data follow the published data from the Chinese DNA²⁰, which uses official national statistics.

$$EF_{grid,BM,y} = 0.4701 \text{ tCO}_2/\text{MWh}$$

Step 6: Calculate the combined margin (CM) emission factor.

As per the “tool to calculate the emission factor for an electricity system”, the combined margin emission factor ($EF_{grid,CM,y}$) is calculated 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 combined margin emissions factor is calculated as follows:

$$EF_{grid,CM,y} = EF_{grid,OM,y} \times w_{OM} + EF_{grid,BM,y} \times w_{BM} \quad (11)$$

Where:

$EF_{grid,OM,y}$	Build margin CO ₂ emission factor in year y (tCO ₂ /MWh)
$EF_{grid,BM,y}$	Operating margin CO ₂ emission factor in year y (tCO ₂ /MWh)
w_{OM}	Weighting of build margin emissions factor (%)
w_{BM}	Weighting of operating margin emissions factor (%)

Based on the description above, for NCPG, $EF_{grid,OM,y} = 0.9714 \text{ tCO}_2/\text{MWh}$ and $EF_{grid,BM,y} = 0.4701 \text{ tCO}_2/\text{MWh}$.

²⁰ <http://www.ditan.com/static/upload/file/20231121/1700533899201781.pdf>

According to ‘Tool to calculate the emission factor for an electricity system’, the weights of OM and BM for all other projects except wind and solar power generation project activities are as follows:

$$\omega_{OM} = 0.5 \quad \omega_{BM} = 0.5$$

Thus, $EF_{grid,CM,y} = 0.9714 \text{ tCO}_2/\text{MWh} \times 0.5 + 0.4819 \text{ tCO}_2/\text{MWh} \times 0.5 = 0.4701 \text{ tCO}_2/\text{MWh}$.

4.2 Project Emissions

Project emissions comprise the following sources:

- (a) Emissions from the energy use to capture and use methane;
- (b) Emissions from destruction of captured methane through production of various energy types and/or flaring and/or flameless oxidation;
- (c) Emissions from the un-combusted methane. Project emissions are defined by the following equation:

$$PE_y = PE_{ME,y} + PE_{MD,y} + PE_{UM,y} \quad (12)$$

Where:

PE_y	Project emissions in year y (t CO ₂ /y)
$PE_{ME,y}$	Project emissions from energy use to capture and use methane (tCO ₂ e)
$PE_{MD,y}$	Project emissions from destruction of captured methane (tCO ₂ e)
$PE_{UM,y}$	Project emissions from un-combusted methane in year y (tCO ₂ e)

Project emissions from the energy use to capture and to use methane

During the normal operation of the project activity, the additional electricity consumption required by the project activity to capture and utilize the CMM is supplied by the power generation of the project; Only when the project is out of operation or abnormal operation, there is a small amount of power consumed.

According to methodology ACM0008 (v08.0), emissions due to electricity consumption should be determined using the latest version of the “Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation” (v03.0) should be used.

Thus,

$$PE_{ME,y} = PE_{EC,y} = \sum_j EC_{PJ,j,y} \times EF_{EF,i,y} \times (1 + TDL_{j,y}) \quad (13)$$

Where,

$PE_{EC,y}$	Project emissions in year y (tCO ₂ /y)
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$EC_{PJ,j,y}$	Quantity of electricity consumed by the project electricity consumption source j in year y (MWh/yr)
$EF_{EF,i,y}$	Emission factor for electricity generation for source j in year y (tCO ₂ /MWh)
$TDL_{j,y}$	Average technical transmission and distribution losses for providing electricity to source j in year y
j	Sources of electricity consumption in the project

According to “Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation” (version 03.0), $EF_{EF,i,y} = EF_{grid,CM,y}$. Furthermore, it is assumed that the amount of electricity consumed from the grid is zero ($EC_{PJ,j,y} = 0$) in ex-ante phase, which will be monitored in the verification period.

According to the tool “Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation” (version 03.0), i) the project is the case of Scenario A: Electricity consumption from the grid; ii) the electricity consumption by all project and leakage electricity consumption sources (the data is 0 in ex-ante phase, which will be monitored in the verification period) is smaller than the electricity consumption of all baseline electricity consumption sources (According to FSR, the data is 98,600MWh annually). Thus, use as default values of 3% for project and leakage electricity consumption sources for the project, i.e. $TDL_{j,y} = 3\%$.

Project emissions from destruction of captured methane

When the captured methane is burned in a flare, heat or power plant, or oxidized in a flameless oxidation unit, combustion emissions are released.

$$PE_{MD,y} = \sum_i MD_{i,y} \times CEF_{CH_4} \quad (14)$$

Where,

$PE_{MD,y}$	Project emissions from methane destroyed (tCO ₂ e)
$MD_{i,y}$	Methane destroyed through use i (tCH ₄)
i	Use of methane (power generation, heat generation, supply to gas grid to various combustion end uses)
CEF_{CH_4}	Carbon emission factor for combusted methane. Set as 2.75 (t CO ₂ /t CH ₄)

As mentioned above, since emission reductions will not be claimed in heat generation. And for the project is not involved emission reduction from supply of vehicle fuels. The Project only involve in methane destroyed through power generation.

$$\text{Thus, } PE_{MD,y} = MD_{ELEC,y} \times CEF_{CH_4}$$

In each end-use, the amount of methane destroyed depends on the efficiency of combustion of each end use and should be determined as follows.

$$MD_{i,y} = MM_{i,y} \times Eff_{i,y} \quad (15)$$

Where,

$MD_{i,y}$	Methane destroyed through use i in year y (t CH ₄)
$MM_{i,y}$	Methane measured sent to use i in year y (tCH ₄)
$Eff_{i,y}$	Efficiency of methane destruction in use I in year y (%)

$$\text{Thus, } PE_{MD,y} = MD_{ELEC,y} \times CEF_{CH_4} = MM_{ELEC,y} \times Eff_{ELEC,y} \times CEF_{CH_4} \quad (16)$$

Where,

$MD_{ELEC,y}$	Methane destroyed through use of power generation in year y (t CH ₄)
$MM_{ELEC,y}$	Methane measured sent to use i in year y (tCH ₄)
$Eff_{ELEC,y}$	Efficiency of methane destruction in use I in year y (%)

Project emissions from un-combusted methane

Not all of the methane sent to the flare, to the flameless oxidizer or used to generate power and heat will be combusted, so a small amount will be released to the atmosphere. These emissions are calculated as follows:

$$PE_{UM,y} = GWP_{CH_4} \times \sum_i MM_{i,y} \times (1 - Eff_{i,y}) \quad (17)$$

Where,

$PE_{UM,y}$	Project emissions from un-combusted methane (tCO ₂ e)
GWP_{CH_4}	Global warming potential of methane (t CO ₂ e/t CH ₄)
i	Use of methane (power generation, heat generation, supply to gas grid to various combustion end uses)
$MM_{i,y}$	Methane measured sent to use i in year y (t CH ₄), i is only for electricity, so $MM_{i,y} = MM_{ELEC,y}$
$Eff_{i,y}$	Efficiency of methane destruction in use I in year y (%), i is only for electricity, so $Eff_{i,y} = Eff_{ELEC,y}$

$$\text{For the project, } PE_{UM,y} = GWP_{CH_4} \times MM_{ELEC,y} \times (1 - Eff_{ELEC,y}) \quad (18)$$

4.3 Leakage

Leakage may occur if the project activity prevents methane from being used to meet baseline thermal energy demand, whether as a result of physical constraints on delivery, or price changes.

Since the baseline scenario of the project does not include thermal energy use, the leakage (LEy) is taken as zero.

4.4 Estimated GHG Emission Reductions and Carbon Dioxide Removals

According to the FSR of the project, the estimated annual CMM measured sent to power plant will be 42.14 million m³ CMM per year when the project is fully operated. The volume of CMM utilized by the project is estimated under the temperature of 293.15K, so the density of methane is 0.67kg/m³²¹. Therefore, the methane measured sent to power plant annually is calculated as follows:

$$MT_{PJ,s,i,y} = 42.14 \times 10^6 \times 0.67 \text{ kg/m}^3 / 1000 = 28,234 \text{ t CH}_4$$

1. Baseline Emission(BEy)

1.1 Baseline emissions from methane destroyed

As described in 4.1, BE_{MD,y}=0.

1.2 Baseline emissions from release of methane into the atmosphere

$$BE_{MR,y} = GWP_{CH_4} \times MT_{PJ,s,i,y} = 28 \text{ tCO}_2/\text{tCH}_4 \times 28,234 \text{ tCH}_4 = 790,546 \text{ tCO}_2\text{e}$$

1.3 Baseline emissions from power generation replaced by the project

$$BE_{Use,y} = EG_{Use,k,y} \times EF_{grid,CM,y} = EG_{PJ,grid,y} \times EF_{grid,CM,y} = 163.987 \text{ MWh} \times 0.72075 \text{ tCO}_2/\text{MWh} = 118,193 \text{ tCO}_2\text{e}$$

Baseline emissions are calculated by the formulation below:

$$BE_y = BE_{MD,y} + BE_{MR,y} + BE_{Use,y} = 0 \text{ tCO}_2\text{e} + 790,546 \text{ tCO}_2\text{e} + 118,193 \text{ tCO}_2\text{e} = 908,739 \text{ tCO}_2\text{e}$$

2. Project Emission(PEy)

2.1 Project emissions from the energy use to capture and to use methane

As described in section 4.2, it is assumed that the amount of electricity consumed from the grid is zero (EC_{PJ,j,y}=0) in ex-ante phase, which will be monitored in the verification period. Thus, PEME,y=0 in ex-ante phase.

2.2 Project emissions from destruction of captured methane

$$\begin{aligned} PE_{MD,y} &= \sum_i MD_{i,y} \times CEF_{CH_4} \\ &= MD_{ELEC,y} \times CEF_{CH_4} = MM_{ELEC,y} \times Eff_{ELEC,y} \times CEF_{CH_4} \\ &= 28,234 \text{ t CH}_4 \times 99.5\% \times 2.75 \text{ tCO}_2/\text{tCH}_4 = 77,255 \text{ tCO}_2\text{e} \end{aligned}$$

2.3 Project emissions from un-combusted methane

²¹ 2006 IPCC Guidelines for National Greenhouse Gas Inventories

$$PE_{UM,y} = GWP_{CH_4} \times MM_{ELEC,y} \times (1 - EF_{FELEC,y}) = 28 \text{ tCO}_2/\text{tCH}_4 \times 28,234 \text{ t CH}_4 \times (1 - 99.5\%) = 3,953 \text{ tCO}_2\text{e}$$

Project emissions are calculated by the formulation below:

$$PE_y = PE_{EC,y} + PE_{MD,y} + PE_{UM,y} = 0 \text{ tCO}_2\text{e} + 77,255 \text{ tCO}_2\text{e} + 3,953 \text{ tCO}_2\text{e} = 81,208 \text{ tCO}_2\text{e}$$

3. Leakage(LE_y)

As described in section 4.3, LE_y=0.

4. Emission Reduction(ER_y)

The emission reduction (ER_y) by the project activity is:

$$ER_y = BE_y - PE_y - LE_y$$

$$= 908,739 \text{ tCO}_2\text{e} - 81,208 \text{ tCO}_2\text{e} - 0 = 827,531 \text{ tCO}_2\text{e}$$

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)
01-Dec-2022 to 31-Dec-2022	77,181	6,897	0	70,283
01-Jan-2023 to 31-Dec-2023	908,739	81,208	0	827,531
01-Jan-2024 to 31-Dec-2024	908,739	81,208	0	827,531
01-Jan-2025 to 31-Dec-2025	908,739	81,208	0	827,531
01-Jan-2026 to 31-Dec-2026	908,739	81,208	0	827,531
01-Jan-2027 to 31-Dec-2027	908,739	81,208	0	827,531
01-Jan-2028 to 31-Dec-2028	908,739	81,208	0	827,531
01-Jan-2029 to 31-Dec-2029	908,739	81,208	0	827,531
01-Jan-2030 to 31-Dec-2030	908,739	81,208	0	827,531
01-Jan-2031 to 31-Dec -2031	908,739	81,208	0	827,531
01-Jan-2032 to 30-Nov-2032	831,558	74,311	0	757,248
Total	9,087,390	812,080	0	8,275,310

5 MONITORING

5.1 Data and Parameters Available at Validation

Data / Parameter	$MT_{BL,s,i,y}$
Data unit	tCH ₄
Description	Methane from source s that would have been captured and destroyed by use i in the baseline scenario in the year y
Source of data	Data provided by the project owner
Value applied:	0
Justification of choice of data or description of measurement methods and procedures applied	-
Purpose of Data	Calculation of baseline emissions
Comments	In the baseline scenario, there is no CMM captured and destroyed, thus $MT_{BL,s,i,y}$ is 0

Data / Parameter	CEF_{CH_4}
Data unit	tCO ₂ e/ tCH ₄
Description	Carbon emission factor for combusted methane
Source of data	ACM0008 (Version 08.0)
Value applied:	2.75
Justification of choice of data or description of measurement methods and procedures applied	ACM0008 (Version 08.0) default value
Purpose of Data	Calculation of f project emissions

Comments	44/16 = 2.75tCO ₂ e/tCH ₄
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Data / Parameter	EF _{k,y} , EF _{EF,j,y} (EF _{grid,CM,y})
Data unit	tCO ₂ /MWh
Description	Combined margin emission factor for the grid in year y
Source of data	“2021 Baseline Emission Factors for Regional Power Grids in China” published by DNA of China
Value applied:	0.72075
Justification of choice of data or description of measurement methods and procedures applied	Calculated as per TOOL07 (version 07.0) based on official data published by the Ministry of Ecology and Environment of China
Purpose of Data	Calculation of baseline emissions
Comments	-

Data / Parameter	TDL _{j,y}
Data unit	%
Description	Average technical transmission and distribution losses for providing electricity to source j in year y
Source of data	Methodological tool “Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation” (v03.0)
Value applied:	3%
Justification of choice of data or description of measurement methods and procedures applied	According to the tool “Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation” (version 03.0), i) the project is the case of Scenario A; ii) the electricity consumption by all project and leakage electricity consumption sources (the data is 0 in ex-ante phase, which will be monitored in the verification period) is

	smaller than the electricity consumption of all baseline electricity consumption sources (According to FSR, the data is 94,656 MWh annually). Thus, Use as default values of 3% for: (b) project and leakage electricity consumption sources
Purpose of Data	Calculation of project emissions
Comments	The parameter will be updated according to the tool “Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation” (version 03.0).

Data / Parameter	D _{CH4}
Data unit	kg/m ³
Description	Density of methane under normal conditions of temperature and pressure
Source of data	2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value applied:	0.67
Justification of choice of data or description of measurement methods and procedures applied	IPCC reference
Purpose of Data	Used to calculate the methane from sources captured and destroyed by the project activity in mass unit. For MT _{PJ,s,i,y} (MM _{ELEC,y}) is monitored by flow meter in volume unit, which will be converted to mass unit with the parameter of D _{CH4} .
Comments	Applies at atmospheric pressure and 20°C

5.2 Data and Parameters Monitored

Data / Parameter	MT _{PJ,s,i,y}
Data unit	tCH ₄

Description	Methane from source s captured and destroyed by use i in the project activity in year y
Source of data	Calculated from the monitored data
Description of measurement methods and procedures applied	$MT_{PJ,s,i,y}$ is calculated by the gas flow rate, pressure, temperature and CH_4 concentration of CMM, which will be continuously measured by flow meter and gas analyzer. All electronic data and paper documents will be archived for two years following the end of the crediting period.
Frequency of monitoring/recording	Continuous
Value applied:	28,234 (Ex ante from FSR)
Monitoring equipment	flow meter and gas analyzer
QA/QC procedures applied	Flow meter and gas analyzer will be periodically checked and calibrated.
Purpose of data	Calculation of baseline emissions
Calculation method	For $MT_{PJ,s,i,y}$ is monitored by flow meter in volume unit, which will be converted to mass unit with the parameter of D_{CH_4} .
Comments	Flow meter will record gas volumes, pressure and temperature. Density of methane under normal conditions of temperature and pressure (defined as 1 atm, 293.15K) is $0.67kg/m^3$ (2006 IPCC).

Data / Parameter	$MM_{ELEC,y}$
Data unit	tCH_4
Description	Methane measured sent to use of power generation in year y
Source of data	Calculated from the monitored data
Description of measurement methods and procedures applied	$MM_{ELEC,y}$ (same with $MT_{PJ,s,i,y}$) is calculated by the gas flow rate, pressure, temperature and CH_4 concentration of CMM, which will be continuously measured by flow meter and gas analyzer All

	electronic data and paper documents will be archived for two years following the end of the crediting period.
Frequency of monitoring/recording	Continuous
Value applied:	28,234 (Ex ante from FSR)
Monitoring equipment	Flow meter and gas analyzer
QA/QC procedures applied	Flow meter and gas analyzer will be periodically checked and calibrated.
Purpose of data	Calculation of project emissions
Calculation method	For $MM_{ELEC,y}$ is monitored by flow meter in volume unit, which will be converted to mass unit with the parameter of D_{CH_4} .
Comments	Flow meter will record gas volumes, pressure and temperature. Density of methane under normal conditions of temperature and pressure (defined as 1 atm, 293.15K) is 0.67kg/m^3 (2006 IPCC).

Data / Parameter	GWP_{CH_4}
Data unit	tCO_2e/ tCH_4
Description	Global warming potential of methane
Source of data	IPCC Fifth Assessment Report (AR5)
Description of measurement methods and procedures applied	IPCC Fifth Assessment Report (AR5) default value
Frequency of monitoring/recording	The parameter will be updated according to the relevant documents
Value applied:	28
Monitoring equipment	-
QA/QC procedures applied	-

Purpose of data	Calculation of baseline emissions and project emissions
Calculation method	-
Comments	-

Data / Parameter	EG _{use,k,y} (EG _{PJ,grid,y})
Data unit	MWh
Description	Energy of type k displaced by the project activity in year y
Source of data	Monitoring data provided by the project owner
Description of measurement methods and procedures applied	The electricity meter(s) and monthly recorded. All electronic data and paper documents will be archived for two years following the end of the crediting period.
Frequency of monitoring/recording	Continuously
Value applied:	163,987 (Ex ante from FSR)
Monitoring equipment	The electricity meter(s)
QA/QC procedures applied	The data will be cross checked with Electricity Transaction Note. The electricity meter(s) will be periodically checked and maintained. Calibration will be carried out once a year to ensure normal operation.
Purpose of data	Calculation of baseline emissions
Calculation method	-
Comments	-

Data / Parameter	EC _{PJ,j,y}
Data unit	MWh
Description	Quantity of electricity consumed by the project electricity

	consumption source j in year y
Source of data	Monitoring data provided by the project owner
Description of measurement methods and procedures applied	The electricity meter(s) and monthly recorded. All electronic data and paper documents will be archived for two years following the end of the crediting period.
Frequency of monitoring/recording	Continuously
Value applied:	0
Monitoring equipment	The electricity meter(s)
QA/QC procedures applied	The data will be cross checked with Electricity Transaction Note. The electricity meter(s) will be periodically checked and maintained. Calibration will be carried out once a year to ensure normal operation.
Purpose of data	Calculation of project emissions
Calculation method	-
Comments	-

Data / Parameter	$Eff_{i,y}$ ($Eff_{ELEC,y}$)
Data unit	%
Description	Efficiency of methane destruction in use i (for the project, i represents power generation)
Source of data	2006 IPCC Guidelines for National Greenhouse Gas Inventories
Description of measurement methods and procedures applied	IPCC reference
Frequency of monitoring/recording	-
Value applied:	99.5
Monitoring equipment	-
QA/QC procedures	-

applied	
Purpose of data	Calculation of project emissions
Calculation method	-
Comments	The parameter will be updated according to IPCC.

5.3 Monitoring Plan

The monitoring plan presented in this PD assures that real, measurable, long-term GHG emission reductions can be monitored, recorded and reported. It is a crucial procedure to identify the final VCUs of the project. This monitoring plan will be implemented by the project owner during the project operation. The details of the monitoring plan are specified as follows:

(A) Data and parameters to be monitored

Data and parameters to be monitored are listed below Figure 6 shows the positions of the monitoring instruments and Table 12 lists the corresponding parameters monitored:

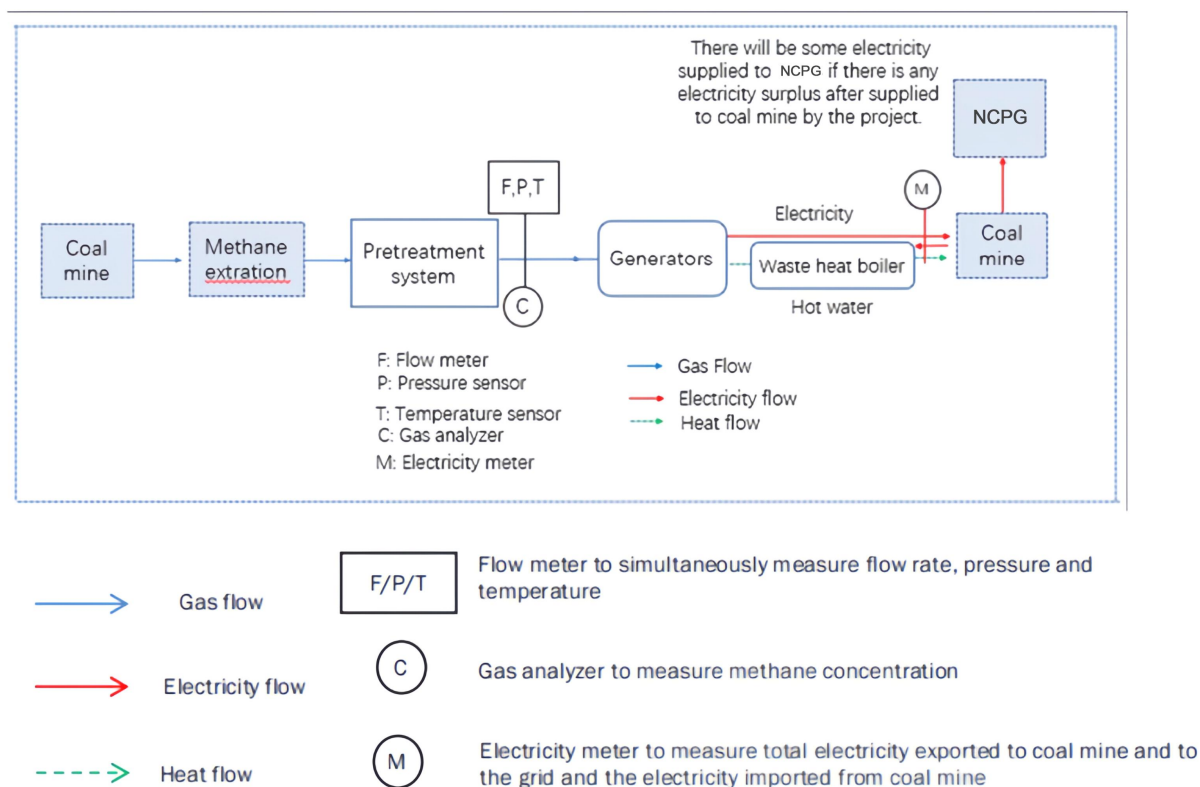


Figure 6: Project monitoring diagram

Table 12: Corresponding parameters monitored

Position	Parameter Monitored	Description
CMM Inflow Monitoring: the flow meter with pressure sensor and temperature sensor and gas analyzer are installed at the outlet of the pretreatment system	$MT_{PJ,s,i,y}$ and $MM_{ELEC,y}$	Methane concentration, gas flow rate, pressure and temperature are monitored on-site and used to calculate methane from source s captured and destroyed by use of power generation and methane measured sent to use of power generation
Electricity Monitoring: Electricity meter (M1, M2) is installed at the side of grid company to monitor the electricity delivered to NCPG if there is any electricity surplus. Electricity meter (M3, M4) is installed at Guiyuan substation to monitor the electricity delivered to Guiyuan coal mine and electricity imported from the coal mine.	$EG_{use,k,y}$ $(EG_{PJ,grid,y})$ 、 $EC_{PJ,j,y}$	Electricity generation by the project and electricity consumption for the project activity are continuously monitored.
/	GWP_{CH4} 、 $Eff_{i,y}$ $(Eff_{ELEC,y})$ 、 $TDL_{j,y}$ 、 $EF_{grid,CM,y}$	Global warming potential of methane、efficiency of methane destruction in use i 、average technical transmission and distribution losses for providing electricity to source j in year y will be updated according to relevant data sources, and the combined margin emission factor are fixed in the crediting period.

(B) Management Structure

The Project owner organizes a specific VCS team in project development department to be responsible for data collection, supervision and witness the whole process of data measuring and recording. A VCS manager is appointed to take full responsibility for the overall monitoring of the project. The monitoring and measurement of extracted gas, electricity generation and consumption etc. are carried out by a few designated monitoring officers. In addition, the Project developer appoints internal verifiers who is responsible for internal check of the

measurement, collection of relevant receipts and invoices, and the calculation of the emission reductions. A monitoring and management manual of the project that identifies detailed duties and responsibilities of the relevant parties is developed and served as the basis of the project monitoring. Figure 7 shows the operation and management structure of the Project.

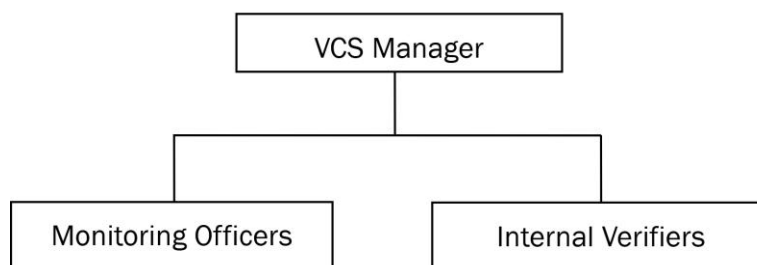


Figure 7 Operation and management structure of the project

(C) Data collection

Monitoring officers are responsible for data collection. Designated teams will read and collect the monitored data regularly. The computer system will automatically monitor and record relevant meter data. Automatic records will serve as the main data source for emission reductions calculation. All data files, relevant purchase invoices and sales receipts will be collected by a designated monitoring officer, who will prepare backup in time and archive all documents properly.

(D) Quality assurance

All metering equipment for monitoring will be chosen in accordance with VCS requirements and will be calibrated regularly for accuracy by qualified party according to the national regulations. To assist in future verifications, the Project owner will preserve the calibration records, along with the data files of project monitoring.

Error check routines will be established on site and at the point of data storage to detect data measuring/transmission failures as well as malfunctions. In the case of malfunction of the meters, the meter supplier will provide technical support to engage the problem promptly and emission reductions during the corresponding period will be calculated conservatively.

The installation of the electricity metering equipment will fulfill the requirements of “DL/T448–2016 Technical Administrative Code of Electric Energy Metering”²². The accuracy should not be less than 0.5S. The installation of flow meters and gas analyzers will fulfill the national standard (JJG1029-2007 and JJG 1138-2017). All the meters will be checked and maintained periodically.

²² <http://www.doc88.com/p-2377330908298.html>

(E) Data file management

All monitoring data will be electronically filed by the end of each month and the electronic data files will be archived in both disk copy and printed hard copy. Other documents in paper e.g., maps, forms and environment assessment reports will be preserved as well. All data collected as part of monitoring will be archived electronically and be kept at least for 2 years after the end of the crediting period. The Project owner will provide original records and documents if necessary.