GUIZHOU WENJIABA CMM POWER GENERATION PROJECT

Document Prepared by Climate Bridge (Shanghai) Ltd.

Tel: +86 21 6246 2036; Fax: +86 21 2301 9950

Project Title	Guizhou Wenjiaba CMM Power Generation Project
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Prepared By	Ms. Ding Wenjun, Climate Bridge (Shanghai) Ltd.
Contact	Physical address: Block B, Level 24, Jiangong Mansion, 33 Fushan Road, Pudong New Area, Shanghai, China 200120 Telephone: +86 21 6246 2036; Email: projects@climatebridge.com http://www.climatebridge.com

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1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

Guizhou Wenjiaba CMM Power Generation Project (hereinafter referred to as the Project) utilizes the low concentration coal mine methane (CMM) that otherwise would be vented into the atmosphere directly from Wenjiaba coal mine for power generation to supply electricity to the coal mine where the Project is located and to China Southern Power Grid (CSPG) if there is any electricity surplus. The electricity generated by the Project replaces the electricity that would otherwise have been purchased from the CSPG and displaces part of the electricity generated by CSPG dominated by fossil fuel-fired power plants. For the Project, the surplus electricity delivered to CSPG is not included in the emission reduction calculation.

The waste heat from the generators is 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 are not claimed for this part.

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.

In the Project, four sets of CMM power generators are installed with a total installed capacity of 3.5MW (2*0.75MW & 2*1MW) and 5.645 million m^3 of methane is utilized annually. It is estimated that in the 10 years crediting period of the project (from 24-September-2020 to 23-September-2030), the expected average annual GHG emission reduction is 103,297 tCO_2e, with the total emission reduction of 1,032,970 tCO_2e.

The timeline of the project is shown below:

Start date of construction	15-July-2018
Start date of operation (operation date of the 2 sets of 1MW CMM generators)	24-September-2020
Start date of the crediting period	24-September-2020

During this monitoring period, three of the four sets(2*1MW+1*0.75MW) in the power station are actually in operation and one with the rated capacity of 0.75MW is not in operation due to the insufficient methane supply. No events or situations, which may impact the applicability of the applied methodology, occurred during this monitoring period. This monitoring period is the second VCS monitoring period spanning from 26-August-2021 to 25-May-2022 (both days included). The total emission reductions achieved in this monitoring period are 60,032 tCO_2e.

1.2 Sectoral Scope and Project Type

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

Sectoral Scope 8: Mining/mineral production, and

The project is not a grouped project.

1.3 Project Proponent

Organization name	Guizhou Shuikuang Orion Clean Energy Co., Ltd.
Contact person	Li Peihai
Title	Manager
Address	Anle Village, Chadian Township, Pingzai Village, Zhijin County, Bijie City, Guizhou Province, China
Telephone	+86 21 6246 2036
Email	3542346576@qq.com

1.4 Other Entities Involved in the Project

Organization name	Climate Bridge (Shanghai) Ltd.
Role in the Project	VCU buyer
Contact person	Gao zhiwen
Title	General Manager
Address	Block B, Level 24, Jiangong Mansion, 33 Fushan Road, Pudong New Area, Shanghai, China 200120
Telephone	+86-2162462036
Email	gao.zhiwen@climatebridge.com

1.5 Project Start Date

24-September-2020 (operation start date).

1.6 Project Crediting Period

This project adopts fixed crediting periods of 10 years, from 24-September-2020 to 23-September-2030 (both days included).

1.7 Project Location

The Project is located in Pingzai Village, Zhijin County, Bijie City, Guizhou Province, People's Republic of China. The geographical coordinates for the project site are east longitude 105°40′53.93″ and north latitude 26°39′24.99″.

The geographic location of the project is shown in Figure 1.

Figure 1 The geographic location of the project

1.8 Title and Reference of Methodology

The applied baseline and monitoring methodology for the project:

ACM0008 “Abatement of methane from coal mines” (version 08.0).

Reference:https://cdm.unfccc.int/methodologies/DB/YSD3FQ5WR3VPC9Q64CDTLXHLFVKKKU

Tools applied:

“Tool to calculate the emission factor for an electricity system” (version 07.0);

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

“Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation” (version 03.0);

Reference: https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-05-v3.0.pdf

1.9 Participation under other GHG Programs

The project has neither been registered nor seeking registration under any other GHG programs.

The project has been registered only in VCS program.

1.10 Other Forms of Credit

Net GHG emission reductions generated by the Project during this monitoring period from 26-August-2021 to 25-May-2022 will not be used for compliance in emissions trading programs or any other mechanism that includes GHG allowance trading.

China has a national emissions trading scheme only cover the high-emission industries, such as thermal power generation, petrochemical, chemical, building materials, iron and steel, nonferrous metals, papermaking, civil aviation industries and other key emission industries that emitted more than 26,000 tons of CO_2e/year[1]. And the project activity is not included the mandatory emission control scheme and there is no emission cap enforced for the project owner according to the enforced company list in public information[2].

The project proponent has declared that emission reductions achieved during this monitoring period will not be used for other forms of GHG-related environmental credit, including renewable energy certificates. The emission reductions of the project achieved during this monitoring period (from 26-August-2021 to 25-May-2022) will seek VCS credit only. Hence, it is confirmed that the emission reductions will not be double counted.

[1] https://www.mee.gov.cn/xxgk2018/xxgk/xxgk06/202203/t20220315_971468.html

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

1.11 Sustainable Development Contributions

Guizhou Wenjiaba CMM Power Generation Project, located in Pingzai Village, Zhijin County, Bijie City, Guizhou Province, People's Republic of China, utilizes coal mine methane (CMM) to generate power and produce heat. By destroying CMM that would have been vented into the atmosphere in the absence of the project activity, and by displacing part of the electricity that would have been supplied by the grid, the project achieves significant GHG emission reductions and ensures the underground mining safety. The project also provides long-term job opportunities to local people and contributes to the economic prosperity.

Table 1: Sustainable Development Contributions[3]

Row number	SDG Target	SDG Indicator	Net Impact on SDG Indicator	Current Project Contributions	Contributions Over Project Lifetime
1)	8.5	Numbers of job opportunities provided by implementation of the project	Implemented activities to increase	22 employees have signed long-term labour contracts and receive stable payments due to the implementation of the project activity.	The project offers 22 long-term employment opportunities since the project started operation.
2)	9.4	CO_2 emission reduction per tonnes of produced coal	Implemented activities to decrease	In this reporting period, total 180,819 tonnes of coals have been produced. As the project achieved 60,032 tCO_2 emission reductions during this reporting period, the project decreased 0.332 tCO_2 emissions for each tonne of coal produced.	From 24-September-2020 to 25-May-2022, the project decreased 0.332 tCO_2e emission per tonne of coal produced for 330,891 tonnes of coal (150,000 tonnes during the first monitoring period and 180,819 tonnes during this monitoring period).
3)	13.0	Tonnes of greenhouse gas emissions avoided or removed	Implemented activities to increase	The project achieved GHG emission reductions of 60,032 tCO_2e during the reporting period.	An accumulated 109,914 (60,032 tCO_2e during this monitoring period and 49,882 tCO_2e during the first monitoring period) tCO_2e of GHG emission reduction have been achieved by the project by end of the reporting period.

[3] Please refer to appendix 1 for supporting evidence.

2 SAFEGUARDS

2.1 No Net Harm

The project started construction on 15-July-2018 and operated on 24-September-2020, the following measures in the construction and operation phase were carried out by the project owner to mitigated the potential impact.

Air pollution

In the construction phase, sprinkling dust control measures were taken timely by the project owner on the dust caused by earthwork excavation and backfilling. The body and tires were cleaned when the transport vehicles were out of the site. Vehicles that easy to cause dust were covered with tarps, and overload was not allowed.

In the operation phase, exhaust gas from combustion of gas units is treated by waste heat recovery device and discharged through the exhaust cylinder after meeting the V stage standardof "Emission Limits and Measurement Methods of Vehicle Exhaust Pollutants of Pressurized combustion and gas-fueled Ignition Engines and Vehicles" (GB17691-2005); The oil fume from the canteen is led to the roof of the building through a smoke duct for discharge after being treated by the oil fume purifier, which is meeting the small standard of "Lampblack Emission Standard of catering Industry (Trial)" (GB18483-2001).

Wastewater

In the construction phase, the wastewater in construction phase was from the washing wastewater of the concrete mixing system and mixing machinery. The wastewater was returned to the construction after being treated in the grease trap and is not discharged outside. Other domestic sewage was reused reasonably after settling.

In the operation phase, the waste water from the water ring pump and the cooling water from the generators are recycled by the project owner and not discharged; The gas-filtered waste water and the waste water from the floor cleaning of the generator room are treated by the oil separating sedimentation tank and then used for production without discharge; The oil slick collected in the oil-separating sedimentation tank belongs to hazardous waste, and it is collected and temporarily stored in the hazardous waste temporary storage room, and it is regularly entrusted to the units with corresponding qualifications for disposal; The canteen oily wastewater is pre-treated by grease trap and discharged into the improved septic tank for treatment with other domestic sewage. It is used as agricultural fertilizer regularly and is not discharged externally

Noise

In order to eliminate noise impact on workers and local residents in the construction phase, the project owner selected low-noise construction equipment and construction was not conducted at night (10.pm-6.am).

In the operation phase, the generator and engine are installed in a semi-enclosed workshop. The workshop adopts brick and concrete structure, the inner wall is equipped with sound absorbing materials, and the inlet and outlet are equipped with mufflers. Strengthen management and maintain the normal operation of equipment. Noise emission from the project operation complies with the standard requirements of Category 2 of "Emission standard for industrial enterprise noise at boundary" (GB12348-2008), and the environmental noise at the residential settlement satisfies Category 2 of "Environmental quality standard for noise" (GB3096-2008).

Solid waste

In the construction phase, the waste materials such as steel bars and other recyclable materials were recycled by the project owner in a classified way. Other construction wastes that cannot be recycled were transported to the designated local places for disposal. The domestic wastes were collected uniformly and then handed over to the local sanitation departments for disposal.

In the operation phase, a standard hazardous waste storage room is be set up to store waste oil, waste batteries, waste oil drums, oily rags and other hazardous wastes, and the entity with relevant qualifications for disposal is entrusted by the project owner; Filter dust and slag regularly cleaned, disposed together with household garbage; Household wastes are collected separately. Recycled those that can be recycled and those that cannot be recycled are sent to the designated place of the local sanitation department for disposal.

In conclusion, through the above measures by the project owner, there are no negative environmental and/or socio-economic impacts due to the project. Meanwhile, the implementation of the project will improve local socio-economic development through creating career opportunities and paying taxes

2.2 Local Stakeholder Consultation

LSC prior to the project implementation:

The Project owner collected comments by local stakeholders on the project activity. Survey questionnaires were distributed to relevant personnel of Wenjiaba coal mine, local villagers and government officials by the Project owner on 23-February-2017. The survey questionnaire was designed to assess the project impacts on the local environment and social economic development. The structure of the survey respondents is listed in Table 2 below.

Table 2: Structure of stakeholder surveyed

Distribution	Quantity	Percentage

Item			
Amount of stakeholders surveyed	Male	28	56%
	Female	22	44%
Age	<25	6	12%
	25-45	22	44%
	45-55	17	34%
	>55	5	10%
Education	Junior high school or below	25	50%
	Senior high school	17	34%
	College or above	8	16%
Occupation	Worker	15	30%
	farmer	11	22%
	Management personnel	5	10%
	Civil servant	6	12%
	Unspecified	13	26%

Fifty questionnaires were distributed to local stakeholders, and all questionnaires have been recollected. Comments from these questionnaires are summarized below:

No.	Questions	Attitude or Opinion	Amount	Percentage
1	Do you know about the proposed project?	Quite much	30	60%
		Heard of	17	34%
		Nothing	3	6%

2	What is your attitude towards the project construction?	Supportive	45	90%
		Against	0	0%
		Indifferent	5	10%
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	0	0%
		Water pollution	1	2%
		Noise pollution	3	6%
		Harm to indigenous animals and plants	0	0%
		No idea	8	16%
4	Do you think the project operation will bring about more benefits than loss?	Yes	43	86%
		No	0	0%
		About the same	7	14%
5	Are you willing to participate in the project construction or operation?	Yes	40	80%
		No	3	6%
		Indifferent	7	14%
6	What influence do you think the project will bring about to you and your family?	Positive	41	82%
		None	9	18%
		Negative	0	0%

7	Do you think the project operation will affect the production safety of the coal mine?		Positive effect	41	82%
			None	9	18%
			Negative effect	0	0%
8	What impact do you think the project will bring to local community? (multiple choice)	Employment	50	100%	100%
			0	0%	0
			0	0%	0
		Economy	46	92%	98%
			0	0%	0
			4	8%	2%
		Power Supply	45	90%	86%
			0	0%	0
			5	10%	14%

The survey shows that the Project is well known by local residents. Most of respondents know or hear about the Project. Most of them are supportive of the project construction and think the Project brings more benefit than loss. 80% of the respondents are willing to participate in the construction and operation of the Project.

76% of the respondents believe that the Project will not have any environmental impact, but there are a few respondents who show their concern about the potential noise pollution and water pollution caused by the Project. For both issues, the project owner will adopt some measures to mitigate the pollution. For the noise pollution: the plant buildings that contain machinery will be all built from reinforced concrete, with soundproof materials installed inside, atop and at the openings. Mufflers and vibration damper bases have been designed for the machinery. Noise emission from the project operation complies with the standard requirements of Category 2 of "Emission standard for industrial enterprise noise at boundary" (GB12348-2008), and the environmental noise at the residential settlement satisfies Category 2 of "Environmental quality standard for noise" (GB3096-2008). For the water pollution: wastewater during operation

consists of condensate water, cooling water and domestic wastewater. Condensate water which contains no pollutant will be used in the water-based flame arrester. Cooling water also doesn't contain any pollutants, which will be circulated after cooling. Domestic wastewater from excretion of construction personnel is fermented and sterilized before used as fertilizer for agricultural land. Wastewater from washing hands will be treated by sedimentation and reused for plant landscaping.

82% of the respondents recognize the positive impact of the Project on individuals and families. They think the Project will improve the local employment and increasing the residential income, thus greatly reducing family burden. No one thinks that the Project will have a negative impact on the local life. In the aspect of coal mine production safety, 18% of the respondents believe the Project will not have any impact on coal mine safety, and 82% of the respondents consider the Project improve the operational safety of the coal mines to some extent.

In general, local stakeholders are supportive of the project construction. The survey shows that a majority of local stakeholders think the Project will help improve the life of local people and promote local economic development without much adverse environmental impact. The survey shows that almost all of the stakeholders are supportive to the proposed project, believing that the Project will provide more employment opportunities, help local economic development, and increase local power supply. Therefore, the implementation of the Project is regarded as beneficial by most of the local stakeholders.

LSC during the operation period:

The LSC during the first monitoring period was conducted on 15-January-2021 to introduce the implementation situation of project to local stakeholders. During this monitoring period, the opinions of the local stakeholders were recollected on 16-April-2022.

The following people are considered as the stakeholders of this project during the implementation stage.

- Residents of the nearby village.
- Staff of the project.
- Relevant administrative staff of the local government.

The project owner designed a questionnaire to collect the comments of relevant stakeholders and the major question issues and results are shown as below:

Item	Options	Results	Percentage
Whether the project cause water pollution?	Yes	0	0.00%
	No	29	96.7%

	Don't know	1	3.3%
Whether the project cause air pollution?	Yes	0	0.00%
	No	28	93.33%
	Don't know	2	6.67%
Whether the project cause noise pollution?	Yes	0	0.00%
	No	29	96.7%
	Don't know	1	3.3%
Whether the project impact on soil environment?	Yes	0	0.00%
	No	28	93.33%
	Don't know	2	6.67%
Whether the project impact on the surrounding animals and plants?	Yes	0	0.00%
	No	24	80.00%
	Don't know	6	20.00%
Impact on the local residents' employment opportunities and income.	Advantageous	26	86.67%
	No impact	4	13.33%
	Disadvantageous	0	0.00%
Impact on the local economic development.	Advantageous	27	90.00%
	No impact	3	10.00%
	Disadvantageous	0	0.00%
	Advantageous	25	83.33%

Impact on the local power grid.	No impact	5	16.67%
	Disadvantageous	0	0.00%
Attitude on implementation of the project.	Support	30	100.00%
	Oppose	0	0.00%
	Don't know	0	0.00%

All local stakeholders are supportive to the implementation of the project, believing that the Project help improve the life of local people and promote local economic development without adverse environmental impact.

However, during the operation, some main issues were raised by local stakeholder and the developer should pay attention and solve these issues which are listed as following:

1. Some measurements should be taken to control the environmental pollution;

2. Project developer should ensure the security of the power station during the operation period;

For the first issue, as the project will merely cause environmental pollution during the operation period, this issue can be easily controlled; for the second issue, all the workers should receive the safety training regularly.

Communications with Local stakeholders are being carried out at periodic intervals. Key implementation schedules or changes of the project will be communicated to the local authority, who will inform the neighbourhood committee and the local residents, the comments and suggestions from residents will be collected by the local authority meanwhile. And the local government agencies and competent authorities will conduct spot checks on the implementation of the project from time to time, and give suggestions on the involved rectification problems. There are no negative comments received for the project. In line with VCS requirements all the processes have been implemented to receive comments from local stakeholders as well as communicate with them at periodic intervals.

2.3 AFOLU-Specific Safeguards

Not applicable due to the project is non-AFOLU project.

3 IMPLEMENTATION STATUS

3.1 Implementation Status of the Project Activity

The project is implemented in accordance with the description of the PD. Four sets of CMM power generators with total capacity of 3.5 MW (2*0.75MW & 2*1MW) have been installed to utilize CMM for power generation. During the second monitoring period from 26-August-2021 to 25-May-2022, 3 of the 4 sets with 2.75MW generators have been operated to generate electricity, the reason for not being full power operation is that the methane from the coal mine is insufficient. In this monitoring period, electricity of 9,991.8 MWh generated by the project supplied to Wenjiaba Coal mine and 2,187.26 tCH_4 from the coal mine was utilized. During this monitoring period, the surplus electricity generated by the project supplied to CSPG is not calculated for CO_2 emission reduction, which consisted with the situation described in the registered PD.

The timeline of the project is as below:

Start date of construction	15-July-2018
Start date of commissioning	24-September-2020
Start date of the crediting period	24-September-2020

In this monitoring period from 26-August-2021 to 25-May-2022, there are 3 to 4 sets of CMM power generators have been put into generation, the operation capacity load is about 71.4% of the actual capacity load with total four sets of CMM power generators.

During this monitoring period, the power plant run continuously. No events or situations, which may impact the applicability of the applied methodology, occurred during this monitoring period.

The technical process of the Project is shown in Figure 3-1. The Project installed gas analyzers and flow meters to respectively monitor the methane concentration and CMM volume sent to the CMM power plants. Electricity meters (M1) was installed to monitor the electricity exported to coal mines. Table 1 shows the key technical specifications of CMM gas generators installed.

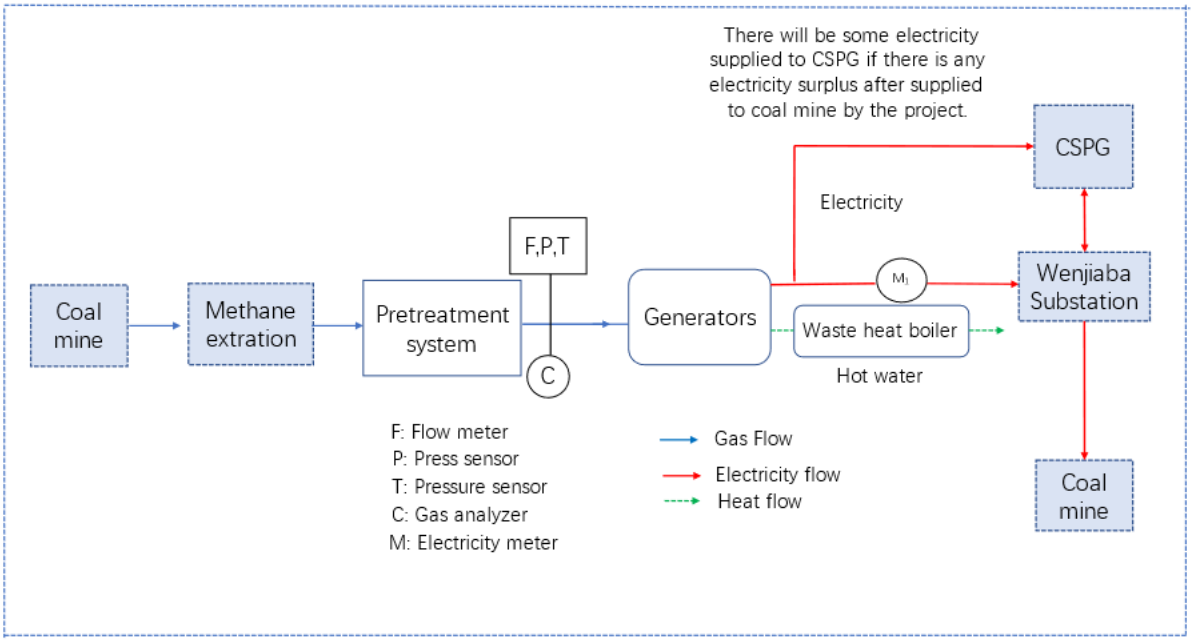

Figure 3-1: Project process diagram

Table 1: Generator Specifications

Type	P750GF	P1000GF
Supplier	Henan Diesel Engine Industry Co., Ltd.	Henan Diesel Engine Industry Co., Ltd.
Quantity	2	2
Rated power（kW）	750	1,000
Rated current (A)	48	82
Rated voltage (V)	10,500	10,500
Rated speed (r/min)	1,000	1,500
Frequency（Hz）	50	50
Power factor	0.8	0.8
Life time (year)	10	10

3.2 Deviations

3.2.1 Methodology Deviations

There is no methodology deviation applied to this monitoring period.

3.2.2 Project Description Deviations

There is no project description deviation applied to this monitoring period.

3.3 Grouped Projects

The Project is not a grouped project.

4 DATA AND PARAMETERS

4.1 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_{CH4}
Data unit	tCO_2e/ 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	ACM0008 (Version 08.0) default value

measurement methods and procedures applied	
Purpose of Data	Calculation of project emissions
Comments	44/16 = 2.75tCO_2e/tCH_4

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 (CSPG)
Source of data	DNA of China
Value applied	0.5088
Justification of choice of data or description of measurement methods and procedures applied	Calculated as per "Tool to calculate the emission factor for an electricity system" (version 07.0)
Purpose of Data	Baseline emission calculation
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	Calculated as per "Tool to calculate the emission factor for an electricity system" (version 07.0)
Purpose of Data	Calculation of project emissions.
Comments	-

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 calculated 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℃

4.2 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 to be 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 recorded by the project proponent will be archived for two years following the end of the crediting period.
Frequency of monitoring/recording	Continuously monitored and daily recorded
Value applied	

Year	$MT_{PJ,s,i,y}$
26-August-2021~31-December-2021	897.42
1-Janurary-2022~25-May-2022	1,289.84
Total	2,187.26

Please refer to ER spreadsheet for monthly values.

Monitoring equipment	A multi-parameter flow meter (which functions as a flow meter, a pressure transmitter and a temperature transmitter at the same time) has been installed to continuously measure the gas flow (in volume), pressure and temperature. A gas analyzer has been installed to continuously measure the methane concentration in the CMM. For more information of the measuring equipment, please refer to Table 4-2.
QA/QC procedures to be applied	The flow meter is calibrated annually according to the relevant standard "Verification regulation of different pressure type flow meter (JJG640-2016)". The gas analyzer is calibrated annually in compliance with the industrial standard Non-dispersive Infrared Methane Transmitters for Coal Mine (JJG 1138-2017). Please refer to Table 4-2 for calibration information
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 $D_{CH4.}$
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 to be 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 recorded by the project proponent will be archived for two years following the end of the crediting period.
Frequency of monitoring/recording	Continuously monitored and daily recorded
Value applied	

Year	$MT_{PJ,s,i,y}$
26-August-2021~31-December-2021	897.42
1-Janurary-2022~25-May-2022	1,289.84
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Monitoring equipment	A multi-parameter flow meter (which functions as a flow meter, a pressure transmitter and a temperature transmitter at the same time) has been installed to continuously measure the gas flow (in volume), pressure and temperature. A gas analyzer has been installed to continuously measure the methane concentration in the CMM. For more information of the measuring equipment, please refer to Table 4-2.
QA/QC procedures to be applied	The flow meter is calibrated annually according to the relevant standard "Verification regulation of different pressure type flow meter (JJG640-2016)". The gas analyzer is calibrated annually in compliance with the industrial standard Non-dispersive Infrared Methane Transmitters for Coal Mine (JJG 1138-2017). Please refer to Table 4-2 for calibration information.
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_{CH4}.
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	$EG_{use,k,y}$ ($EG_{PJ,grid,y}$)
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 to be applied	The electricity meter (M1) is monthly recorded by the project proponent. All electronic data and paper documents will be archived for two years following the end of the crediting period.
Frequency of monitoring/recording	Continuously monitored and monthly recorded
Value applied	Year: 26-August-2021~31-December-2021; $EG_{use,k,y}$ ($EG_{PJ,grid,y}$): 4,144.135

	01-Janurary-2022~25-May-2022 | 5,847.665 Total | 9,991.8 For the project, the surplus electricity delivered to CSPG is not included in the emission reduction calculation.
Monitoring equipment	The electricity meter(M1), for detailed information of the meter, please refer to Table 4-2.
QA/QC procedures to be applied	The data is cross checked with Electricity Transaction Note and the monitored data is consistent with that on Electricity Transaction Notes during this monitoring period. Calibration is carried out once a year to ensure normal operation in compliance with the industrial standard Technical Administrative Coad of Electric Energy Metering (DL/T 448-2016).
Purpose of data	Calculation of baseline emissions.
Calculation method	-
Comments	-

Data / Parameter	GWP_{CH4}
Data unit	tCO_2e/ tCH_4
Description	Global warming potential of methane
Source of data	IPCC Fifth Assessment Report: Climate Change 2013 (AR5)[4]
Value applied	28
Justification of choice of data or description of measurement methods and procedures applied	IPCC Fifth Assessment Report: Climate Change 2013 (AR5)
Purpose of Data	Baseline emission and project emission calculation
Comments	-

Data / Parameter	Eff_{ELEC}
Data unit	%

[4] As per Section 3.14.4 of VCS Standard 4.1, for GHG emission reductions occurring on or after 1 January 2021, all ex-ante estimates and ex-post calculations shall be converted to CO_2e using GWP values from the IPCC Fifth Assessment Report (AR5). For GHG emission reductions occurring on or before 31 December 2020, all ex-ante estimates and ex-post calculations may be converted to CO_2e using either the GWP values from the IPCC Fourth Assessment Report (AR4) or those from AR5.

Description	Efficiency of methane destruction in power plant
Source of data	ACM0008 (Version 07)
Value applied	99.5
Justification of choice of data or description of measurement methods and procedures applied	IPCC reference
Purpose of Data	Project emission calculation
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 to be applied	The electricity meter (M1) is monthly recorded by the project proponent. All electronic data and paper documents will be archived for two years following the end of the crediting period.
Frequency of monitoring/recording	Continuously monitored and monthly recorded
Value applied	0
Monitoring equipment	The electricity meter (M1)
QA/QC procedures to be applied	-
Purpose of data	Calculation of project emissions.
Calculation method	-
Comments	The electricity consumed by the project is imported from CSPG to the power station through coal mine, and the electricity is measured by electricity meter (M1) installed at the project site.

	The electricity meter was calibrated annually according to the industrial standard "Technical administrative code of electric energy metering (DL/T448-2016)" The electricity generated by this project can meet its own electricity demand, so this project does not require grid power supply during this monitoring period.

4.3 Monitoring Plan

The monitoring plan presented in this report 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 4-1 shows the positions of the monitoring instruments and Table 4-1 lists the corresponding parameters monitored:

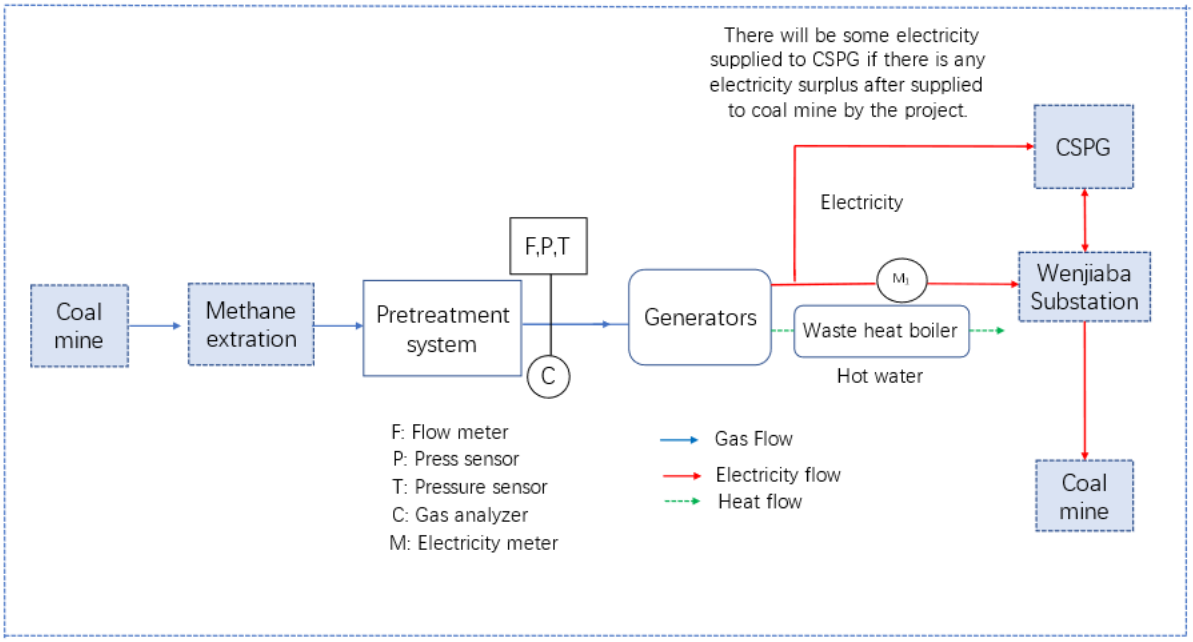

Figure 4-1: Project monitoring diagram

Table 4-1: Corresponding parameters monitored

Position	Parameter Monitored	Description
CMM Inflow Monitoring: the flow meter with	$MT_{PJ,s,i,y}$ and $MM_{ELEC,y}$	Methane concentration, gas flow rate, pressure and temperature are monitored on-site and used to calculate methane from

pressure sensor and temperature sensor and gas analyzer are installed at the outlet of the pretreatment system		source s captured and destroyed by use of power generation and methane measured sent to use of power generation
Electricity Monitoring: Electricity meter (M_1) is installed at the project site to monitor the electricity delivered to Wenjiaba coal mine and electricity imported through the coal mine from the CSPG The electricity delivered to CSPG will not be included in the calculation of emission reduction if there is any electricity surplus so these parts of electricity are not monitored.	$EG_{use,k,y}$ ($EG_{PJ,grid,y}$)、 $EC_{PJ,j,y}$	Electricity generation by the project and electricity consumption for the project activity are continuously monitored.
/	GWP_{CH4}、 $Eff_{i,y}$ ($Eff_{ELEC,y}$)、	Global warming potential of methane 、 efficiency of methane destruction in use i

Table 4-2: Information of monitoring equipment installed

Equipment	Model	Serial No.	Accuracy	Date of calibration	Validity	Parameter monitored
Flow meter	TY-7030	R91003	±1%	25-May-2021; 25-April - 2022	24-May-2022; 24-April-2023	$MT_{PJ,s,i,y}$ and $MM_{ELEC,y}$
Pressure sensor			0.5%FS			
Temperature sensor			0.2%SF			
Gas analyzer	TY-6020EX	TY6020EX19012501	methane: ± 2%FS	08-June-2021	07-June-2022	$MT_{PJ,s,i,y}$ and $MM_{ELEC,y}$
Electricity meter (M_1)	DSSD71	1900030130	0.5S	31-May-2021	30-May-2022	$EG_{use,k,y}$ ($EG_{PJ,grid,y}$), $EC_{PJ,j,y}$

(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 Electricity Transaction Note (ETN), 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 4-2 shows the operation and management structure of the Project.

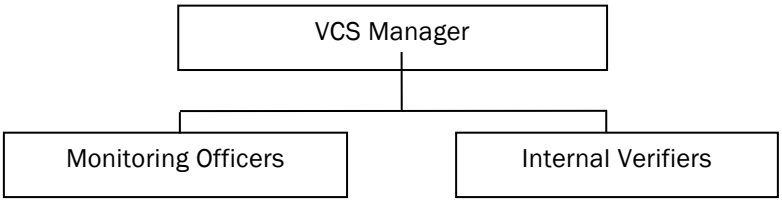

Figure 4-2 Operation and management structure of the project

(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 electricity transaction note 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. During this monitoring period, the meters all ran well, no such situation happened.

The installation of the electricity metering equipment will fulfill the requirements of "DL/T448–2016 Technical Administrative Code of Electric Energy Metering"[5] . The accuracy should not be less than 0.5S. The installation of flow meters and gas analyzers will fulfill the national standard (JJG640-2016 and JJG 1138-2017). All the meters will be checked and maintained periodically.

(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.

5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

5.1 Baseline Emissions

According to the methodology ACM0008 (version 07), baseline emission is given by the following equation:

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

Where:

BE_y	=	Baseline emissions in year *y* (tCO_2);
$BE_{MD,y}$	=	Baseline emissions from destruction of methane in the baseline scenario in year *y* (tCO_2);

[5] https://wenku.baidu.com/view/c8ad0b432379168884868762caaedd3383c4b59e.html

$BE_{MR,y}$	=	Baseline emissions from release of methane into the atmosphere in year y that is avoided by the project activity (tCO_2e);
$BE_{Use,y}$	=	Baseline emissions from the production of power replaced by the project activity in year *y* (tCO_2e).

1. Baseline emissions from methane destroyed

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

2. Baseline emission from methane released into the atmosphere

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

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

Where:

$BE_{MR,y}$	=	Baseline emissions from release of methane into the atmosphere in year y that is avoided by the project activity (tCO_2e)
$MT_{PJ,s,i,y}$	=	Methane from source s captured and destroyed by use i in the project activity in year y (t CH_4);
$MT_{BL,s,I,y}$	=	Methane from source s that would have been captured and destroyed by use i in the baseline scenario in the year y (t CH_4) ;
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 CO_2e/t CH_4)

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

Thus,

$$BE_{MR,y} = \sum_{i}\sum_{s} MT_{PJ,s,i,y} \times GWP_{CH4} \qquad (3)$$

Thus, the calculation result of $BE_{MR,y}$ is as the following table 5-1.

Table 5-1 Calculation of $BE_{MR,y}$

Year	$MT_{PJ,s,i,y}$	GWP_{CH4}	$BE_{MR,y}$
	tCH_4	tCO_2/tCH_4	tCO_2
26-August-2021~31-December-2021	897.42	28	25,127
01-January-2022~25-May-2022	1,289.84	28	36,115
Total			61,242

3. Baseline emission from power generation replaced by project

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

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

Where,

$BE_{use,y}$	=	Baseline emissions from energy displaced by the project activity in year y (t CO_2);
$EG_{use,k,y}$	=	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

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 equation can be simplified as followed:

$BE_{Use,y} = EG_{use,k,y} \times EF_{grid,CM,y} = EG_{PJ,grid,y} \times EF_{grid,CM,y}$

The calculation result of $BE_{Use,y}$ is as table 5-2.

Table 5-2 Calculation of $BE_{Use,y}$

Year	$EG_{use,k,y}$ ($EG_{PJ,grid,y}$)	$EF_{k,y}$ ($EF_{grid,CM,y}$)	$BE_{Use,y}$
	MWh	tCO_2/MWh	tCO_2
26-August-2021~31-December-2021	4,144.135	0.5088	2,108
01-January-2022~25-May-2022	5,847.665	0.5088	2,975
Total			5,083

As a summary, the baseline emission is as table 5-3.

Table 5-3 Summary of baseline emission

Year	$BE_{MD,y}$	$BE_{MR,y}$	$BE_{Use,y}$	BE_y
	tCO_2	tCO_2	tCO_2	tCO_2
26-August-2021~31-December-2021	0	25,127	2,108	27,235
01-January-2022~25-May-2022	0	36,115	2,975	39,090
Total	0	61,242	5,083	66,325

5.2 Project Emissions

Project emissions are defined by following equations:

$PE_y = PE_{ME} + PE_{MD} + PE_{UM}$

Where:

PE_y	=	Project emissions in year *y* (tCO_2e);
PE_{ME}	=	Project emissions from energy use to capture and use methane (tCO_2e);
PE_{MD}	=	Project emissions from methane destroyed (tCO_2e);
PE_{UM}	=	Project emissions from un-combusted methane (tCO_2e).

1. Combustion emissions from additional energy required for CMM capture and use

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

Where,

$PE_{EC,y}$	=	Project emissions from electricity consumption in year *y* (tCO_2/yr)
$EC_{PJ,j,y}$	=	Quantity of electricity consumed by the project electricity consumption source j in year y (MWh/yr)
$EF_{EF,j,y}$	=	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

In this monitoring period, the electricity consumed by the project is from the electricity produced by the project, there is no electricity consumed from the grid.

Thus, $EC_{PJ,j,y} = 0$, $PE_{ME,y} = 0$ in this monitoring period.

2. Combustion emissions from use 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.

$$PE_{MD,y} = \sum_{i} MD_{i,y} \times CEF_{CH4} \quad (14)$$

Where:

$PE_{MD,y}$	=	Project emissions from methane destroyed (tCO_2e)
$MD_{i,y}$	=	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_{CH4}	=	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.

Thus, $PE_{MD,y}=MD_{ELEC,y}\times CEF_{CH4}$

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.

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

Thus, $PE_{MD,y}=MD_{ELEC,y}\times CEF_{CH4}= MM_{ELEC,y} \times Eff_{ELEC,y}\times CEF_{CH4}$ (16)

Where:

$MD_{ELEC,y}$	=	Methane destroyed through use of power generation in year y ($t CH_4$)
$MM_{ELELi,y}$	=	Methane measured sent to use of power generation in year y (tCH_4)
$Eff_{ELEL,y}$	=	Efficiency of methane destruction in use of power generation in year y (%)

Thus, the calculation result of $PE_{MD,y}$ is as table 5-4.

Table 5-4 Calculation of $PE_{MD,y}$

Year	$MM_{ELEC,y}$	$Eff_{ELEC,y}$	CEF_{CH4}	$PE_{MD,y}$

	tCH_4	%	tCO_2/ tCH_4	tCO_2
26-August-2021~31-December-2021	897.42	99.5	2.75	2,456
01-January-2022~25-May-2022	1,289.84	99.5	2.75	3,530
Total				5,986

3. Un-combusted methane from project activity

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:

$$PE_{UM,y} = GWP_{CH4} \times \sum_{i} MM_{i,y} \times (1 - Eff_{i,y}) \quad (17)$$

Where:

$PE_{UM,y}$	=	Project emissions from un-combusted methane (tCO_2e)
GWP_{CH4}	=	Global warming potential of methane ($t CO_2e/t CH_4$)
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 $Eff_{i,y} = Eff_{ELEC,y}$

For the project, $PE_{UM,y}=GWP_{CH4}\times MM_{ELEC,y}\times(1-Eff_{ELEC,y})$. $PE_{UM,y}$ for the project is calculated as the following table 5-5.

Table 5-5 Calculation of $PE_{UM,y}$

Year	$MM_{ELEC,y}$	$Eff_{ELEC,y}$	GWP_{CH4}	$PE_{UM,y}$
	tCH_4	%	tCO_2/ tCH_4	tCO_2
26-August-2021~31-December-2021	897.42	99.5	28	126
01-January-2022~25-May-2022	1,289.84	99.5	28	181
Total				307

Hence the project emission is summarized as follows.

Table 5-6 Summary of project emission

Year	$PE_{ME,y}$	$PE_{MD,y}$	$PE_{UM,y}$	PE_y
	tCO_2	tCO_2	tCO_2	tCO_2
26-August-2021~31-December-2021	0	2,456	126	2,582
01-January-2022~25-May-2022	0	3,530	181	3,711
Total	0	5,986	307	6,293

5.3 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 (LE_y) is taken as zero.

5.4 Net GHG Emission Reductions and Removals

Year	Baseline emissions or removals (tCO_2e)	Project emissions or removals (tCO_2e)	Leakage emissions (tCO_2e)	Net GHG emission reductions or removals (tCO_2e)
26-August-2021~31-December-2021	27,235	2,582	0	24,653
01-January-2022~25-May-2022	39,090	3,711	0	35,379
Total	66,325	6,293	0	60,032

Comparison of actual emission reductions with estimates during validation:

The actual emission reductions of 60,032 tCO_2e achieved in this monitoring period is 22.30%[6] lower than the estimated emission reductions 77,260 tCO_2e[7]. One reason is that the operation capacity of the project during this monitoring period is 2.75MW (only 1 set of 0.75MW and 2 sets

[6] (60,032 tCO_2e-77,260 tCO_2e)/ 77,260 tCO_2e=-22.30%

[7] As per the report, the annual emission reduction of the project is 103,297 tCO_2e, thus the estimated emission reduction in the monitoring period from 26-August-2021 to 25-May-2022 (covering 273days) is 77,260 tCO2e, ie. 77,260 tCO_2e=103,297 tCO_2e*273 days/365 days.

of 1MW CMM generators have been operated to generate electricity), while the actual installed capacity of the project is 3.5MW, the estimated emission reductions for this monitoring period was re-calculated based on the actual operation capacity. The re-calculated estimated emission reductions for this monitoring period are 60,705 tCO_2e (=77,260 tCO_2e× 2.75MW / 3.5MW). The actual emission reductions achieved in this monitoring period is 1.11%[8] lower than the re-calculated estimated emission reductions. Considering the actual situation, the difference is reasonable.

[8] (60,032 tCO_2e- 60,705 tCO_2e)/ 60,705 tCO_2e=-1.11%

APPENDIX 1: SUPPORTING EVIDENCE

Evidence for SDG Target 13.0:
The corresponding emission reduction in the first and second monitoring period have been listed in below table.

Start Date	End Date	ER_y (tCO_2e)
24-Sep-2020	25-Aug-2021	49,822
26-Aug-2021	25-May-2022	60,032
Total		109,854

Please refer to the Joint PD-MR for the emission reduction achieved during the first monitoring period, which are accessible from the link below:
https://registry.verra.org/app/projectDetail/VCS/2383
Please refer to section 5.4 in this MR for the emission reduction achieved during the second monitoring period.

Evidence for SDF Target 9.4: the document of Statement about the coal production of Guizhou Wenjiaba Coal Mine provided by the project proponent has been submitted to VVB for verification.

Evidence for SDG Target 8.5: The payroll of the project staff, including name, gender, wage, insurance and housing fund and other specific information has been submitted to VVB for verification. Thus, the payroll is not included as appendices to this report due to confidentiality requirement of the project proponent.