



GUIZHOU PANJIANG LOW CONCENTRATION COAL MINE METHANE POWER GENERATION PROJECT PHASE 2



Document Prepared by Climate Bridge Ltd.

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1 PROJECT DETAILS

1.1 Summary Description of the Project

Guizhou Panjiang Low Concentration Coal Mine Methane Power Generation Project Phase 2 (hereinafter referred to as the Project) will utilize the low concentration coal mine methane (CMM) from Panjiang coal mine for power generation to supply electricity to the coal mines where the Project is located. The Project is located in Pan County, Liu Panshui City, Guizhou Province, China. The Project includes three coalmines (Yueliangtian, Jinjia, Xiangshui) with five mining areas (Nansan, Jinyi, Jin'er, Hexi, Botu), with total methane resource of 52.51 billion m³ and extractable methane of 31.83 billion m³¹.

Prior to the implementation of the project, all three coal mines were equipped with CMM extraction facilities and all extracted CMM was vented into the atmosphere directly; the electricity consumed at coal mines was supplied by two captive power plants² and imported from China Southern Power Grid (CSPG) through the electricity distribution network in Panjiang coal mine area; 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 CSPG 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 methane concentration of 6-30% to produce electricity. No coal bed methane (CBM) or ventilation air methane (VAM) utilization is involved. Thirty CMM power generation units will be installed with a total installed capacity of 17.7MW, destroying 25.22 million m³ of methane annually³. After the full operation of the Project, the annual exported electricity will be 78,163 MWh, which will be supplied to the coalmines through the electricity distribution network in Panjiang coal mine area, replacing the electricity that would otherwise have been purchased from the CSPG. 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 expected total emission reduction of the Project in the crediting periods of 10 years is 4,199,250 tCO₂e, and the annual emission reduction is estimated to be 419,925 tCO₂e.

¹ Feasibility Study Report (FSR)

² Page 72 of the FSR, the capacity of the two captive power plants are 30MW (Laowuji, operated since 1994) and 35MW (Huopu, operated since 2002) respectively

³ Calculated according to FSR, $MD_{ELEC,y} = MM_{ELEC,y} \times Eff_{ELEC}$, where $MM_{ELEC,y} = 25.35$ million m³, $Eff_{ELEC} = 0.995$ (IPCC 1996)

1.2 Sectoral Scope and Project Type

Sectoral Scope 08: Mining/mineral production

The project is not a grouped project.

1.3 Project Eligibility

The scope of the VCS Program includes:

1. The six 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 CSPG. Thus, the project applicable to this scope.
2. Ozone-depleting substances: NA
3. Project activities supported by a methodology approved under the VCS Program through the methodology approval process: NA
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 07) 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: NA

Meanwhile, the project is not belonged to the projects excluded in Table 1 of VCS Standard 4.0.

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

1.4 Project Design

NA.

1.5 Project Proponent

Organization name	Guizhou Panjiang CBM Development & Utilization Co., Ltd.
Contact person	Yang Shiliang
Title	General Manager
Address	Shijijinuan Plaza, Commercial Business Centre, Building D 15F, Guiyang, Guizhou Province, China

Telephone	+86 851-4813697
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1.6 Other Entities Involved in the Project

Organization name	Climate Bridge Ltd.
Role in the project	VCU buyer
Contact person	Gao Zhiwen
Title	General Manager
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1.7 Ownership

The approval of Environmental Impact Assessment (EIA), Feasibility Study Report (FSR), and Letter of Approval for the Project as a CDM Project issued by China National Development and Reform Commission, and the business license of the project owner are evidences for legal right. Besides, the purchasing contract of generators, and the purchasing power agreement are the evidences for the ownership of the plant, equipment and power generating.

1.8 Project Start Date

01-April-2011 (*operation start date*).

1.9 Project Crediting Period

The crediting period under CDM started on 05-December-2012 and will be expired on 04-December-2022 with 10 years fixed.

The crediting period under CCER started on 01-April-2011 and will be expired on 04-December-2022.

The VCS crediting period of the Project is from 01-April-2011 to 31-March-2021 (both days included) totally 10 years.

1.10 Project Scale and Estimated GHG Emission Reductions or Removals

Project Scale	
Project	
Large project	✓

Year	Estimated GHG emission reductions or removals (tCO ₂ e)
01-April-2011 to 31-December-2011	274,381
01-January-2012 to 31-December-2012	364,179
01-January-2013 to 31-December-2013	431,778
01-January-2014 to 31-December-2014	431,778
01-January-2015 to 31-December-2015	431,778
01-January-2016 to 31-December-2016	431,778
01-January-2017 to 31-December-2017	431,778
01-January-2018 to 31-December-2018	431,778
01-January-2019 to 31-December-2019	431,778
01-January-2020 to 31-December-2020	431,778
01-January -2021 to 31-March-2021	106,466
Total estimated ERs	4,199,250
Total number of crediting years	10
Average annual ERs	419,925

The estimated emission annual reductions in the VCS PD are different from the estimated ERs in the CDM PDD. The reason is that the different values of GWP_{CH₄} (21 tCO₂/tCH₄ before 2013 and 25 tCO₂/tCH₄ after 2013) are taken into account in this VCS PD, while the CDM PDD taking the fixed value of 21 tCO₂/tCH₄.

1.11 Description of the Project Activity

Scenario existing prior to the implementation of the project activity

Before the implementation of the project activity, all the extracted CMM with 6%-30% methane from the mining areas involved in the Project is vented into the atmosphere without any

destruction or utilization; the CSPG and two captive fuel-fired power plants⁴ provide electricity to the coal mines and the heat is provided by waste coal boilers. As shown in Figure 1-1, the total electricity consumed in the coal mines in 2009 was 732,321 MWh, of which 376,228 MWh was supplied by the captive plants and 356,093 MWh was imported from CSPG⁵. Although the project can generate 78,163 MWh electricity in addition to the captive power plants, the coal mines still need to import electricity from CSPG. As a result, the electricity generated by the project activity replaces the equivalent electricity from CSPG, not that from the captive power plants. In addition, it is always conservative to calculate emission reductions based on CO₂ emission factor of CSPG (0.7134tCO₂/MWh), which is less than that of the captive power plants (0.8042tCO₂/MWh⁶).

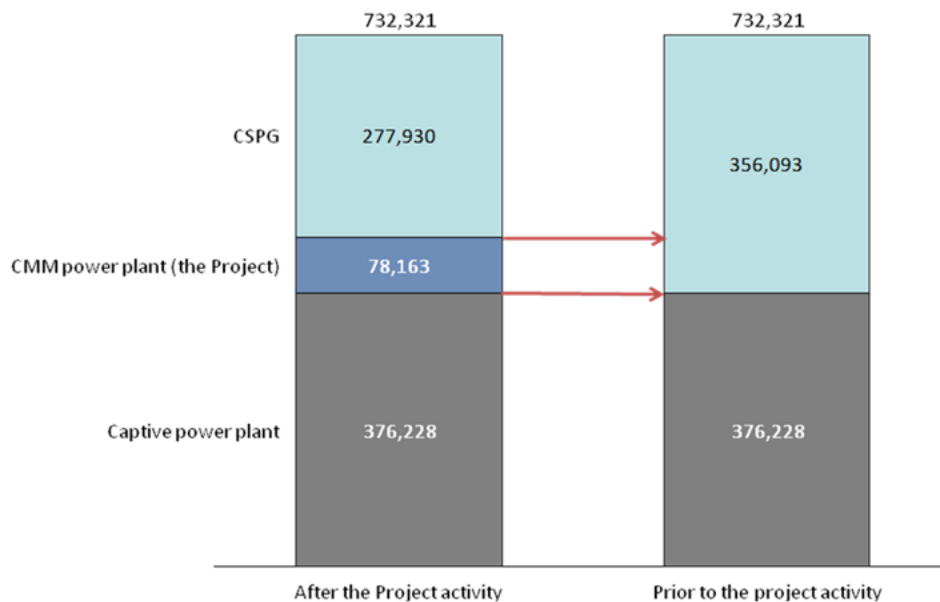


Figure 1-1 Electricity balance (MWh) in 2009; prior to the project activity (data) and after the project activity (predicted)

There are 6 permanent methane extraction stations at the site with 27 methane extraction pumps, and high and low negative pressure extraction systems for each station. The extraction capacity is 5,340 m³/min⁷. As shown in Table 1-1, the total extracted low concentration CMM from the three coal mines in 2008 and 2009 is approximately 64.62 million Nm³. The expected power supply of the Project is from the CSPG.

⁴ FSR

⁵ FSR

⁶ According to ACM0008, $EF_{captive,y} = EF_{CO_2,i} * 3.6 TJ / (Eff_{captive} * 1000 MWh)$, where $EF_{CO_2,i} = 87.3 kgCO_2/TJ$ (the most conservative value according to IPCC 2006), $Eff_{captive} = 39.08\%$ (as per "2010 Baseline Emission Factors for Regional Power Grids in China", the optimal efficiency of coal-fired power plant is 39.08%, which is conservative).

⁷ FSR

Table 1-1 Low concentration CMM extraction of the coal mines in the Project⁸

Name of coal mine	Quantity of extracted low concentration methane (6-30%) (million Nm ³)		Total (million Nm ³)
	2008	2009	
Yueliangt ian	20.8881	22.2727	43.1608
Jinjia	6.2957	13.9710	20.2667
Xiangshu i	0.4571	0.7371	1.1942
Total	27.6409	36.9808	64.6217

Baseline scenario

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

Project activity scenario

Thirty CMM power generation units with total capacity of 17.7 MW will be installed to utilize CMM for power generation. The amount of pure methane destructed is estimated to be 25.22 million Nm³ per year, and the annual exported electricity is 78,163MWh.

The technical process of the Project is shown in Figure 1-2. The low concentration CMM is delivered through methane extraction pumps to pretreatment 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. Table 1-2 and Table 1-4 show the number and capacity of CMM gas generators and waste heat boilers in the three coal mines.

The power generators are produced by the Shengli Oil Field Shengli Power Machinery Group Co.,Ltd. (referred to Shengdong afterwards) and Guizhou Zhenfeng Power Generation Co.,Ltd. with the specifications shown in Table A-4. After site survey and taking advice from professional

⁸ FSR

experts, the Guizhou Coal Mine Design and Research Institute determined the annual operating hours to be 6,000 hours⁹ in the FSR, and thus the plant load factor (PLF) is 0.68¹⁰.

The equipment employed in the Project is all produced domestically without technology transfer.

As shown in Figure 1-2, the Project will install gas analyzers and flow meters to respectively monitor the methane concentration and CMM volume sent to the CMM power plants. Annual gas sampling for laboratory analysis of the NMHC concentration in the CMM sent to the gas engines will be carried out. Electricity meters will be installed to monitor the electricity exported to coal mines.

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 CSPG.

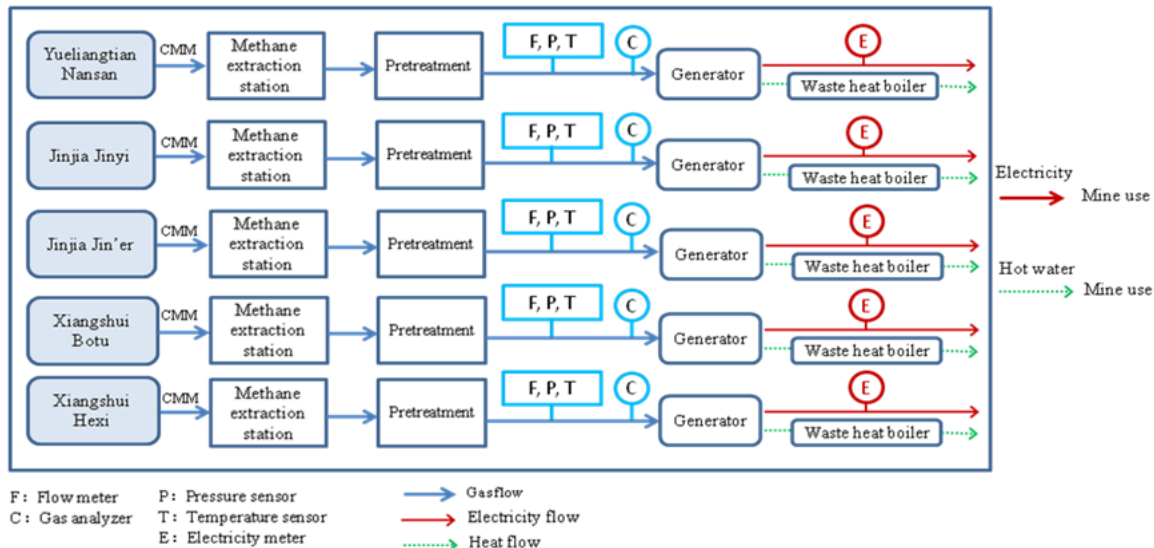


Figure 1-2 Project process diagram

Table 1-2 Quantity and Capacity of power generators¹¹

Coal mine/mining area		Quantity	Capacity (kW)
Jinjia	Jinyi	6*600+2*500	4,600
	Jin'er	4*600	2,400

⁹ FSR

¹⁰ PLF=6000/8760=0.68

¹¹ FSR

Yueliangtian	Nansan	8*600	4,800
Xiangshui	Botu	5*600+1*500	3,500
	Hexi	4*600	2,400
Total		30	17,700

Table 1-3 Generator Specifications¹²

Type	600GJZ1-1PWWD	600GF1-1RW	500GF1-3RW	500GF-WS-2
Supplier	Shengli Oil Field Shengli Power Machinery Group Co.,Ltd. (Shengdong)			Guizhou Zhenfeng Power Generation Co.,Ltd.
Rated power (kW)	600	600	500	500
Continuous power (kW)	480	480	400	400
Rated current (A)	1,083	1,083	901	902
Rated voltage (V)	400	400	400	400
Rated speed (r/min)	1,000	1,000	1,000	1,000
Frequency (Hz)	50	50	50	50
Life time (year)	10	10	10	10

Table 1-4 Number of waste heat boilers¹³

Coal mine/mining area		Number of waste heat boilers
Jinjia	Jinyi	8
	Jin'er	4
Yueliangtian	Nansan	8
Xiangshui	Botu	6
	Hexi	4

¹² FSR

¹³ FSR

Total	30
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Table 1-5 Waste Heat Boiler Specifications¹⁴

Type	Q3/500/0.35/1.0/115/60	Q2/500-0.28/1.0/120	ZG-35A
Rated thermal power (MW)	0.35	0.28	0.25
Rated outflow pressure (MPa)	1	1	1.25
Rated outflow temperature (°C)	115	120	95
Return water temperature (°C)	60	60	60
Life time (year)	10	10	10

1.12 Project Location

The Project is located in Dashan Town, Xiangshui Town, Hongguo Town, Panjiang Town, Pan County, Liupanshui City, Guizhou Province, People's Republic of China. The geographic coordinates of the Project site is shown as follows:

Table 1-1 Geographic coordinates of the coal mines involved in the project

Coal mine	Power station	Decimal Longitude	Decimal Latitude
Jinjia	Jinyi	104.5295E	25.6857N
	Jin'er	104.5428E	25.7003N
Yueliangtian	Nansan	104.5123E	25.9099N
Xiangshui	Botu	104.5993E	25.4693N
	Hexi	104.5835E	25.4634N

The geographic locations of the involved coal mines are shown in Figure 1-3.

¹⁴ FSR



Figure 1-3 Location of the project

1.13 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 CSPG provided the equivalent amount of electricity produced by the Project (as discussed above, the electricity generated by the Project will only replace electricity from CSPG) 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 CSPG provides the equivalent amount of electricity produced by the Project in the baseline.

1.14 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 China ;
2. Guidance Catalogue for the Development of Renewable Energy Industry;
3. Opinions of the General Office of the State Council on Further Accelerating the Extraction and Utilization of Coalbed Methane (Coal Mine Gas);
4. Chinese National Coalmine Safety Regulation;
5. Notice of the National Development and Reform Commission on the issuance of the 11th Five-Year Plan for The Development and Utilization of Coalbed Methane (Coal Mine Gas).

The project obtained the approval letters from governmental authorities: Panxian Development and Reform Commission, as well as Panxian Environmental Protection Department. The two approvals well demonstrate that local government permits the construction of the project. Consequently, the project is compliance with laws, status and other regulatory frameworks.

1.15 Participation under Other GHG Programs

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

The project has been registered as a CDM project in UNFCCC on 05-December-2012 (UNFCCC Ref. 6948). The crediting period started on 05-December-2012 and will be expired on 04-December-2022. Please refer to the following link for details: <https://cdm.unfccc.int/Projects/DB/RINA1344437738.67/view>

The project has been registered as a CCER project on 26-May-2014 (Ref. 011). The crediting period started on 01-April-2011 and will be expired on 04-December-2022.

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

1.15.2 Projects Rejected by Other GHG Programs

NA.

1.16 Other Forms of Credit

1.16.1 Emissions Trading Programs and Other Binding Limits

The GHG emission reductions of 346,403 tCO₂ generated from 01-April-2011 to 04-December-2012 by the project has been issued as CCER used for Chinese allowance trading, while 1,532,606 tCO₂ in the period of 05-December-2012 to 25-February-2018 issued as a CER.

The GHG emission reductions generated by the project from 26-February-2018 to 31-December-2019 will not be used for compliance with emission trading programs or to meet binding limits on GHG emissions.

All credits from 26-February-2018 to 31-December-2019 will be claimed under VCS program as VCU's for the project to avoid double counting.

1.16.2 Other Forms of Environmental Credit

The project hasn't sought or received another form of environmental credits.

1.17 Additional Information Relevant to the Project

Leakage Management

According to the methodology and registered CDM PDD (version 06), the leakage of the project is zero, thus the leakage management is not applicable to the project.

Commercially Sensitive Information

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

Sustainable Development

The Project will 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.

Further Information

NA.

2 SAFEGUARDS

2.1 No Net Harm

NA.

2.2 Local Stakeholder Consultation

NA.

2.3 Environmental Impact

NA.

2.4 Public Comments

This project was open for public comment from 28-May-2020 to 27-June-2020. There are no public comments received for the project during the comment period.

2.5 AFOLU-Specific Safeguards

NA.

3 APPLICATION OF METHODOLOGY

3.1 Title and Reference of Methodology

NA.

3.2 Applicability of Methodology

NA.

3.3 Project Boundary

NA.

3.4 Baseline Scenario

NA.

3.5 Additionality

NA.

3.6 Methodology Deviations

There is no methodology deviations for the project.

4 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

4.1 Baseline Emissions

NA.

4.2 Project Emissions

NA.

4.3 Leakage

NA.

4.4 Net GHG Emission Reductions and Removals

NA.

5 MONITORING

5.1 Data and Parameters Available at Validation

NA.

5.2 Data and Parameters Monitored

NA.

5.3 Monitoring Plan

NA.