



**Verified Carbon
Standard**

SICHUAN FURONG COAL MINE METHANE UTILIZATION PROJECT

Document Prepared by Goldchina Consultancy International Co., Ltd.

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1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

Sichuan Furong Coal Mine Methane Utilization Project (the Project) is implemented by Sichuan Furong Group's Limited Industrial Company (hereinafter referred to as "Furong Group"). The primary objective of the project is to capture and use coal mine methane ("CMM") for power generation. This will displace electricity used from the Central China Power Grid ("CCPG")¹ for on-site use. CMM is extracted from three of Furong Group's mines, including Baijiao, Shanmushu, and Gongquan coal mines. CMM extracted from three coal mines is prioritized for residential use and the surplus amount is sent for power generation. While the small portion of residential and commercial usage of CMM in the baseline scenario remains unaffected by the Project and no emission reduction is claimed for this part of CMM utilization.

The project activity involves the installation of electricity generators with a combined capacity of 15MW for the generation of power using CMM. Four domestic generators each with a 500kW capacity were commissioned in Baijiao coal mine on 28/11/2007 and during 05/2012-06/2012, three domestic generators installed in Baijiao coal mine were moved to Gongquan coal mine, two sets of 3.048MW gas generators were commissioned in Baijiao coal mine on 25/05/2009. A set of 3.048MW gas generator in Shanmushu coal mine area has been put into commission since 01/09/2013 and another 3.048MW gas generator has been put into commission at Shanmushu coal mine since 01/10/2015. Four domestic generators each with a 500kW capacity were commissioned in Gongquan coal mine on 15/05/2009; During 05/2012-06/2012, three domestic generators installed in Baijiao coal mine were moved to Gongquan coal mine.

Details about the generation capacity of the three coal mines please refer to the table below.

Table 1-1 Generation capacity of the three coal mines

Coal mines	Practical Situation
Baijiao	6.596MW(3.048MW×2units+0.5MW), On 28/11/2007, four domestic generators each with a 500kW capacity were commissioned in Baijiao coal mine ^a ; On 25/05/2009, two sets of 3.048MW gas generator manufactured by GE Jenbacher GmbH were commissioned in Baijiao coal mine.
Shanmushu	6.096MW(3.048MW×2units) One set of 3.048MW gas generator manufactured by GE Jenbacher GmbH has been installed in Shanmushu coal mine area and put into commission since 01/09/2013; Another 3.048MW gas generator manufactured by GE Jenbacher GmbH has been installed in Shanmushu coal mine and put into commission since 01/10/2015.

¹ [The on-site captive power plant was stopped on 11/04/2010 according to the local government requirements, so, the electricity generated by the project only displaced the electricity generated by CCPG after 11/04/2010.

Gongquan	3.50 MW(0.5MW×7units) On 15/05/2009, four domestic generators each with a 500kW capacity were commissioned in Gongquan coal mine. During 05/2012-06/2012, three domestic generators installed in Baijiao coal mine were moved to Gongquan coal mine
Total	16.192MW ^b

Note: ^a During 05/2012-06/2012, three domestic generators installed in Baijiao coal mine were moved to Gongquan coal mine.

^bThe total named capacity of the project activity is 16.192MW, but two sets of 500kW domestic generators are used as back-up (one is in Baijiao coal mine and the other is in Gongquan coal mine), because the equipment failure of 500kW domestic generators is frequent, which was approved by local DRC. Thus the total actual capacity of the project activity is about 15MW.

Through the implementation of the project, it is estimated that an average annual volume of 15.6 million cubic meters of CH₄ will be combusted and destroyed, which, in the baseline scenario, would otherwise be released directly into the atmosphere. Furthermore, average annual 43,890 MWh electricity derived from CMM will be delivered to the Furong coal mines for self-use, which will displace electricity from the CCPG. Waste heat from the power generation process is recovered and utilized for coal miners. However, emission reductions will not be claimed for this component in order to be conservative. Consequently, through CMM combustion and displacement of fossil fuel-fired electricity from the CCPG, the project will reduce 2,829,543 tCO₂ equivalents of greenhouse gas emissions during the 10-year crediting period considering the 28 of GWP_{CH₄}².

During the monitoring period (from 01/01/2013 to 31/12/2017), the monitoring activities were conducted strictly in accordance with the monitoring plan in the approved revised PDD. The project has operated without any accidental or emergency events that might impact the accuracy and/or implementation of monitoring activities.

Date of construction for the project (the CMM power plant in Baijiao Coal Mine start to construct): 30/08/2007

Commissioning start date for the project (the first unit of the CMM power plant in Baijiao Coal Mine began to operate): 28/11/2007

continued operation periods for the project : 20yrs

The project was registered as a VCS project (VCS1446). The 10 year fixed crediting period started on 16/04/2010 and expired on 15/04/2020.

² As per VCS Standard V4.2, for GHG emission reductions occurring on or before 31 December 2020, all ex-ante estimates and ex-post calculations may be converted to CO₂e using either the GWP values from the IPCC Fourth Assessment Report (AR4) or those from AR5. so, the GWP values from from AR5 was applied for the project

During the monitoring period (01/01/2013 to 31/12/2017), the emission reduction achieved by the project is 1,516,883 tCO₂e. The emission reductions in the monitoring period will be verified and issued under VCS rules.

1.2 Sectoral Scope and Project Type

This category would fall within sectoral scope 08: Mining/Mineral Production and 10: Fugitive Emission from Fuels(solid, oil and gas)

The project is not a grouped project.

1.3 Project Proponent

Organization name	Sichuan Furong Group's Limited Industrial Company
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1.4 Other Entities Involved in the Project

Organization name	Goldchina Consultancy International Co., Ltd.
Role in the Project	Consultant
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1.5 Project Start Date

The operation starting date for the project was 18/11/2007.

1.6 Project Crediting Period

10 years fixed crediting period is adopted by the project activity. The project was registered as CDM project (CDM ref no.:2677).

The VCS project crediting period will be ended once the fixed CDM project crediting period expired. The 10 years fixed crediting period started on 16/04/2010 and expired on 15/04/2020.

1.7 Project Location

The proposed project is located in Furong coal mine of Xunchang town in Yibin city of southern Sichuan province, China. The Furong coal mine consists of three mines (Baijiao, Shanmushu, and Gongquan) now. It is located 5km from the center of Xunchang town, 50km from Yibin city, and at a coordinate of 104°39'~104°41' east longitude and 28°25'~28°28' north latitude.

The power generators have been installed at Baijiao, Shanmushu and Gongquan coal mines.

The geographic location of the project is shown in the figure below.

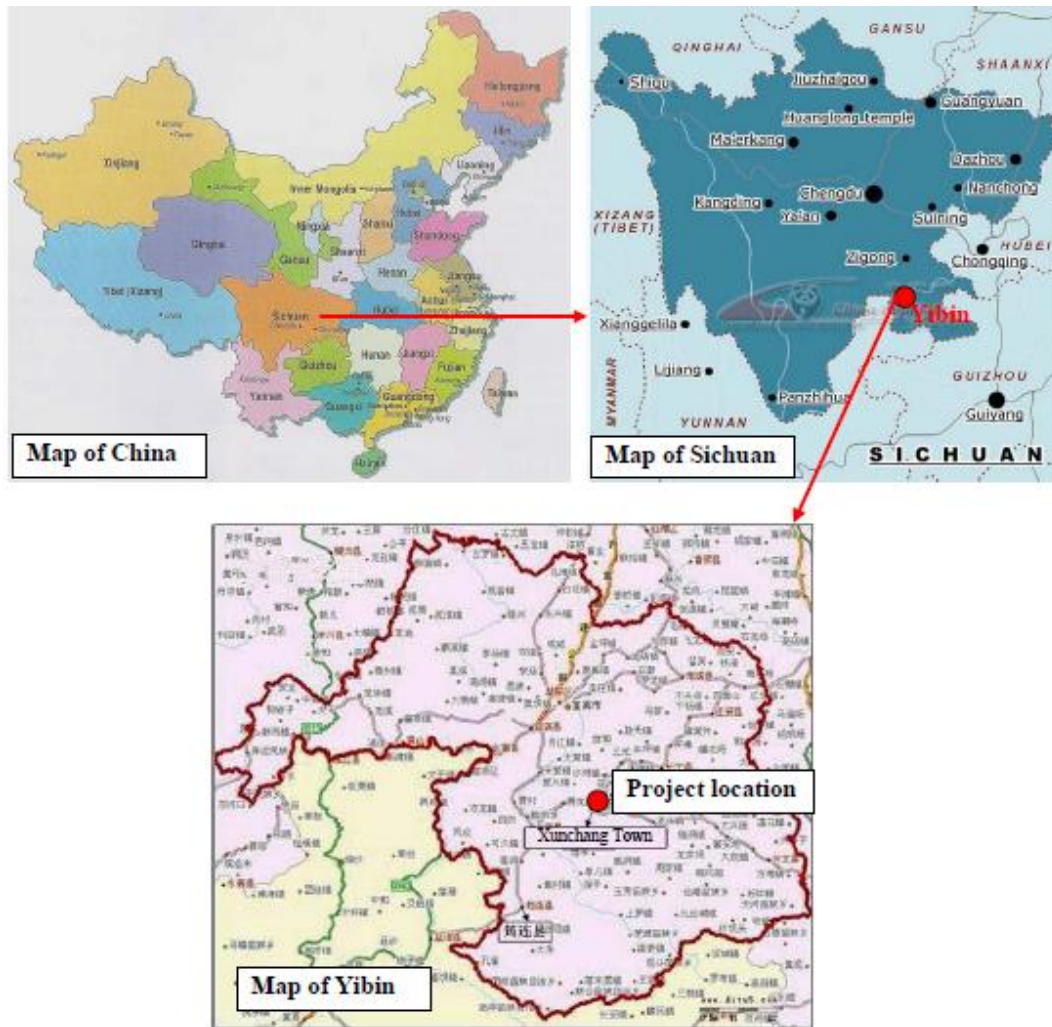


Fig.1-1 Project Location

1.8 Title and Reference of Methodology

ACM0008 Consolidated baseline methodology for coal bed methane, coal mine methane and ventilation air methane capture and use for power (electrical or motive) and heat and/or destruction by flaring or catalytic oxidation (version 04).

Tool to calculate the emission factor for an electricity system (version 01.1)

Tool for the demonstration and assessment of additionality (version 05.2)

1.9 Participation under other GHG Programs

The project has been registered as a CDM project with registration number 2677 and VCS project (project ID: 1446).

1.10 Other Forms of Credit

The project has not created any other form of environmental credit during this monitoring period, which will be verified by VVB. The project was registered as CDM project (CDM no.:2677) with the start date of the fixed crediting period, 16/04/2010, which is same as the start date of fixed crediting period for VCU issuance. As per CCER rule, those emission reductions in the fixed crediting period is Ineligible to participate the China's ETS. The project owner is a coal mine company in Sichuan Province, up to now(end of 05/2022) was not be included the Emission Trading Programs and Other Binding Limits in China .

Furthermore, the project owner submitted the letter of commitment for no-double counting that will not any forms of credit in the fixed crediting period(16/04/2010-15/04/2020).

1.11 Sustainable Development Contributions

The project activity will promote sustainable development through the following aspects:

- (1)provide clean and reliable electricity
- (2)Create job opportunities during the project construction and operation periods;
- (3)Promote CMM utilization by eliminating the release of methane into the atmosphere, which effectively reduce the greenhouse gas emission;
- (4)Promote the technology transfer of advanced gas generator.

Table 1: Sustainable Development Contributions

Row number	SDG Target	SDG Indicator	Net Impact on SDG Indicator	Current Project Contributions	Contributions Over Project Lifetime
<i>Sequential row number</i>	<i>SDG Target number</i>	<i>Number and text of SDG indicator or, if no official SDG indicator is applicable, user-defined indicator</i>	<i>Indicate the project's contribution to the SDG Indicator (implemented activities to increase or decrease)</i>	<i>Brief description of the quantifiable impact of the project's activities related to the SDG indicator, during the monitoring period.</i>	<i>Brief description of the cumulative quantifiable impact of the project's activities related to the SDG indicator, over the project lifetime.</i>
1)	7.1	7.1.2 Proportion of population with access to electricity	Implemented activities to increase	Shanmushu power plant put into operation in this monitoring period, increase 129.78GWh electricity supply.	The project has provided 327461.52MWh electricity supply during 16/04/2010-31/12/2017.
2)	8.5	8.5.1 Number of jobs created	Implemented activities to increase	There are new increased 12 employee in Shanmushu power plant due to the implementation of the project activity	The project provided more than 40 employment opportunities.
3)	13.0	Tonnes of greenhouse gas emissions avoided or removed	Implemented activities to increase	By recover and used CMM to produce electricity, 1,516,883tCO ₂ e emission was reduced during the monitoring period	By recover and used CMM to produce electricity, the project reduce 1951262t CO ₂ emission during 16/04/2010-31/12/2017. .

4)	17.7.0	Promote the development, transfer, dissemination and diffusion of environmentally sound technologies to developing countries on favourable terms, including on concessional and preferential terms, as mutually agreed	Implemented activities to increase	2 set of advanced GE JMS620GS-S.L 3MW level gas generators were installed for combust CMM to produce electricity.	4 set of advanced GE JMS620GS-S.L 3MW level gas generators are applied for combust CMM to produce electricity.
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2 SAFEGUARDS

2.1 No Net Harm

There is no net harm.

The project owner commissioned the Environmental Science and Technology School of Southwest Jiaotong University to perform an environmental impact assessment of the proposed project. In the assessment, the proposed project has been considered to have few potential impacts on air, water quality, sound environment, etc. The Environmental Impact Assessment (EIA) Report was approved by Yibin Environmental Protection Bureau (EPB) on September 10th 2007.

In addition, the EIA report on the newly built 20,000 m³ gas tank was completed by Chongqing Dehe Environmental Engineering Co., Ltd. in July 2007, and approved by Yibin EPB on August 29th 2007.

The results of this evaluation are summarized as follows.

Air Pollution

During the project construction period, the main air pollutant is particulates (dust) which are released from construction activities and transportation and the emission from vehicles and construction machinery. Measures will be taken to mitigate this pollutant, such as spraying water at construction sites and on dusty roads, controlling vehicle speeds and operating with proper maintenance and in compliance with relevant emission standards.

During the operation period, the main air pollutant is exhaust gas from gas generators, which containing mainly NO_x. With the installation of modern equipment, the NO_x emissions will be in compliance with Chinese standards and limits.

Wastewater

In the project activity, water will be used as a coolant for the gas generators. This coolant will be circulated in a closed circuit line, and between gas generators and the cooling tower also. Consequently, no effluent will be produced and discharged into the river system from the electricity generation component. Sewage will be treated on-site. After treatment, a portion of treated water will be reused for watering plants on site, and the remaining once having met the discharging standards will be discharged into the river.

Noise

The potential noise source will be gas generators. However, the generators will be housed indoors and the walls will be made of soundproof materials to reduce noise emissions. Through noise protection measures (such as mufflers on exhaust pipes and sound

insulation parts) it can be reduced to a level that meets regulation. In addition, since the gas generators are located in the existing captive power plant or the coal mine area, which is away from any residence, noise have no impact on local residents. Operators will work in the control room outside of the generator house, and they will be protected with ear plugs, if necessary.

Waste

The main forms of solid waste from the proposed project include: refuse generated on the construction site and waste generated by construction workers in the construction period, and by operators in the operation period. These solid wastes will be disposed of in a local landfill.

Gas storage tank

The main environmental impact related to the gas tank is the noise caused by blowers. The following measures will be taken to mitigate the gas tank noise.

- Adopting low noise equipment;

- Constructing soundproof walls and mufflers;

- Applying soft connections between pipes and vibrating equipment;

- Planting trees around the gas tank area.

In addition, many protective measures are undertaken in order to prevent leakage or the occurrence of explosions. These measures include, but are not limited to:

- Installing gas leakage detector on the tank;

- Equipping with automatic cut-out system for emergencies at the inlet and outlet of storage tank and blowers;

- Installing fire-resistance wall and explosion-proof equipment and devices;

- Maintaining and inspecting storage tank and all relevant parts on a regular basis;

- Establishing safety management and operation policies and measures, e.g. Duties for Control Entry to Storage Tank Area, Duties for Routine Inspection, Duties for Maintenance and Repair,

The project has no negative potential impact on the local people and environment.

The EIA report on the project and individual EIA report on the gas tank were approved by Yibin Environmental Protection Bureau on September 10th 2007 and August 29th 2007, respectively. Strict environmental monitoring and mitigation measures was carried out during the construction and operation phases. The project will not cause any significant environmental impacts. On the contrary, the project will bring a positive impact on the local

environment. By implementing the proposed project, electricity generated by coal-fired captive power plant and from the thermal-power-dominated CCPG will be displaced. Thus, emissions of dust, sulphur oxides and nitrogen oxides, etc. that would be produced by the CCPG will be avoided.

The project recover and utilize the vented CMM to generate electricity, which create new benefits for the project owner and improve the coal mine safety, so the project has no negative socio-economic impacts.

2.2 Local Stakeholder Consultation

A stakeholder consultation has been carried out. The project owner sent letters to key local stakeholders and leading residents in Xunchang town to attend the stakeholder consultation of the proposed project. In the letter they enclosed papers explaining the aim and outline of the proposed project. And they televised the project concept and information to the local residents and announced the date of the stakeholder consultation through a local TV channel. Meanwhile, they posted public announcements on village billboards two weeks before the stakeholder consultation.

The Furong area stakeholder consultation was held on January 11th 2007. Twenty-two people participated, who were representatives of local villagers, local council workers, related local government organizations and project staff.

At the consultation, the project manager explained the project's mission and outline. Participants asked questions on the project and Furong project staffs provided responses accordingly as follow:

Almost all stakeholders who were present during the consultation understood the significant aim of this project, which is to reduce GHG and to use CMM for residential fuel and power generation. Some stakeholders asked or brought up the following questions or concerns, and project manager answered accordingly.

Q1. We are concerned that if the CMM extracted is converted into electricity, there will be a shortage of residential gas supply.

A1. The principle of the CMM project is to give high priority to residential use. We will make sure that the residential gas will never be in short supply after the project begins operation.

Q2. Recently shortage of household gas fuel has been occurred especially in winter. In the proposed project, CMM will be used for gas generator too. We are very concerned about more frequent occurrences of gas shortage.

A2. In the proposed project, the existing gas grid will be restructured on a massive scale. A new gas storage tank which has 20,000 cubic meter capacity will be installed at Shanmushu coal mine. Only a part of Shanmushu CMM could be used by the gas grid up

to now, but after the new storage tank is installed we can fully use the CMM of Shanmushu. So residential gas will be supplied sufficiently. Even in winter, residents can use plenty of gas, more than before.

Q3. How will you reduce the noise pollution from the gas power plant?

A3. All gas generators will be installed in houses that will be constructed with sound proof materials. Also, exhaust pipe noise protection measures (such as muffler/silencer) will be installed. It can be reduced to a level that meets regulation. Therefore, outside of the house the noise level will be lower than relevant Chinese regulation. Also the gas generators are located away from residential streets, schools, and sensitive receptors. It is expected that the project will have few acoustic impacts on the existing amenity.

Q4. Is there any concern over the environmental impact after the operation of the gas power plant?

A4. There is little toxic material contained in the exhaust gas and wastewater of the project. Moreover the electricity from gas generators will displace the electricity from the captive power plant and the CCPG, so SO_x and NO_x and dust will be lower than present level.

Q5. Is it possible to use CMM from the nearby small coal mines under this proposed project?

A5. It would be possible theoretically, but we did not consider this possibility due to limited time on the project construction. Currently, there is another methodology for small-scale CDM that is available to small coal mines, which can be easily developed as a CDM project.

At the end of the meeting, all participants unanimously agreed to implement the project.

During project implementation phase, there is a public comments collection and feedback book for each power plant. The local stakeholders can leave their opinions, comments and concerns on the project and contact information in the public comments collection and feedback book at any time. The project owner will contact the local stakeholder to give feedback within one week. So far, no public comments about potential negative impacts during project implementation have been received by the project owner.

2.3 AFOLU-Specific Safeguards

The project is not AFOLU projects.

3 IMPLEMENTATION STATUS

3.1 Implementation Status of the Project Activity

Four domestic generators each with a 500kW capacity were commissioned in Baijiao coal mine on 28/11/2007 and during 05/2012-06/2012, three domestic generators installed in Baijiao coal mine were moved to Gongquan coal mine, two sets of 3.048MW gas generators were commissioned in Baijiao coal mine on 25/05/2009. A set of 3.048MW gas generator in Shanmushu coal mine area has been put into commission since 01/09/2013 and another 3.048MW gas generator has been put into commission at Shanmushu coal mine since 01/10/2015.

500kW domestic generators are easily moved, so, it is the project owner's arrangement that 500kW domestic generators will be used to balance the CMM extraction fluctuation for three coal mines. So, the location of 500kW domestic generators is flexible.

Eight domestic generators each with a 500kW capacity and four imported generators each with a 3048kW capacity have already been installed at the project site. Please refer to Table 3-1 and 3-2 below for the technical parameters of the already installed generators.

Table 3-1 Technical parameters of 3.048MW gas generators

Parameter	Value
	Imported Units
Model	JMS620GS-S.L
Rated power	3048 kW
Power factor	1
Rated voltage	6300 V
Rate speed	1500
Weight	22200 kg
Technical lifetime	20years
Amount	4
Location	2 at Baijiao coal mine, 2 at Shanmushu coal mine

Table 3-2 Technical parameters of 500KW gas generators

Parameter	Value
Model	500GF1-2RW
Rated Power	500 kW
Power factor	0.8
Rated voltage	400V

Rate Speed	1000r/min
Weight	13350kg
Technical lifetime	>20years
Amount	8
Location	7 sets at Gongquan coal mine and 1 set at Baijiao coal mine.
Remark	Among the 8 sets gas generators, 2 sets will be used as back-up for hardware replacement, by now, one is at Baijiao coal mine and the other one is at Gongquan coal mine.

Eight waste heat boilers for 500KW gas generators were installed. The specifications of these waste heat boilers are shown in the Table 3-3 below.

Table 3-3 Technical parameters of waste heat boilers for 500KW gas generators

Model	Q2/500-0.28-5.5/120/60	Q2/500-0.28-1.0/120
location	Baijiao, Gongquan	Gongquan
Rated heat output	0.28 MW	0.28 MW
Rated outflow pressure	5.5 Mpa	1.0 Mpa
Rated outflow temperature	115 °C	120 °C
Backwater temperature	60 °C	60 °C

Two waste heat boilers for 3.048MW gas generators were installed at Baijiao and two waste heat boilers for 3.048MW gas generators were installed at Shanmushu. The specifications of these waste heat boilers are shown in the table below.

Table 3-4 Technical parameters of waste heat boilers for 3048KW gas generator

Items	Baijiao	Shanmushu
Model	QC12/500-2.4-1.0-200	Q12.4/493-1.75-0.8
Rated heat output	2.4t/h	1.75t/h
Rated outflow pressure	1.0Mpa	0.8Mpa
Rated outflow temperature	200°C	175°C
Backwater temperature	10°C	20°C

The post –registration change was included in the revised registered PDD version 08 dated 28/08/2013 and approved by EB on 18/12/2013.

The project was implemented as described in the revised registered PDD version 08 dated 28/08/2013. During this monitoring period, from 01/01/2013 to 31/12/2017 the project had a smooth operation and the monitoring system worked properly, no special events occurred.

3.2 Deviations

2.1.1 Methodology Deviations

There is no deviation applied to this monitoring period.

2.1.2 Project Description Deviations

There is no deviation applied to this monitoring period.

The post –registration change was included in the revised registered PDD version 08 dated 28/08/2013 and approved by EB on 18/12/2013.

The project was implemented as described in the revised registered PDD version 08 dated 28/08/2013

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	Eff_{ELEC}
Data unit	-
Description	Efficiency of methane destruction in power plant
Source of data	IPCC
Value applied	99.5%
Justification of choice of data or description of measurement methods and procedures applied	IPCC is the reliable source.
Purpose of Data	Calculation of project emissions
Comments	

Data / Parameter	GWP_{CH_4}
Data unit	tCO ₂ e/CH ₄
Description	Global warming potential of methane
Source of data	IPCC
Value applied	28
Justification of choice of data or description of measurement methods and procedures applied	AR5 of IPCC is the reliable source.
Purpose of Data	Calculation of baseline, project and leakage emissions
Comments	-

Data / Parameter	CEF_{CH_4}
Data unit	tCO ₂ e/tCH ₄
Description	Carbon emission factor for combusted methane
Source of data	Methodology ACM0008 (ver 04)
Value applied	2.75
Justification of choice of data or description of measurement methods and procedures applied	ACM0008 is the reliable source.
Purpose of Data	Calculation of project emissions
Comments	-

Data / Parameter	D_{CH_4}
Data unit	tCH ₄ /m ³
Description	Density of methane under normal conditions (20°C and 101.325kPa) in the exhaust gases.
Source of data	IPCC default value
Value applied	0.00067
Justification of choice	IPCC is the reliable source.

of data or description of measurement methods and procedures applied	
Purpose of Data	Calculation of baseline, project and leakage emissions
Comments	-

Data / Parameter	CEF_{ELEC}
Data unit	tCO ₂ e/MWh
Description	Because the on-site captive plant was closed as per the government requirement, only considering the electricity from the CCPG is displaced. So the CEF_{ELEC} will be CCPG emissions factor, this is conservative.
Source of data	The approved revised PDD
Value applied	0.9745
Justification of choice of data or description of measurement methods and procedures applied	The data is ex ante determined in the approved revised PDD.
Purpose of Data	Calculation of baseline emissions
Comments	Determined ex-ante and fixed for the fixed crediting period

4.2 Data and Parameters Monitored

Data / Parameter	$CONS_{ELEC.PJ}$
Data unit	MWh
Description	Additional electric power consumption by the project in year y
Source of data	On-site continuous measurements by electricity meters
Description of measurement methods and procedures to be applied	On-site electricity meters.
Frequency of monitoring/recording	Continuously monitored by on-site electricity meters. The data will be daily recorded.
Value monitored	8,994.0192

Monitoring equipment		Baijiao	Shanmushu	Gongquan
	Type	Electricity meter	Electricity meter	Electricity meter
	Accuracy class	0.5s/0.5	0.5	0.5s
	Serial number	0045641220/ 45386238	13442301/ 13442265	45386237
	Calibration frequency	yearly	yearly	yearly
	Date of previous calibration	10/01/2012	10/01/2012	10/01/2012
		05/01/2013	05/01/2013	05/01/2013
		03/01/2014	03/01/2014	03/01/2014
		25/12/2014	25/12/2014	25/12/2014
20/12/2015		20/12/2015	20/12/2015	
15/12/2016		15/12/2016	15/12/2016	
	10/12/2017	10/12/2017	10/12/2017	
Validity	yes	yes	yes	
QA/QC procedures to be applied	Electricity meters were maintained and calibrated for accuracy (0.5) according to manufacturer's specifications and relevant national or sectoral regulations. The calibration will be carried out annually by an independent certified party.			
Purpose of the data	Calculation of project emissions			
Calculation method	N/A			
Comments	The original data and calculation process please refer to the ER calculation sheet			

Data / Parameter	MM_{ELEC}
Data unit	tCH ₄
Description	Methane(including pre-mining CMM and post mining CMM) sent to CMM power plant(minus the vented methane)
Source of data	Automatically calculated by the installed monitoring system with monitored data by gas flow meters (installed at the inlet pipeline and the pipeline emergency vent valve located) and methane concentration meters (installed at the inlet pipeline).

Description of measurement methods and procedures to be applied	Measured						
Frequency of monitoring/recording	Continuously measured. The monitored data will be daily recorded.						
Value monitored	51,127.84						
Monitoring equipment	Automatically calculated by the installed monitoring system with monitored data by gas flow meters (installed at the inlet pipeline and the pipeline emergency vent valve located) and methane concentration meters (installed at the inlet pipeline).						
	meter	Gas flow meter			methane concentration meter		
	mine	Baijiao	Gongquan	Shanmushu	Baijiao	Gongquan	Shanmushu
	Type	Gas flow meter	Gas flow meter	Gas flow meter	methane concentration meter	methane concentration meter	methane concentration meter
	Accuracy class	0.5	0.5	0.5	0.5	0.5	0.5
	Serial number	Installed at the inlet pipeline: 1553/120894 (120894 replaced 1553 on 10/07/2012) Installed at the pipeline emergency vent valve: 1566	Installed at the inlet pipeline: 1528 Installed at the pipeline emergency vent valve: 1527	Installed at the inlet pipeline: 09005/09001 Installed at the pipeline emergency vent valve: 09004	2484/1101(1101 replaced 2484 on 28/12/2012)	1245/1243(1243 replaced 1245 on 24/12/2012)	1414
	Calibration frequency	yearly	yearly	yearly	yearly	yearly	yearly
	Date of last calibration	20/06/2012 (for 1553) 03/07/2012 (for 120894) 19/06/2013 19/06/2014 19/06/2015 19/06/2016 19/06/2017	20/06/2012 19/06/2013 19/06/2014 19/06/2015 19/06/2016 19/06/2017	20/06/2012 19/06/2013 19/06/2014 19/06/2015 19/06/2016 19/06/2017	09/01/2012 (for 2484) 15/03/2012 14/03/2013 14/03/2014 14/03/2015 19/06/2015 19/06/2016 19/06/2017	20/06/2012 (for 1245) 20/06/2012 (for 1243) 19/06/2013 19/06/2014 19/06/2015 19/06/2016 19/06/2017	19/06/2013 19/06/2014 19/06/2015 19/06/2016 19/06/2017
	Validity	yes	yes	yes	yes	yes	yes

QA/QC procedures to be applied	Monitoring instruments are maintained and calibrated according to manufacturer's specifications and relevant national or sectoral regulations. The calibration is carried out by an independent certified party annually.
Purpose of the data	Calculation of baseline and project emissions
Calculation method	The methane in volume sent to CMM power plant is equal to the CMM from the pumps subtract the vented CMM. But the readings of gas flow meters which were installed at the emergency vent valves are zero, which means that the emergency evacuation valves before the gas generators were not used, so no CMM was vented during the monitoring period.
Comments	The original data and calculation process please refer to the ER calculation sheet. Some backup meters are calibrated and waiting for replacement once gas flow meters and methane concentration meters be malfunctioned.

Data / Parameter	PC_{CH_4}			
Data unit	%			
Description	Concentration (in volume) of methane in extracted gas (%), measured on wet basis			
Source of data	Measured by the on-site infrared methane concentration meters, optical.			
Description of measurement methods and procedures to be applied	Measured			
Frequency of monitoring/recording	Continuously measured			
Value monitored	34.73(average)			
Monitoring equipment	Methane concentration can be measured real-time by infrared methane concentration meters mounted on the gas pipelines using nondispersive infrared gas analysis technique. The monitored data will be recorded daily. The continuously monitored methane concentration meter with accuracy of 0.5 will be installed.			
	mine	Baijiao	Gongquan	shanmushu

	Type	methane concentration meter	methane concentration meter	methane concentration meter
	Accuracy class	0.5	0.5	0.5
	Serial number	2484/1101 (1101 replaced 2484 on 28/12/2012)	1245/1243 (1243 replaced 1245 on 24/12/2012)	1414
	Calibration frequency	yearly	yearly	yearly
	Date of last calibration	09/01/2012 (for 2484) 15/03/2012 (for 1101) 14/03/2013 14/03/2014 14/03/2015 19/06/2015 19/06/2016 19/06/2017	20/06/2012 (for 1245) 20/06/2012 (for 1243) 19/06/2013 19/06/2014 19/06/2014 19/06/2015 19/06/2016 19/06/2017	19/06/2013 19/06/2014 19/06/2015 19/06/2016 19/06/2017
	Validity	yes	yes	yes
QA/QC procedures to be applied	Monitoring instruments are maintained and calibrated according to manufacturer's specifications. The calibration is carried out by an independent certified party annually.			
Purpose of the data	Calculation of baseline and project emissions			
Calculation method	N/A			
Comments	Some backup meters are calibrated and waiting for replacement once gas flow meters and methane concentration meters be malfunctioned.			

Data / Parameter	PC_{NMHC}
Data unit	%
Description	Concentration (in volume) of NMHC in extracted gas
Source of data	Analyzed by Sichuan Quality Supervision and Inspection Institute for Gaseous Product, a nationally certified entity. Measured by hydrogen flame ionization detector using gas phase chromatography, optical.

Description of measurement methods and procedures to be applied	Measured																								
Frequency of monitoring/recording	at least once a year																								
Value monitored	<table border="1"> <thead> <tr> <th>Year</th> <th>Baijiao CMM power plant</th> <th>Gongquan CMM power plant</th> <th>Shanmushu CMM power plant</th> </tr> </thead> <tbody> <tr> <td>2013</td> <td>0.015%</td> <td>0.015%</td> <td>0.016%</td> </tr> <tr> <td>2014</td> <td>0.016%</td> <td>0.015%</td> <td>0.016%</td> </tr> <tr> <td>2015</td> <td>0.016%</td> <td>0.016%</td> <td>0.015%</td> </tr> <tr> <td>2016</td> <td>0.016%</td> <td>0.015%</td> <td>0.016%</td> </tr> <tr> <td>2017</td> <td>0.015%</td> <td>0.016%</td> <td>0.016%</td> </tr> </tbody> </table>	Year	Baijiao CMM power plant	Gongquan CMM power plant	Shanmushu CMM power plant	2013	0.015%	0.015%	0.016%	2014	0.016%	0.015%	0.016%	2015	0.016%	0.016%	0.015%	2016	0.016%	0.015%	0.016%	2017	0.015%	0.016%	0.016%
Year	Baijiao CMM power plant	Gongquan CMM power plant	Shanmushu CMM power plant																						
2013	0.015%	0.015%	0.016%																						
2014	0.016%	0.015%	0.016%																						
2015	0.016%	0.016%	0.015%																						
2016	0.016%	0.015%	0.016%																						
2017	0.015%	0.016%	0.016%																						
Monitoring equipment	<p><i>Annual qualified lab analysis with hydrogen flame ionization detector using gas phase chromatography.</i></p> <p><i>The lab must be qualified and certified by relevant authorities according to local or national regulations.</i></p>																								
QA/QC procedures to be applied	<i>The test will be carried out at least once a year in accordance with national standards</i>																								
Purpose of the data	Calculation of project emissions																								
Calculation method	N/A																								
Comments	CO ₂ emissions from the combustion of non methane hydrocarbons (NMHCs), if they represent more than 1% by volume of the extracted coal mine gas; if $PC_{NMHC} < 1\%$, CO ₂ emissions from NMHC destruction can be ignored.																								

Data / Parameter	CEF_{NMHC}
Data unit	-
Description	Carbon emission factor for combusted non methane hydrocarbons (various)
Source of data	Will be analyzed by the same qualified institute for .
Description of measurement methods and procedures to be applied	To be monitored.
Frequency of	at least once a year

monitoring/recording	
Value monitored	-
Monitoring equipment	<p>Analyzed by Sichuan Quality Supervision and Inspection Institute for Gaseous Product, a nationally certified entity</p> <p>The lab must be qualified and certified by relevant authorities according to local or national regulations.</p>
QA/QC procedures to be applied	<i>The test will be carried out at least once a year in accordance with national standards.</i>
Purpose of the data	Calculation of project emissions
Calculation method	N/A
Comments	if $PC_{NMHC} < 1\%$, CO ₂ emissions from NMHC destruction can be ignored.

Data / Parameter	GEN_y			
Data unit	MWh			
Description	Electricity generated by gas generators			
Source of data	Continuous on-site measurement by electricity meters			
Description of measurement methods and procedures to be applied	Electricity meters were installed at gas power plants to measure the electricity delivered to the on-site electric grid for Furong self-use.			
Frequency of monitoring/recording	Continuously measured			
Value monitored	247,652.28			
Monitoring equipment		Baijiao	Gongquan	Shanmushu
	Type	Electricity meter	Electricity meter	Electricity meter
	Accuracy class	0.5/0.5/0.2	0.5	0.5S
	Serial number	2510034/13 260114 /100503177 0071	13260124	190970070

	Calibration frequency	yearly	yearly	year
	Date of last calibration	25/04/2012 20/04/2013 15/04/2014 10/04/2015 05/04/2016 01/04/2017	25/04/2012 20/04/2013 15/04/2014 10/04/2015 05/04/2016 01/04/2017	20/08/2013 15/04/2014 10/04/2015 05/04/2016 01/04/2017
	Validity	yes	yes	yes
QA/QC procedures to be applied	Monitoring instruments will be maintained and calibrated for accuracy (0.5) according to manufacturer's specifications. The calibration will be carried out annually by an independent certified party.			
Purpose of the data	Calculation of baseline emissions			
Calculation method	N/A			
Comments	The original data and calculation process please refer to the ER calculation sheet.			

4.3 Monitoring Plan

Data Collection Procedures

CMM flow, temperature and pressure are continuously measured by the flow meters installed. Methane concentration is continuously measured by the methane concentration meters installed. The monitored data is recorded automatically and aggregated hourly, daily, monthly and yearly by the monitoring system.

Electricity generated and additional electric power consumption by the project are continuously measured by the electricity meters installed at the CMM power plant and installed at the CMM pump house. The monitored data will be daily recorded and aggregated monthly and yearly.

Additional electric power consumption by the project is continuously measured by the electricity meters installed at the pump station. And the monitored data will be daily recorded and aggregated monthly and yearly.

The other parameters, such as NMHC in the CMM are measured annually by a qualified institute.

Collected data is archived in electronic spreadsheet and checked by directors of Monitoring System. The electronic documents are stored on hard disk. In addition, a hard copy printout is archived in a designated documents storage room.

The main monitoring instruments and installation points are shown in Fig. 4-1 below.

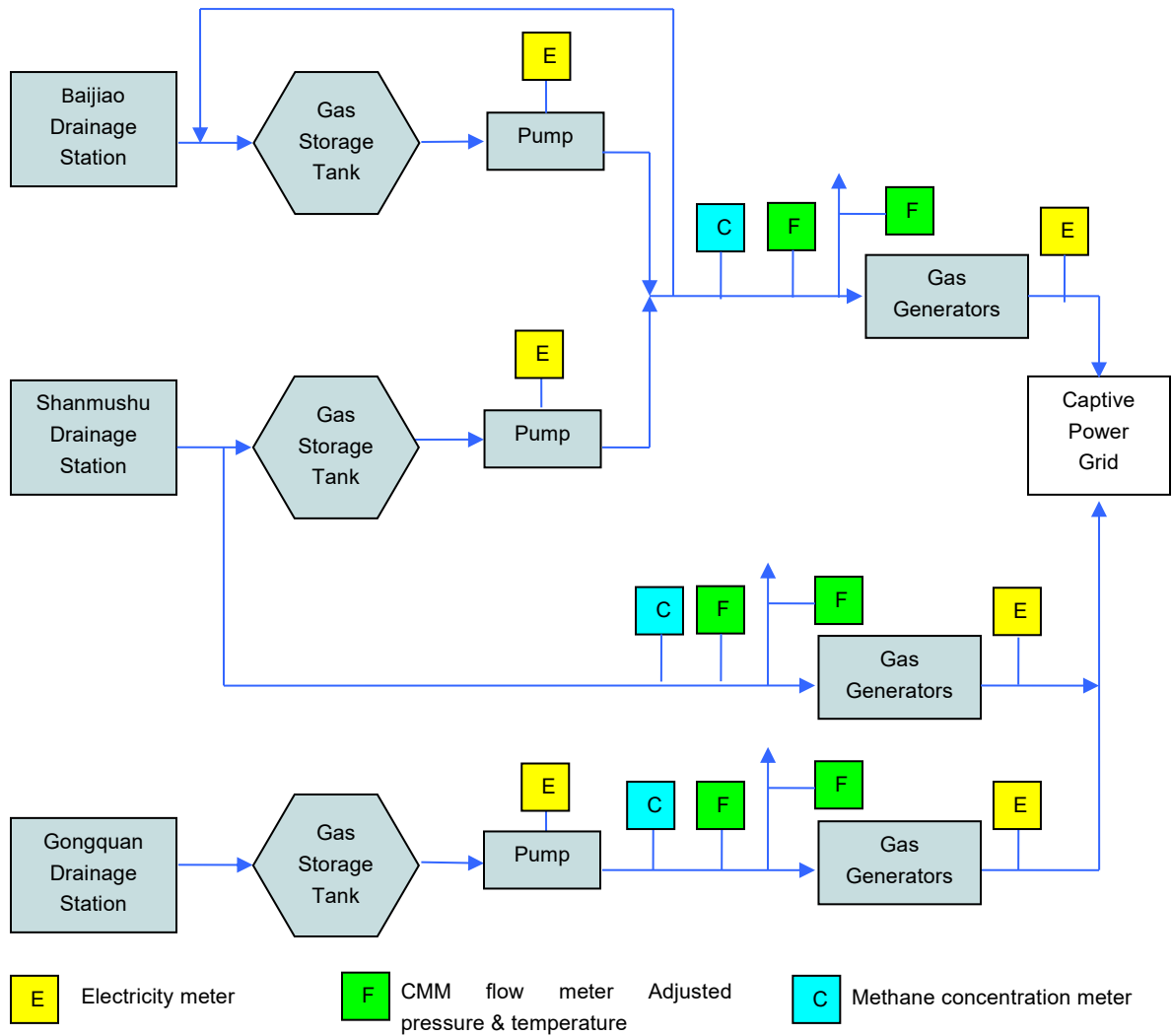


Fig.4-1 Monitoring Instruments and Installation

CMM flow meters, methane concentration meters (temperature and pressure can be monitored simultaneously) and a modern display cabinet was supplied by CQCCRI, which is responsible for the instrument installation and provided the training for the operation and maintenance of these instruments by the operating staff.

The accuracy and applicable standards of these meters are shown in the Table 4-1 below.

Table 4-1 Main Monitoring Instruments

Symbol	Instrument	Function	Applied Standards	Model	Accuracy
--------	------------	----------	-------------------	-------	----------

C	Methane concentration meter	Measuring CH ₄ concentration of the drained CMM sent to the gas generators	AQ 6211-2008 JJG 1138-2017	GJG100H(B) Infra red	0.5
F	Gas flow meter	Measuring the CMM volume sent to the gas Generators and CMM volumes vented from the pipeline emergency vent valve	JJG 640-1994 JJG640-2016	GLY series	0.5
E	Electricity meter	Measuring electricity delivered by the project	JJG 307-2006 JJG 596-1999 JJG596-2012	N/A	0.2/0.5(s)

2. Monitoring Organization

The structure of the VER team is shown as follows.

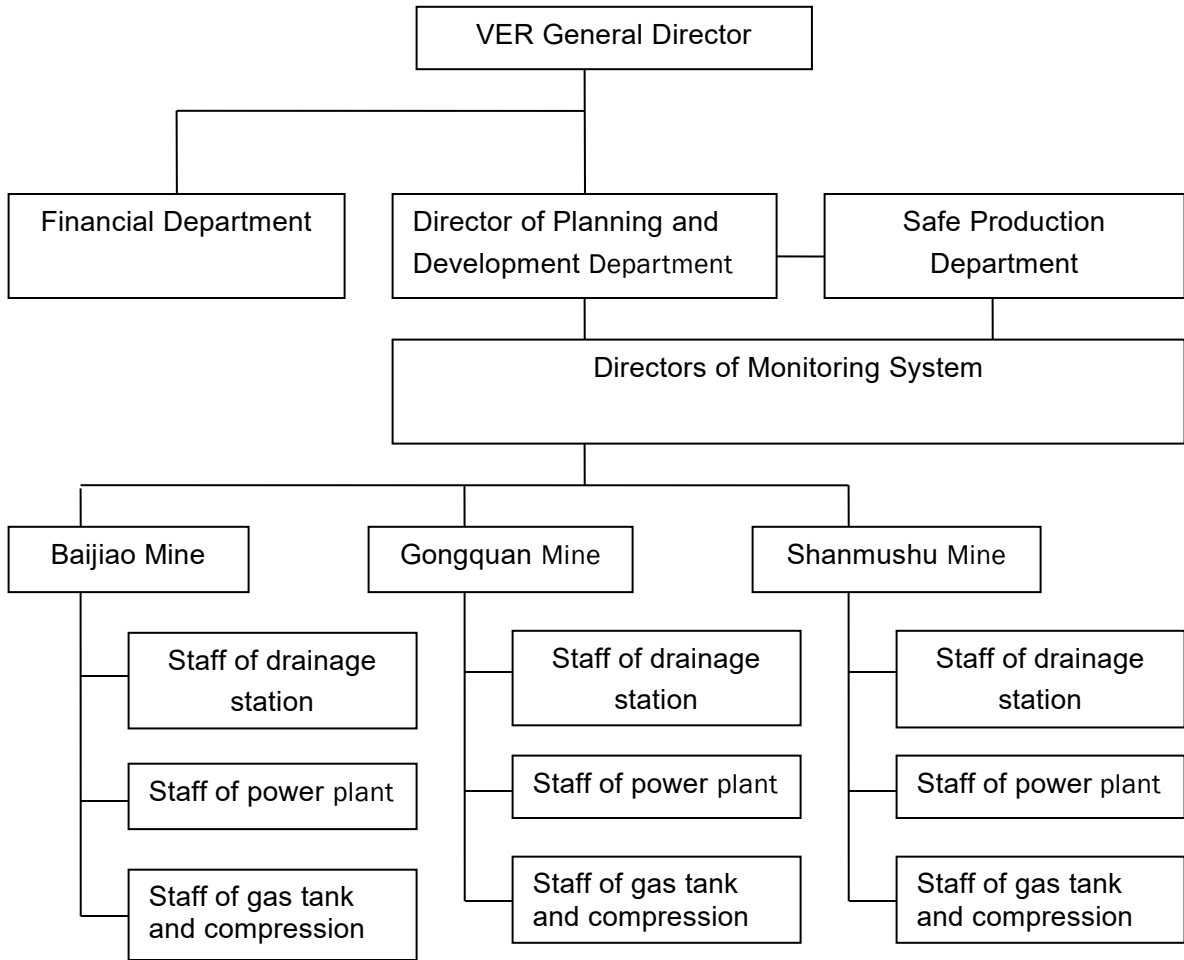


Fig. 4-2 Furong Group VER Team

All other monitoring staff have clearly defined roles and responsibilities to ensure the accurate implementation of the monitoring plan, including:

(1) Directors of Monitoring System

- ✓ Provide training for the monitoring staff to ensure high quality of monitoring activities.
- ✓ Calculate ERs using collected data.
- ✓ Compiling periodical monitoring reports for verification of VERs.
- ✓ Reporting to the Director of Planning and Development Department with any issues related to project's performance.

(2) Monitoring staff

- ✓ Collect and store monitoring data in a safe manner.
- ✓ Maintain monitoring system and equipment under their normal operating conditions.
- ✓ Calibrate monitoring devices and instruments in accordance with the manufacturer's specifications and national or sectoral standards and requirements.

5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

5.1 Baseline Emissions

The project activity includes supplying CMM to power plant, no other technologies such as flaring, catalytic oxidation, etc., are being applied. Although the CMM directly used for heat generation is not included in the project activity, it will be monitored if any CMM destroyed through heat generation occurs in the crediting period. In addition, CMM supplied to gas grid or vehicle use will be monitored too. If the overlap occurs between CMM used for power generation and baseline use of CMM for households and vehicles, it will be used for calculating the project emissions. If total annual CMM volumes are more than enough to cover annual thermal energy and power requirements, no project emissions will be accounted for. Therefore, the formula is expressed as follows:

Baseline emissions are given by the following equation:

$$BE_y = BE_{MD,y} + BE_{MR,y} + BE_{Use,y}$$

Where:

BE_y Baseline emissions in year y (tCO₂e)

$BE_{MD,y}$ Baseline emissions from destruction of methane in the baseline scenario in year y (tCO₂e)

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

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

5.1.1 Methane destruction in the baseline

In the baseline scenario, a small portion of the extracted CMM is utilized by residential users through the gas grid. Emission reduction from this part is not considered and methane destruction in the baseline is set to zero. This is conservative.

5.1.2 Methane released into the atmosphere

$$BE_{MR,y} = GWP_{CH_4} \times MM_{ELEC}$$

Where:

GWP_{CH_4} Global warming potential of methane (28tCO₂e/tCH₄)

MM_{ELEC} Methane measured sent to power plant (tCH₄)

For the pre-mining CMM and post-mining CMM in the Project, there is a common drainage system and it is impossible to install separated systems, so, MM_{ELEC} includes the pre-mining CMM and post-mining CMM.

Table 5-1 Methane sent to Baijiao CMM power plant, under baseline scenario would be released into the atmosphere

Year	MM_{ELEC} (m ³)	MM_{ELEC} (tCH ₄)	$BE_{MR,y}$ (tCO ₂ e)
	A	B=A* $Density_{CH_4}$	C=B* GWP_{CH_4}
01/01/2013-31/01/2013	527488.2	353.42	9,896
01/02/2013-28/02/2013	408917.6	273.97	7,671
01/03/2013-31/03/2013	573300	384.11	10,755
01/04/2013-30/04/2013	481870.74	322.85	9,040
01/05/2013-31/05/2013	820919.8	550.02	15,400
01/06/2013-30/06/2013	723410.24	484.68	13,571
01/07/2013-31/07/2013	287904.96	192.90	5,401
01/08/2013-31/08/2013	205882.18	137.94	3,862
01/09/2013-30/09/2013	410177.71	274.82	7,695
01/10/2013-31/10/2013	655389.75	439.11	12,295

01/11/2013-30/11/2013	287789.07	192.82	5,399
01/12/2013-31/12/2013	511619.39	342.78	9,598
01/01/2014-31/01/2014	474551.4	317.95	8,903
01/02/2014-28/02/2014	228691.51	153.22	4,290
01/03/2014-31/03/2014	560636.65	375.63	10,518
01/04/2014-30/04/2014	854872.48	572.76	16,037
01/05/2014-31/05/2014	751917.45	503.78	14,106
01/06/2014-30/06/2014	257292.07	172.39	4,827
01/07/2014-31/07/2014	725947.96	486.39	13,619
01/08/2014-31/08/2014	533732.53	357.60	10,013
01/09/2014-30/09/2014	226072.04	151.47	4,241
01/10/2014-31/10/2014	546433.39	366.11	10,251
01/11/2014-30/11/2014	632459.54	423.75	11,865
01/12/2014-31/12/2014	564908.83	378.49	10,598
01/01/2015-31/01/2015	394713.64	264.46	7,405
01/02/2015-28/02/2015	272191.01	182.37	5,106
01/03/2015-31/03/2015	480358.05	321.84	9,012
01/04/2015-30/04/2015	693053.79	464.35	13,002
01/05/2015-31/05/2015	428648.85	287.19	8,041
01/06/2015-30/06/2015	694579.6	465.37	13,030
01/07/2015-31/07/2015	676902.73	453.52	12,699
01/08/2015-31/08/2015	598785.74	401.19	11,233
01/09/2015-30/09/2015	463532.59	310.57	8,696
01/10/2015-31/10/2015	496339.65	332.55	9,311
01/11/2015-30/11/2015	507774.27	340.21	9,526
01/12/2015-31/12/2015	449818.19	301.38	8,439
01/01/2016-31/01/2016	434537.44	291.14	8,152
01/02/2016-29/02/2016	721934.41	483.70	13,543

01/03/2016-31/03/2016	480819.57	322.15	9,020
01/04/2016-30/04/2016	760129.56	509.29	14,260
01/05/2016-31/05/2016	325768.83	218.27	6,111
01/06/2016-30/06/2016	607865.73	407.27	11,404
01/07/2016-31/07/2016	396617.91	265.73	7,441
01/08/2016-31/08/2016	726056.16	486.46	13,621
01/09/2016-30/09/2016	657680.26	440.65	12,338
01/10/2016-31/10/2016	581029.81	389.29	10,900
01/11/2016-30/11/2016	285089.89	191.01	5,348
01/12/2016-31/12/2016	711498.66	476.70	13,348
01/01/2017-31/01/2017	592724.66	397.13	11,120
01/02/2017-28/02/2017	488570.55	327.34	9,166
01/03/2017-31/03/2017	320596.68	214.80	6,014
01/04/2017-30/04/2017	856069	573.57	16,060
01/05/2017-31/05/2017	618637.44	414.49	11,606
01/06/2017-30/06/2017	411864.61	275.95	7,727
01/07/2017-31/07/2017	737851.28	494.36	13,842
01/08/2017-31/08/2017	555097.33	371.92	10,414
01/09/2017-30/09/2017	449160.11	300.94	8,426
01/10/2017-31/10/2017	659964.18	442.18	12,381
01/11/2017-30/11/2017	673663.46	451.35	12,638
01/12/2017-31/12/2017	433893.75	290.71	8,140
Total	31,896,004.88	21,370.32	598,369

Table 5-2 Methane sent to Gongquan CMM power plant, under baseline scenario would be released into the atmosphere

Year	MM_{ELEC} (m ³)	MM_{ELEC} (tCH ₄)	$BE_{MR,y}$ (tCO _{2e})
------	----------------------------------	------------------------------------	-------------------------------------

	A	$B=A * Density_{CH_4}$	$C=B * GWP_{CH_4}$
01/01/2013-31/01/2013	334687.9	224.24	6,279
01/02/2013-28/02/2013	381773.18	255.79	7,162
01/03/2013-31/03/2013	302244.63	202.50	5,670
01/04/2013-30/04/2013	383461.91	256.92	7,194
01/05/2013-31/05/2013	330159.53	221.21	6,194
01/06/2013-30/06/2013	534321.1	358.00	10,024
01/07/2013-31/07/2013	522990.14	350.40	9,811
01/08/2013-31/08/2013	544400.78	364.75	10,213
01/09/2013-30/09/2013	248555.36	166.53	4,663
01/10/2013-31/10/2013	512422.54	343.32	9,613
01/11/2013-30/11/2013	449636.24	301.26	8,435
01/12/2013-31/12/2013	381199.7	255.40	7,151
01/01/2014-31/01/2014	433018.59	290.12	8,123
01/02/2014-28/02/2014	314938.02	211.01	5,908
01/03/2014-31/03/2014	214085.22	143.44	4,016
01/04/2014-30/04/2014	393370.06	263.56	7,380
01/05/2014-31/05/2014	555322.22	372.07	10,418
01/06/2014-30/06/2014	437108.31	292.86	8,200
01/07/2014-31/07/2014	366394.79	245.48	6,874
01/08/2014-31/08/2014	508628.23	340.78	9,542
01/09/2014-30/09/2014	268105.98	179.63	5,030
01/10/2014-31/10/2014	404322.26	270.90	7,585
01/11/2014-30/11/2014	567077.11	379.94	10,638
01/12/2014-31/12/2014	321722	215.55	6,036
01/01/2015-31/01/2015	402024.31	269.36	7,542
01/02/2015-28/02/2015	364437.4	244.17	6,837
01/03/2015-31/03/2015	464214.2	311.02	8,709

01/04/2015-30/04/2015	302577.15	202.73	5,676
01/05/2015-31/05/2015	282867.8	189.52	5,307
01/06/2015-30/06/2015	346094.83	231.88	6,493
01/07/2015-31/07/2015	275464.05	184.56	5,168
01/08/2015-31/08/2015	308488.97	206.69	5,787
01/09/2015-30/09/2015	350550.11	234.87	6,576
01/10/2015-31/10/2015	479067.33	320.98	8,987
01/11/2015-30/11/2015	457709.76	306.67	8,587
01/12/2015-31/12/2015	383131.3	256.70	7,188
01/01/2016-31/01/2016	260295.81	174.40	4,883
01/02/2016-29/02/2016	328860.43	220.34	6,169
01/03/2016-31/03/2016	326038.66	218.45	6,116
01/04/2016-30/04/2016	415303.45	278.25	7,791
01/05/2016-31/05/2016	386838.83	259.18	7,257
01/06/2016-30/06/2016	344743.62	230.98	6,467
01/07/2016-31/07/2016	421391.5	282.33	7,905
01/08/2016-31/08/2016	442559.52	296.51	8,302
01/09/2016-30/09/2016	490546.08	328.67	9,203
01/10/2016-31/10/2016	381856.07	255.84	7,164
01/11/2016-30/11/2016	316017.23	211.73	5,928
01/12/2016-31/12/2016	419158.07	280.84	7,863
01/01/2017-31/01/2017	497615.79	333.40	9,335
01/02/2017-28/02/2017	430972.98	288.75	8,085
01/03/2017-31/03/2017	286291.46	191.82	5,371
01/04/2017-30/04/2017	355503.03	238.19	6,669
01/05/2017-31/05/2017	376899.59	252.52	7,071
01/06/2017-30/06/2017	263415.94	176.49	4,942
01/07/2017-31/07/2017	459345.87	307.76	8,617

01/08/2017-31/08/2017	423768.35	283.92	7,950
01/09/2017-30/09/2017	422715.14	283.22	7,930
01/10/2017-31/10/2017	333827.19	223.66	6,263
01/11/2017-30/11/2017	410123.54	274.78	7,694
01/12/2017-31/12/2017	344852.23	231.05	6,469
Total	23,265,513.39	15,587.89	436,461

Table 5-3 Methane sent to Shanmushu CMM power plant, under baseline scenario would be released into the atmosphere

Year	MM_{ELEC}	MM_{ELEC}	$BE_{MR,y}$
	(m ³)	(tCH ₄)	(tCO _{2e})
	A	B=A* $Density_{CH_4}$	C=B* GWP_{CH_4}
01/01/2013-31/01/2013	0	0.00	0
01/02/2013-28/02/2013	0	0.00	0
01/03/2013-31/03/2013	0	0.00	0
01/04/2013-30/04/2013	0	0.00	0
01/05/2013-31/05/2013	0	0.00	0
01/06/2013-30/06/2013	0	0.00	0
01/07/2013-31/07/2013	0	0.00	0
01/08/2013-31/08/2013	0	0.00	0
01/09/2013-30/09/2013	175471.7	117.57	3,292
01/10/2013-31/10/2013	154046.75	103.21	2,890
01/11/2013-30/11/2013	265834.98	178.11	4,987
01/12/2013-31/12/2013	252469.73	169.15	4,736
01/01/2014-31/01/2014	288341.31	193.19	5,409
01/02/2014-28/02/2014	338642.64	226.89	6,353
01/03/2014-31/03/2014	278338.5	186.49	5,222

01/04/2014-30/04/2014	375832.16	251.81	7,051
01/05/2014-31/05/2014	312064.21	209.08	5,854
01/06/2014-30/06/2014	282799.21	189.48	5,305
01/07/2014-31/07/2014	378738.38	253.75	7,105
01/08/2014-31/08/2014	247620.39	165.91	4,645
01/09/2014-30/09/2014	231264.43	154.95	4,339
01/10/2014-31/10/2014	232818.92	155.99	4,368
01/11/2014-30/11/2014	275820.9	184.80	5,174
01/12/2014-31/12/2014	241368.63	161.72	4,528
01/01/2015-31/01/2015	293967.9	196.96	5,515
01/02/2015-28/02/2015	288290.62	193.15	5,408
01/03/2015-31/03/2015	380428.05	254.89	7,137
01/04/2015-30/04/2015	339470.57	227.45	6,368
01/05/2015-31/05/2015	271292.59	181.77	5,089
01/06/2015-30/06/2015	220450.58	147.70	4,136
01/07/2015-31/07/2015	353832.72	237.07	6,638
01/08/2015-31/08/2015	281768.52	188.78	5,286
01/09/2015-30/09/2015	350723.74	234.98	6,580
01/10/2015-31/10/2015	473815.83	317.46	8,889
01/11/2015-30/11/2015	543683.47	364.27	10,200
01/12/2015-31/12/2015	575347.79	385.48	10,794
01/01/2016-31/01/2016	547654.18	366.93	10,274
01/02/2016-29/02/2016	527952.69	353.73	9,904
01/03/2016-31/03/2016	651264.43	436.35	12,218
01/04/2016-30/04/2016	510143.62	341.80	9,570
01/05/2016-31/05/2016	541807.94	363.01	10,164
01/06/2016-30/06/2016	421520.7	282.42	7,908
01/07/2016-31/07/2016	338727.12	226.95	6,355

01/08/2016-31/08/2016	435798.37	291.98	8,176
01/09/2016-30/09/2016	406077.16	272.07	7,618
01/10/2016-31/10/2016	807659.81	541.13	15,152
01/11/2016-30/11/2016	413123.06	276.79	7,750
01/12/2016-31/12/2016	527851.31	353.66	9,902
01/01/2017-31/01/2017	693725.71	464.80	13,014
01/02/2017-28/02/2017	605153.48	405.45	11,353
01/03/2017-31/03/2017	583863.7	391.19	10,953
01/04/2017-30/04/2017	222545.76	149.11	4,175
01/05/2017-31/05/2017	251303.86	168.37	4,714
01/06/2017-30/06/2017	531974.09	356.42	9,980
01/07/2017-31/07/2017	495477.33	331.97	9,295
01/08/2017-31/08/2017	699234.02	468.49	13,118
01/09/2017-30/09/2017	558011.83	373.87	10,468
01/10/2017-31/10/2017	419695.86	281.20	7,873
01/11/2017-30/11/2017	680681.5	456.06	12,770
01/12/2017-31/12/2017	572897.78	383.84	10,748
Total	21,148,690.53	14,169.62	396,749

5.1.3 Emissions from power and heat generation replaced by the project

$$BE_{Use,y} = GEN_y \times CEF_{ELEC}$$

Where:

GEN_y Electricity generated by project activity in year y (MWh)

CEF_{ELEC} Carbon emissions factor of electricity used by Furong coal mines

The electricity generated by the project will displace the electricity from both the on-site captive plant and the CCPG in the baseline scenario. Because the on-site captive plant

was closed as per the government requirement, only considering the electricity from the CCPG is displaced. So the CEF_{ELEC} will be CCPG emissions factor, this is conservative.

Table 5-4 Emissions from electricity displaced by Baijiao CMM power plant

Year	GEN_y (MWh)	$BE_{Use,y}$ (tCO ₂ e)
	D	$E=D* CEF_{ELEC}$
01/01/2013-31/01/2013	2032.896	1,981
01/02/2013-28/02/2013	1542.528	1,503
01/03/2013-31/03/2013	1910.400	1,862
01/04/2013-30/04/2013	1891.008	1,843
01/05/2013-31/05/2013	2702.592	2,634
01/06/2013-30/06/2013	2812.608	2,741
01/07/2013-31/07/2013	965.472	941
01/08/2013-31/08/2013	687.072	670
01/09/2013-30/09/2013	1572.672	1,533
01/10/2013-31/10/2013	2130.816	2,076
01/11/2013-30/11/2013	1123.008	1,094
01/12/2013-31/12/2013	1689.600	1,647
01/01/2014-31/01/2014	1677.696	1,635
01/02/2014-28/02/2014	865.248	843
01/03/2014-31/03/2014	1919.232	1,870
01/04/2014-30/04/2014	2784.480	2,713
01/05/2014-31/05/2014	2643.648	2,576
01/06/2014-30/06/2014	1008.672	983
01/07/2014-31/07/2014	2342.400	2,283
01/08/2014-31/08/2014	1970.880	1,921
01/09/2014-30/09/2014	799.968	780

01/10/2014-31/10/2014	2033.856	1,982
01/11/2014-30/11/2014	2421.120	2,359
01/12/2014-31/12/2014	1824.768	1,778
01/01/2015-31/01/2015	1426.272	1,390
01/02/2015-28/02/2015	924.384	901
01/03/2015-31/03/2015	1579.392	1,539
01/04/2015-30/04/2015	2710.560	2,641
01/05/2015-31/05/2015	1453.248	1,416
01/06/2015-30/06/2015	2631.456	2,564
01/07/2015-31/07/2015	2628.960	2,562
01/08/2015-31/08/2015	2239.968	2,183
01/09/2015-30/09/2015	1812.000	1,766
01/10/2015-31/10/2015	1930.656	1,881
01/11/2015-30/11/2015	1744.032	1,700
01/12/2015-31/12/2015	1523.136	1,484
01/01/2016-31/01/2016	1554.720	1,515
01/02/2016-29/02/2016	2351.616	2,292
01/03/2016-31/03/2016	1615.680	1,574
01/04/2016-30/04/2016	2714.496	2,645
01/05/2016-31/05/2016	1199.040	1,168
01/06/2016-30/06/2016	2319.648	2,260
01/07/2016-31/07/2016	1429.632	1,393
01/08/2016-31/08/2016	2376.864	2,316
01/09/2016-30/09/2016	2141.472	2,087
01/10/2016-31/10/2016	2018.112	1,967
01/11/2016-30/11/2016	1024.032	998
01/12/2016-31/12/2016	2310.144	2,251
01/01/2017-31/01/2017	2209.632	2,153

01/02/2017-28/02/2017	1792.896	1,747
01/03/2017-31/03/2017	1104.672	1,077
01/04/2017-30/04/2017	2766.816	2,696
01/05/2017-31/05/2017	2009.472	1,958
01/06/2017-30/06/2017	1541.664	1,502
01/07/2017-31/07/2017	2675.712	2,607
01/08/2017-31/08/2017	1888.128	1,840
01/09/2017-30/09/2017	1641.696	1,600
01/10/2017-31/10/2017	2254.752	2,197
01/11/2017-30/11/2017	2310.144	2,251
01/12/2017-31/12/2017	1481.952	1,444
Total	112,689.696	109,816

Table 5-5 Emissions from electricity displaced by Gongquan CMM power plant

Year	GEN_y (MWh)	$BE_{Use,y}$ (tCO _{2e})
	D	$E=D*CEF_{ELEC}$
01/01/2013-31/01/2013	891.036	868
01/02/2013-28/02/2013	906.228	883
01/03/2013-31/03/2013	782.604	763
01/04/2013-30/04/2013	925.524	902
01/05/2013-31/05/2013	764.568	745
01/06/2013-30/06/2013	1105.236	1,077
01/07/2013-31/07/2013	1347.768	1,313
01/08/2013-31/08/2013	1286.748	1,254
01/09/2013-30/09/2013	657.108	640
01/10/2013-31/10/2013	1328.976	1,295
01/11/2013-30/11/2013	1213.668	1,183

01/12/2013-31/12/2013	1058.868	1,032
01/01/2014-31/01/2014	1074.672	1,047
01/02/2014-28/02/2014	928.188	905
01/03/2014-31/03/2014	572.292	558
01/04/2014-30/04/2014	992.34	967
01/05/2014-31/05/2014	1234.512	1,203
01/06/2014-30/06/2014	1118.16	1,090
01/07/2014-31/07/2014	937.476	914
01/08/2014-31/08/2014	1297.404	1,264
01/09/2014-30/09/2014	763.74	744
01/10/2014-31/10/2014	1087.056	1,059
01/11/2014-30/11/2014	1304.784	1,272
01/12/2014-31/12/2014	892.116	869
01/01/2015-31/01/2015	974.376	950
01/02/2015-28/02/2015	871.92	850
01/03/2015-31/03/2015	1235.736	1,204
01/04/2015-30/04/2015	854.82	833
01/05/2015-31/05/2015	796.644	776
01/06/2015-30/06/2015	934.56	911
01/07/2015-31/07/2015	789.876	770
01/08/2015-31/08/2015	946.908	923
01/09/2015-30/09/2015	985.896	961
01/10/2015-31/10/2015	1106.82	1,079
01/11/2015-30/11/2015	1076.004	1,049
01/12/2015-31/12/2015	879.012	857
01/01/2016-31/01/2016	764.928	745
01/02/2016-29/02/2016	927.648	904
01/03/2016-31/03/2016	912.96	890

01/04/2016-30/04/2016	1101.96	1,074
01/05/2016-31/05/2016	949.824	926
01/06/2016-30/06/2016	777.996	758
01/07/2016-31/07/2016	1074.852	1,047
01/08/2016-31/08/2016	1155.528	1,126
01/09/2016-30/09/2016	1202.112	1,171
01/10/2016-31/10/2016	992.268	967
01/11/2016-30/11/2016	873.216	851
01/12/2016-31/12/2016	1098.504	1,070
01/01/2017-31/01/2017	1304.136	1,271
01/02/2017-28/02/2017	1233.972	1,203
01/03/2017-31/03/2017	740.772	722
01/04/2017-30/04/2017	846.54	825
01/05/2017-31/05/2017	991.116	966
01/06/2017-30/06/2017	648.972	632
01/07/2017-31/07/2017	1168.524	1,139
01/08/2017-31/08/2017	1052.748	1,026
01/09/2017-30/09/2017	1112.364	1,084
01/10/2017-31/10/2017	880.308	858
01/11/2017-30/11/2017	1034.676	1,008
01/12/2017-31/12/2017	982.224	957
Total	59,751.792	58,228

Table 5-6 Emissions from electricity displaced by Shanmushu CMM power plant

Year	GEN_y (MWh)	$BE_{Use,y}$ (tCO _{2e})
	D	$E=D * CEF_{ELEC}$
01/01/2013-31/01/2013	0.000	-

01/02/2013-28/02/2013	0.000	-
01/03/2013-31/03/2013	0.000	-
01/04/2013-30/04/2013	0.000	-
01/05/2013-31/05/2013	0.000	-
01/06/2013-30/06/2013	0.000	-
01/07/2013-31/07/2013	0.000	-
01/08/2013-31/08/2013	0.000	-
01/09/2013-30/09/2013	607.584	592
01/10/2013-31/10/2013	541.632	528
01/11/2013-30/11/2013	940.608	917
01/12/2013-31/12/2013	895.296	872
01/01/2014-31/01/2014	1022.880	997
01/02/2014-28/02/2014	1197.408	1,167
01/03/2014-31/03/2014	987.648	962
01/04/2014-30/04/2014	1333.344	1,299
01/05/2014-31/05/2014	1107.456	1,079
01/06/2014-30/06/2014	1003.392	978
01/07/2014-31/07/2014	1343.904	1,310
01/08/2014-31/08/2014	878.784	856
01/09/2014-30/09/2014	820.512	800
01/10/2014-31/10/2014	825.792	805
01/11/2014-30/11/2014	978.240	953
01/12/2014-31/12/2014	856.608	835
01/01/2015-31/01/2015	1043.520	1,017
01/02/2015-28/02/2015	1023.168	997
01/03/2015-31/03/2015	1349.664	1,315
01/04/2015-30/04/2015	1204.608	1,174
01/05/2015-31/05/2015	961.920	937

01/06/2015-30/06/2015	781.728	762
01/07/2015-31/07/2015	1254.720	1,223
01/08/2015-31/08/2015	999.840	974
01/09/2015-30/09/2015	1237.152	1,206
01/10/2015-31/10/2015	1678.656	1,636
01/11/2015-30/11/2015	1928.640	1,879
01/12/2015-31/12/2015	2041.824	1,990
01/01/2016-31/01/2016	1943.424	1,894
01/02/2016-29/02/2016	1873.344	1,826
01/03/2016-31/03/2016	2310.624	2,252
01/04/2016-30/04/2016	1809.408	1,763
01/05/2016-31/05/2016	1922.784	1,874
01/06/2016-30/06/2016	1495.392	1,457
01/07/2016-31/07/2016	1201.632	1,171
01/08/2016-31/08/2016	1546.944	1,507
01/09/2016-30/09/2016	1439.712	1,403
01/10/2016-31/10/2016	2867.232	2,794
01/11/2016-30/11/2016	1465.056	1,428
01/12/2016-31/12/2016	1871.424	1,824
01/01/2017-31/01/2017	2460.384	2,398
01/02/2017-28/02/2017	2147.712	2,093
01/03/2017-31/03/2017	2071.488	2,019
01/04/2017-30/04/2017	788.256	768
01/05/2017-31/05/2017	890.976	868
01/06/2017-30/06/2017	1886.688	1,839
01/07/2017-31/07/2017	1758.816	1,714
01/08/2017-31/08/2017	2481.600	2,418
01/09/2017-30/09/2017	1980.192	1,930

01/10/2017-31/10/2017	1488.960	1,451
01/11/2017-30/11/2017	2416.128	2,355
01/12/2017-31/12/2017	2032.416	1,981
Total	74,997.120	73,085

Total Baseline Emissions

Baseline emissions are given by the following equation:

$$BE_y = BE_{MD,y} + BE_{MR,y} + BE_{Use,y}$$

BE_y Baseline emissions in year y (tCO₂e)

$BE_{MD,y}$ Baseline emissions from destruction of methane in the baseline scenario in year y (tCO₂e)

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

$BE_{Use,y}$ Baseline emissions from the production of power, heat or supply to gas grid replaced by the project activity in year y (tCO₂e)

Table 5-7 Baseline emissions of Baijiao CMM power plant

Year	$BE_{MD,y}$	$BE_{MR,y}$	$BE_{Use,y}$	BE_y
	(tCO ₂ e)	(tCO ₂ e)	(tCO ₂ e)	(tCO ₂ e)
	F	C	E	G=F+C+E
01/01/2013-31/01/2013	0	9,896	1,981	11,877
01/02/2013-28/02/2013	0	7,671	1,503	9,174
01/03/2013-31/03/2013	0	10,755	1,862	12,617
01/04/2013-30/04/2013	0	9,040	1,843	10,883
01/05/2013-31/05/2013	0	15,400	2,634	18,034
01/06/2013-30/06/2013	0	13,571	2,741	16,312
01/07/2013-31/07/2013	0	5,401	941	6,342

01/08/2013-31/08/2013	0	3,862	670	4,532
01/09/2013-30/09/2013	0	7,695	1,533	9,228
01/10/2013-31/10/2013	0	12,295	2,076	14,372
01/11/2013-30/11/2013	0	5,399	1,094	6,493
01/12/2013-31/12/2013	0	9,598	1,647	11,244
01/01/2014-31/01/2014	0	8,903	1,635	10,537
01/02/2014-28/02/2014	0	4,290	843	5,133
01/03/2014-31/03/2014	0	10,518	1,870	12,388
01/04/2014-30/04/2014	0	16,037	2,713	18,751
01/05/2014-31/05/2014	0	14,106	2,576	16,682
01/06/2014-30/06/2014	0	4,827	983	5,810
01/07/2014-31/07/2014	0	13,619	2,283	15,901
01/08/2014-31/08/2014	0	10,013	1,921	11,933
01/09/2014-30/09/2014	0	4,241	780	5,021
01/10/2014-31/10/2014	0	10,251	1,982	12,233
01/11/2014-30/11/2014	0	11,865	2,359	14,224
01/12/2014-31/12/2014	0	10,598	1,778	12,376
01/01/2015-31/01/2015	0	7,405	1,390	8,795
01/02/2015-28/02/2015	0	5,106	901	6,007
01/03/2015-31/03/2015	0	9,012	1,539	10,551
01/04/2015-30/04/2015	0	13,002	2,641	15,643
01/05/2015-31/05/2015	0	8,041	1,416	9,458
01/06/2015-30/06/2015	0	13,030	2,564	15,595
01/07/2015-31/07/2015	0	12,699	2,562	15,261
01/08/2015-31/08/2015	0	11,233	2,183	13,416
01/09/2015-30/09/2015	0	8,696	1,766	10,462
01/10/2015-31/10/2015	0	9,311	1,881	11,193
01/11/2015-30/11/2015	0	9,526	1,700	11,225

01/12/2015-31/12/2015	0	8,439	1,484	9,923
01/01/2016-31/01/2016	0	8,152	1,515	9,667
01/02/2016-29/02/2016	0	13,543	2,292	15,835
01/03/2016-31/03/2016	0	9,020	1,574	10,595
01/04/2016-30/04/2016	0	14,260	2,645	16,905
01/05/2016-31/05/2016	0	6,111	1,168	7,280
01/06/2016-30/06/2016	0	11,404	2,260	13,664
01/07/2016-31/07/2016	0	7,441	1,393	8,834
01/08/2016-31/08/2016	0	13,621	2,316	15,937
01/09/2016-30/09/2016	0	12,338	2,087	14,425
01/10/2016-31/10/2016	0	10,900	1,967	12,867
01/11/2016-30/11/2016	0	5,348	998	6,346
01/12/2016-31/12/2016	0	13,348	2,251	15,599
01/01/2017-31/01/2017	0	11,120	2,153	13,273
01/02/2017-28/02/2017	0	9,166	1,747	10,913
01/03/2017-31/03/2017	0	6,014	1,077	7,091
01/04/2017-30/04/2017	0	16,060	2,696	18,756
01/05/2017-31/05/2017	0	11,606	1,958	13,564
01/06/2017-30/06/2017	0	7,727	1,502	9,229
01/07/2017-31/07/2017	0	13,842	2,607	16,450
01/08/2017-31/08/2017	0	10,414	1,840	12,254
01/09/2017-30/09/2017	0	8,426	1,600	10,026
01/10/2017-31/10/2017	0	12,381	2,197	14,578
01/11/2017-30/11/2017	0	12,638	2,251	14,889
01/12/2017-31/12/2017	0	8,140	1,444	9,584
Total	0	598,369	109,816	708,185

Table 5-8 Baseline emissions of Gongquan CMM power plant

Year	$BE_{MD,y}$	$BE_{MR,y}$	$BE_{Use,y}$	BE_y
	(tCO ₂ e)	(tCO ₂ e)	(tCO ₂ e)	(tCO ₂ e)
	F	C	E	G=F+C+E
01/01/2013-31/01/2013	0	6,279	868	7,147
01/02/2013-28/02/2013	0	7,162	883	8,045
01/03/2013-31/03/2013	0	5,670	763	6,433
01/04/2013-30/04/2013	0	7,194	902	8,096
01/05/2013-31/05/2013	0	6,194	745	6,939
01/06/2013-30/06/2013	0	10,024	1,077	11,101
01/07/2013-31/07/2013	0	9,811	1,313	11,125
01/08/2013-31/08/2013	0	10,213	1,254	11,467
01/09/2013-30/09/2013	0	4,663	640	5,303
01/10/2013-31/10/2013	0	9,613	1,295	10,908
01/11/2013-30/11/2013	0	8,435	1,183	9,618
01/12/2013-31/12/2013	0	7,151	1,032	8,183
01/01/2014-31/01/2014	0	8,123	1,047	9,171
01/02/2014-28/02/2014	0	5,908	905	6,813
01/03/2014-31/03/2014	0	4,016	558	4,574
01/04/2014-30/04/2014	0	7,380	967	8,347
01/05/2014-31/05/2014	0	10,418	1,203	11,621
01/06/2014-30/06/2014	0	8,200	1,090	9,290
01/07/2014-31/07/2014	0	6,874	914	7,787
01/08/2014-31/08/2014	0	9,542	1,264	10,806
01/09/2014-30/09/2014	0	5,030	744	5,774
01/10/2014-31/10/2014	0	7,585	1,059	8,644
01/11/2014-30/11/2014	0	10,638	1,272	11,910
01/12/2014-31/12/2014	0	6,036	869	6,905

01/01/2015-31/01/2015	0	7,542	950	8,492
01/02/2015-28/02/2015	0	6,837	850	7,687
01/03/2015-31/03/2015	0	8,709	1,204	9,913
01/04/2015-30/04/2015	0	5,676	833	6,509
01/05/2015-31/05/2015	0	5,307	776	6,083
01/06/2015-30/06/2015	0	6,493	911	7,403
01/07/2015-31/07/2015	0	5,168	770	5,937
01/08/2015-31/08/2015	0	5,787	923	6,710
01/09/2015-30/09/2015	0	6,576	961	7,537
01/10/2015-31/10/2015	0	8,987	1,079	10,066
01/11/2015-30/11/2015	0	8,587	1,049	9,635
01/12/2015-31/12/2015	0	7,188	857	8,044
01/01/2016-31/01/2016	0	4,883	745	5,629
01/02/2016-29/02/2016	0	6,169	904	7,073
01/03/2016-31/03/2016	0	6,116	890	7,006
01/04/2016-30/04/2016	0	7,791	1,074	8,865
01/05/2016-31/05/2016	0	7,257	926	8,183
01/06/2016-30/06/2016	0	6,467	758	7,226
01/07/2016-31/07/2016	0	7,905	1,047	8,953
01/08/2016-31/08/2016	0	8,302	1,126	9,428
01/09/2016-30/09/2016	0	9,203	1,171	10,374
01/10/2016-31/10/2016	0	7,164	967	8,131
01/11/2016-30/11/2016	0	5,928	851	6,779
01/12/2016-31/12/2016	0	7,863	1,070	8,934
01/01/2017-31/01/2017	0	9,335	1,271	10,606
01/02/2017-28/02/2017	0	8,085	1,203	9,288
01/03/2017-31/03/2017	0	5,371	722	6,093
01/04/2017-30/04/2017	0	6,669	825	7,494

01/05/2017-31/05/2017	0	7,071	966	8,036
01/06/2017-30/06/2017	0	4,942	632	5,574
01/07/2017-31/07/2017	0	8,617	1,139	9,756
01/08/2017-31/08/2017	0	7,950	1,026	8,976
01/09/2017-30/09/2017	0	7,930	1,084	9,014
01/10/2017-31/10/2017	0	6,263	858	7,120
01/11/2017-30/11/2017	0	7,694	1,008	8,702
01/12/2017-31/12/2017	0	6,469	957	7,427
Total	0	436,461	58,228	494,689

Table 5-9 Baseline emissions of Shanmushu CMM power plant

Year	$BE_{MD,y}$	$BE_{MR,y}$	$BE_{Use,y}$	BE_y
	(tCO ₂ e)	(tCO ₂ e)	(tCO ₂ e)	(tCO ₂ e)
	F	C	E	G=F+C+E
01/01/2013-31/01/2013	0	0	0	0
01/02/2013-28/02/2013	0	0	0	0
01/03/2013-31/03/2013	0	0	0	0
01/04/2013-30/04/2013	0	0	0	0
01/05/2013-31/05/2013	0	0	0	0
01/06/2013-30/06/2013	0	0	0	0
01/07/2013-31/07/2013	0	0	0	0
01/08/2013-31/08/2013	0	0	0	0
01/09/2013-30/09/2013	0	3,292	592	3,884
01/10/2013-31/10/2013	0	2,890	528	3,418
01/11/2013-30/11/2013	0	4,987	917	5,904
01/12/2013-31/12/2013	0	4,736	872	5,609
01/01/2014-31/01/2014	0	5,409	997	6,406
01/02/2014-28/02/2014	0	6,353	1,167	7,520

01/03/2014-31/03/2014	0	5,222	962	6,184
01/04/2014-30/04/2014	0	7,051	1,299	8,350
01/05/2014-31/05/2014	0	5,854	1,079	6,934
01/06/2014-30/06/2014	0	5,305	978	6,283
01/07/2014-31/07/2014	0	7,105	1,310	8,415
01/08/2014-31/08/2014	0	4,645	856	5,502
01/09/2014-30/09/2014	0	4,339	800	5,138
01/10/2014-31/10/2014	0	4,368	805	5,172
01/11/2014-30/11/2014	0	5,174	953	6,128
01/12/2014-31/12/2014	0	4,528	835	5,363
01/01/2015-31/01/2015	0	5,515	1,017	6,532
01/02/2015-28/02/2015	0	5,408	997	6,405
01/03/2015-31/03/2015	0	7,137	1,315	8,452
01/04/2015-30/04/2015	0	6,368	1,174	7,542
01/05/2015-31/05/2015	0	5,089	937	6,027
01/06/2015-30/06/2015	0	4,136	762	4,897
01/07/2015-31/07/2015	0	6,638	1,223	7,861
01/08/2015-31/08/2015	0	5,286	974	6,260
01/09/2015-30/09/2015	0	6,580	1,206	7,785
01/10/2015-31/10/2015	0	8,889	1,636	10,525
01/11/2015-30/11/2015	0	10,200	1,879	12,079
01/12/2015-31/12/2015	0	10,794	1,990	12,783
01/01/2016-31/01/2016	0	10,274	1,894	12,168
01/02/2016-29/02/2016	0	9,904	1,826	11,730
01/03/2016-31/03/2016	0	12,218	2,252	14,469
01/04/2016-30/04/2016	0	9,570	1,763	11,334
01/05/2016-31/05/2016	0	10,164	1,874	12,038
01/06/2016-30/06/2016	0	7,908	1,457	9,365

01/07/2016-31/07/2016	0	6,355	1,171	7,526
01/08/2016-31/08/2016	0	8,176	1,507	9,683
01/09/2016-30/09/2016	0	7,618	1,403	9,021
01/10/2016-31/10/2016	0	15,152	2,794	17,946
01/11/2016-30/11/2016	0	7,750	1,428	9,178
01/12/2016-31/12/2016	0	9,902	1,824	11,726
01/01/2017-31/01/2017	0	13,014	2,398	15,412
01/02/2017-28/02/2017	0	11,353	2,093	13,446
01/03/2017-31/03/2017	0	10,953	2,019	12,972
01/04/2017-30/04/2017	0	4,175	768	4,943
01/05/2017-31/05/2017	0	4,714	868	5,583
01/06/2017-30/06/2017	0	9,980	1,839	11,818
01/07/2017-31/07/2017	0	9,295	1,714	11,009
01/08/2017-31/08/2017	0	13,118	2,418	15,536
01/09/2017-30/09/2017	0	10,468	1,930	12,398
01/10/2017-31/10/2017	0	7,873	1,451	9,324
01/11/2017-30/11/2017	0	12,770	2,355	15,124
01/12/2017-31/12/2017	0	10,748	1,981	12,728
Total	0	396,749	73,085	469,834

5.2 Project Emissions

Project emissions are defined by the following equation:

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

Where:

PE_y Project emissions in year y (tCO₂e)

PE_{ME} Project emissions from energy use to capture and use methane (tCO₂e)

PE_{MD} Project emissions from methane destroyed (tCO₂e)

PE_{UM} Project emissions from un-combusted methane (tCO₂e)

5.2.1 Combustion emissions from additional energy required for CMM capture and use

$$PE_{ME} = CONS_{ELEC,PJ} \times CEF_{ELEC}$$

Where:

$CONS_{ELEC,PJ}$ Additional electricity consumption for capture and use of methane (MWh)

CEF_{ELEC} Carbon emissions factor of electricity used by Furong coal mines (tCO₂e/MWh)

Consequently, the result of PE_{ME} is shown in the table below.

Table 5-10 Project emissions from additional energy use in Baijiao coal mine and Shanmushu coal mine³

Years	$CONS_{ELEC,PJ}$ (MWh)	PE_{ME} (tCO ₂ e)
	H	I=H * CEF_{ELEC}
01/01/2013-31/01/2013	146.448	143
01/02/2013-28/02/2013	111.139	108
01/03/2013-31/03/2013	137.592	134
01/04/2013-30/04/2013	136.224	133
01/05/2013-31/05/2013	194.664	190
01/06/2013-30/06/2013	202.536	197
01/07/2013-31/07/2013	69.686	68
01/08/2013-31/08/2013	49.552	48
01/09/2013-30/09/2013	98.226	96

³ Before the operation of the CMM power plant in Shanmushu coal mine, the CMM of Shanmushu coal mine was supplied to the CMM power plant in Baijiao coal mine, so project emissions from additional energy use in Baijiao coal mine and Shanmushu coal mine were considered as the project emission of the CMM power plant in Baijiao coal mine in the first monitoring report. After the operation of the CMM power plant in Shanmushu coal mine, part of the CMM of Shanmushu coal mine is still supplied to the CMM power plant in Baijiao coal mine, so, the project emissions from additional energy use in Baijiao coal mine and Shanmushu coal mine can not be separated.

01/10/2013-31/10/2013	128.144	125
01/11/2013-30/11/2013	78.048	76
01/12/2013-31/12/2013	109.152	106
01/01/2014-31/01/2014	110.401	108
01/02/2014-28/02/2014	67.806	66
01/03/2014-31/03/2014	123.385	120
01/04/2014-30/04/2014	177.314	173
01/05/2014-31/05/2014	165.846	162
01/06/2014-30/06/2014	72.596	71
01/07/2014-31/07/2014	152.754	149
01/08/2014-31/08/2014	124.511	121
01/09/2014-30/09/2014	57.978	56
01/10/2014-31/10/2014	127.212	124
01/11/2014-30/11/2014	151.313	147
01/12/2014-31/12/2014	115.947	113
01/01/2015-31/01/2015	96.608	94
01/02/2015-28/02/2015	68.170	66
01/03/2015-31/03/2015	110.077	107
01/04/2015-30/04/2015	171.202	167
01/05/2015-31/05/2015	96.851	94
01/06/2015-30/06/2015	160.108	156
01/07/2015-31/07/2015	167.440	163
01/08/2015-31/08/2015	141.612	138
01/09/2015-30/09/2015	121.442	118
01/10/2015-31/10/2015	148.615	145
01/11/2015-30/11/2015	144.054	140
01/12/2015-31/12/2015	134.378	131
01/01/2016-31/01/2016	133.799	130

01/02/2016-29/02/2016	176.749	172
01/03/2016-31/03/2016	146.056	142
01/04/2016-30/04/2016	195.531	191
01/05/2016-31/05/2016	113.430	111
01/06/2016-30/06/2016	165.955	162
01/07/2016-31/07/2016	109.003	106
01/08/2016-31/08/2016	170.309	166
01/09/2016-30/09/2016	154.560	151
01/10/2016-31/10/2016	182.008	177
01/11/2016-30/11/2016	92.664	90
01/12/2016-31/12/2016	174.458	170
01/01/2017-31/01/2017	183.050	178
01/02/2017-28/02/2017	152.044	148
01/03/2017-31/03/2017	111.752	109
01/04/2017-30/04/2017	173.936	170
01/05/2017-31/05/2017	134.011	131
01/06/2017-30/06/2017	131.749	128
01/07/2017-31/07/2017	192.176	187
01/08/2017-31/08/2017	165.374	161
01/09/2017-30/09/2017	139.579	136
01/10/2017-31/10/2017	162.104	158
01/11/2017-30/11/2017	187.441	183
01/12/2017-31/12/2017	131.860	128
Total	8,148.626	7,941

Table 5-11 Project emissions from additional energy use in Gongquan coal mine

Years	$CONS_{ELEC,PJ}$ (MWh)	PE_{ME} (tCO ₂ e)
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	H	$I=H * CEF_{ELEC}$
01/01/2013-31/01/2013	16.658	16
01/02/2013-28/02/2013	19.313	19
01/03/2013-31/03/2013	16.562	16
01/04/2013-30/04/2013	13.319	13
01/05/2013-31/05/2013	13.190	13
01/06/2013-30/06/2013	13.501	13
01/07/2013-31/07/2013	14.796	14
01/08/2013-31/08/2013	13.940	14
01/09/2013-30/09/2013	12.921	13
01/10/2013-31/10/2013	14.298	14
01/11/2013-30/11/2013	13.155	13
01/12/2013-31/12/2013	9.413	9
01/01/2014-31/01/2014	16.423	16
01/02/2014-28/02/2014	17.631	17
01/03/2014-31/03/2014	17.365	17
01/04/2014-30/04/2014	17.956	17
01/05/2014-31/05/2014	15.147	15
01/06/2014-30/06/2014	17.636	17
01/07/2014-31/07/2014	15.581	15
01/08/2014-31/08/2014	15.207	15
01/09/2014-30/09/2014	14.692	14
01/10/2014-31/10/2014	14.411	14
01/11/2014-30/11/2014	9.372	9
01/12/2014-31/12/2014	8.957	9
01/01/2015-31/01/2015	9.497	9
01/02/2015-28/02/2015	15.903	15
01/03/2015-31/03/2015	13.540	13

01/04/2015-30/04/2015	15.586	15
01/05/2015-31/05/2015	12.882	13
01/06/2015-30/06/2015	13.393	13
01/07/2015-31/07/2015	13.914	14
01/08/2015-31/08/2015	14.683	14
01/09/2015-30/09/2015	12.366	12
01/10/2015-31/10/2015	8.536	8
01/11/2015-30/11/2015	19.604	19
01/12/2015-31/12/2015	15.651	15
01/01/2016-31/01/2016	18.332	18
01/02/2016-29/02/2016	17.284	17
01/03/2016-31/03/2016	14.593	14
01/04/2016-30/04/2016	20.525	20
01/05/2016-31/05/2016	9.641	9
01/06/2016-30/06/2016	10.764	10
01/07/2016-31/07/2016	15.901	15
01/08/2016-31/08/2016	12.868	13
01/09/2016-30/09/2016	13.766	13
01/10/2016-31/10/2016	9.509	9
01/11/2016-30/11/2016	16.940	17
01/12/2016-31/12/2016	16.762	16
01/01/2017-31/01/2017	13.559	13
01/02/2017-28/02/2017	11.194	11
01/03/2017-31/03/2017	14.183	14
01/04/2017-30/04/2017	14.283	14
01/05/2017-31/05/2017	11.936	12
01/06/2017-30/06/2017	14.621	14
01/07/2017-31/07/2017	8.824	9

01/08/2017-31/08/2017	9.708	9
01/09/2017-30/09/2017	9.652	9
01/10/2017-31/10/2017	15.470	15
01/11/2017-30/11/2017	13.420	13
01/12/2017-31/12/2017	14.658	14
Total	845.394	824

5.2.2 Combustion emissions from use of captured methane

$$PE_{MD} = MD_{ELEC} \times (CEF_{CH_4} + r \times CEF_{NMHC})$$

$$r = Pc_{NMHC} / Pc_{CH_4}$$

Where:

MD_{ELEC} Methane destroyed through power generation (tCH₄)

CEF_{CH_4} Carbon emission factor for combusted methane (2.75 tCO₂/tCH₄)

CEF_{NMHC} Carbon emission factor for combusted non methane hydrocarbons (the concentration varies and, therefore, to be obtained through periodical analysis of captured methane) (tCO₂/tNMHC)

r Relative proportion of NMHC compared to methane

Pc_{CH_4} Concentration (in mass) of methane in extracted gas (%)

Pc_{NMHC} NMHC concentration (in mass) in extracted gas (%)

The yearly tests shows that the concentration of NMHC in extracted CMM from Furong coal mines only accounts no more than 0.016% in volume, which is much lower than 1%. Therefore, the combustion emission from NMHC is ignored in ex ante emission calculations.

$$PE_{MD} = MD_{ELEC} \times CEF_{CH_4}$$

$$MD_{ELEC} = MM_{ELEC} \times Eff_{ELEC}$$

The IPCC default value of Eff_{ELEC} , 99.5%, is applied to the proposed project. With CEF_{CH4} value of 2.75 tCO₂/tCH₄, PE_{MD} is calculated and shown in the table below.

Table 5-12 Combustion emissions from use of captured methane from Baijiao coal mines

Years	MM_{ELEC}	MD_{ELEC}	PE_{MD}
	(tCH ₄)	(tCH ₄)	(tCO ₂ e)
	B	$J=B*Eff_{ELEC}$	$K=J*CEF_{CH4}$
01/01/2013-31/01/2013	353.42	351.65	967
01/02/2013-28/02/2013	273.97	272.60	750
01/03/2013-31/03/2013	384.11	382.19	1,051
01/04/2013-30/04/2013	322.85	321.24	883
01/05/2013-31/05/2013	550.02	547.27	1,505
01/06/2013-30/06/2013	484.68	482.26	1,326
01/07/2013-31/07/2013	192.90	191.93	528
01/08/2013-31/08/2013	137.94	137.25	377
01/09/2013-30/09/2013	274.82	273.44	752
01/10/2013-31/10/2013	439.11	436.92	1,202
01/11/2013-30/11/2013	192.82	191.85	528
01/12/2013-31/12/2013	342.78	341.07	938
01/01/2014-31/01/2014	317.95	316.36	870
01/02/2014-28/02/2014	153.22	152.46	419
01/03/2014-31/03/2014	375.63	373.75	1,028
01/04/2014-30/04/2014	572.76	569.90	1,567
01/05/2014-31/05/2014	503.78	501.27	1,378
01/06/2014-30/06/2014	172.39	171.52	472
01/07/2014-31/07/2014	486.39	483.95	1,331
01/08/2014-31/08/2014	357.60	355.81	978
01/09/2014-30/09/2014	151.47	150.71	414
01/10/2014-31/10/2014	366.11	364.28	1,002

01/11/2014-30/11/2014	423.75	421.63	1,159
01/12/2014-31/12/2014	378.49	376.60	1,036
01/01/2015-31/01/2015	264.46	263.14	724
01/02/2015-28/02/2015	182.37	181.46	499
01/03/2015-31/03/2015	321.84	320.23	881
01/04/2015-30/04/2015	464.35	462.02	1,271
01/05/2015-31/05/2015	287.19	285.76	786
01/06/2015-30/06/2015	465.37	463.04	1,273
01/07/2015-31/07/2015	453.52	451.26	1,241
01/08/2015-31/08/2015	401.19	399.18	1,098
01/09/2015-30/09/2015	310.57	309.01	850
01/10/2015-31/10/2015	332.55	330.88	910
01/11/2015-30/11/2015	340.21	338.51	931
01/12/2015-31/12/2015	301.38	299.87	825
01/01/2016-31/01/2016	291.14	289.68	797
01/02/2016-29/02/2016	483.70	481.28	1,324
01/03/2016-31/03/2016	322.15	320.54	881
01/04/2016-30/04/2016	509.29	506.74	1,394
01/05/2016-31/05/2016	218.27	217.17	597
01/06/2016-30/06/2016	407.27	405.23	1,114
01/07/2016-31/07/2016	265.73	264.41	727
01/08/2016-31/08/2016	486.46	484.03	1,331
01/09/2016-30/09/2016	440.65	438.44	1,206
01/10/2016-31/10/2016	389.29	387.34	1,065
01/11/2016-30/11/2016	191.01	190.06	523
01/12/2016-31/12/2016	476.70	474.32	1,304
01/01/2017-31/01/2017	397.13	395.14	1,087
01/02/2017-28/02/2017	327.34	325.71	896

01/03/2017-31/03/2017	214.80	213.73	588
01/04/2017-30/04/2017	573.57	570.70	1,569
01/05/2017-31/05/2017	414.49	412.41	1,134
01/06/2017-30/06/2017	275.95	274.57	755
01/07/2017-31/07/2017	494.36	491.89	1,353
01/08/2017-31/08/2017	371.92	370.06	1,018
01/09/2017-30/09/2017	300.94	299.43	823
01/10/2017-31/10/2017	442.18	439.97	1,210
01/11/2017-30/11/2017	451.35	449.10	1,235
01/12/2017-31/12/2017	290.71	289.26	795
Total	21,370.32	21,263.47	58,475

Table 5-13 Combustion emissions from use of captured methane from Gongquan coal mine

Years	MM_{ELEC}	MD_{ELEC}	PE_{MD}
	(tCH ₄)	(tCH ₄)	(tCO ₂ e)
	B	$J=B*Eff_{ELEC}$	$K=J*CEF_{CH_4}$
01/01/2013-31/01/2013	224.24	223.12	614
01/02/2013-28/02/2013	255.79	254.51	700
01/03/2013-31/03/2013	202.50	201.49	554
01/04/2013-30/04/2013	256.92	255.63	703
01/05/2013-31/05/2013	221.21	220.10	605
01/06/2013-30/06/2013	358.00	356.21	980
01/07/2013-31/07/2013	350.40	348.65	959
01/08/2013-31/08/2013	364.75	362.92	998
01/09/2013-30/09/2013	166.53	165.70	456
01/10/2013-31/10/2013	343.32	341.61	939
01/11/2013-30/11/2013	301.26	299.75	824
01/12/2013-31/12/2013	255.40	254.13	699

01/01/2014-31/01/2014	290.12	288.67	794
01/02/2014-28/02/2014	211.01	209.95	577
01/03/2014-31/03/2014	143.44	142.72	392
01/04/2014-30/04/2014	263.56	262.24	721
01/05/2014-31/05/2014	372.07	370.21	1,018
01/06/2014-30/06/2014	292.86	291.40	801
01/07/2014-31/07/2014	245.48	244.26	672
01/08/2014-31/08/2014	340.78	339.08	932
01/09/2014-30/09/2014	179.63	178.73	492
01/10/2014-31/10/2014	270.90	269.54	741
01/11/2014-30/11/2014	379.94	378.04	1,040
01/12/2014-31/12/2014	215.55	214.48	590
01/01/2015-31/01/2015	269.36	268.01	737
01/02/2015-28/02/2015	244.17	242.95	668
01/03/2015-31/03/2015	311.02	309.47	851
01/04/2015-30/04/2015	202.73	201.71	555
01/05/2015-31/05/2015	189.52	188.57	519
01/06/2015-30/06/2015	231.88	230.72	634
01/07/2015-31/07/2015	184.56	183.64	505
01/08/2015-31/08/2015	206.69	205.65	566
01/09/2015-30/09/2015	234.87	233.69	643
01/10/2015-31/10/2015	320.98	319.37	878
01/11/2015-30/11/2015	306.67	305.13	839
01/12/2015-31/12/2015	256.70	255.41	702
01/01/2016-31/01/2016	174.40	173.53	477
01/02/2016-29/02/2016	220.34	219.23	603
01/03/2016-31/03/2016	218.45	217.35	598
01/04/2016-30/04/2016	278.25	276.86	761

01/05/2016-31/05/2016	259.18	257.89	709
01/06/2016-30/06/2016	230.98	229.82	632
01/07/2016-31/07/2016	282.33	280.92	773
01/08/2016-31/08/2016	296.51	295.03	811
01/09/2016-30/09/2016	328.67	327.02	899
01/10/2016-31/10/2016	255.84	254.56	700
01/11/2016-30/11/2016	211.73	210.67	579
01/12/2016-31/12/2016	280.84	279.43	768
01/01/2017-31/01/2017	333.40	331.74	912
01/02/2017-28/02/2017	288.75	287.31	790
01/03/2017-31/03/2017	191.82	190.86	525
01/04/2017-30/04/2017	238.19	237.00	652
01/05/2017-31/05/2017	252.52	251.26	691
01/06/2017-30/06/2017	176.49	175.61	483
01/07/2017-31/07/2017	307.76	306.22	842
01/08/2017-31/08/2017	283.92	282.51	777
01/09/2017-30/09/2017	283.22	281.80	775
01/10/2017-31/10/2017	223.66	222.55	612
01/11/2017-30/11/2017	274.78	273.41	752
01/12/2017-31/12/2017	231.05	229.90	632
Total	15,587.89	15,509.95	42,652

Table 5-14 Combustion emissions from use of captured methane from Shanmushu coal mine

Years	MM_{ELEC}	MD_{ELEC}	PE_{MD}
	(tCH ₄)	(tCH ₄)	(tCO ₂ e)
	B	$J=B*Eff_{ELEC}$	$K=J*CEF_{CH_4}$
01/01/2013-31/01/2013	0.00	0.00	0
01/02/2013-28/02/2013	0.00	0.00	0

01/03/2013-31/03/2013	0.00	0.00	0
01/04/2013-30/04/2013	0.00	0.00	0
01/05/2013-31/05/2013	0.00	0.00	0
01/06/2013-30/06/2013	0.00	0.00	0
01/07/2013-31/07/2013	0.00	0.00	0
01/08/2013-31/08/2013	0.00	0.00	0
01/09/2013-30/09/2013	117.57	116.98	322
01/10/2013-31/10/2013	103.21	102.70	282
01/11/2013-30/11/2013	178.11	177.22	487
01/12/2013-31/12/2013	169.15	168.31	463
01/01/2014-31/01/2014	193.19	192.22	529
01/02/2014-28/02/2014	226.89	225.76	621
01/03/2014-31/03/2014	186.49	185.55	510
01/04/2014-30/04/2014	251.81	250.55	689
01/05/2014-31/05/2014	209.08	208.04	572
01/06/2014-30/06/2014	189.48	188.53	518
01/07/2014-31/07/2014	253.75	252.49	694
01/08/2014-31/08/2014	165.91	165.08	454
01/09/2014-30/09/2014	154.95	154.17	424
01/10/2014-31/10/2014	155.99	155.21	427
01/11/2014-30/11/2014	184.80	183.88	506
01/12/2014-31/12/2014	161.72	160.91	442
01/01/2015-31/01/2015	196.96	195.97	539
01/02/2015-28/02/2015	193.15	192.19	529
01/03/2015-31/03/2015	254.89	253.61	697
01/04/2015-30/04/2015	227.45	226.31	622
01/05/2015-31/05/2015	181.77	180.86	497
01/06/2015-30/06/2015	147.70	146.96	404

01/07/2015-31/07/2015	237.07	235.88	649
01/08/2015-31/08/2015	188.78	187.84	517
01/09/2015-30/09/2015	234.98	233.81	643
01/10/2015-31/10/2015	317.46	315.87	869
01/11/2015-30/11/2015	364.27	362.45	997
01/12/2015-31/12/2015	385.48	383.56	1,055
01/01/2016-31/01/2016	366.93	365.09	1,004
01/02/2016-29/02/2016	353.73	351.96	968
01/03/2016-31/03/2016	436.35	434.17	1,194
01/04/2016-30/04/2016	341.80	340.09	935
01/05/2016-31/05/2016	363.01	361.20	993
01/06/2016-30/06/2016	282.42	281.01	773
01/07/2016-31/07/2016	226.95	225.81	621
01/08/2016-31/08/2016	291.98	290.52	799
01/09/2016-30/09/2016	272.07	270.71	744
01/10/2016-31/10/2016	541.13	538.43	1,481
01/11/2016-30/11/2016	276.79	275.41	757
01/12/2016-31/12/2016	353.66	351.89	968
01/01/2017-31/01/2017	464.80	462.47	1,272
01/02/2017-28/02/2017	405.45	403.43	1,109
01/03/2017-31/03/2017	391.19	389.23	1,070
01/04/2017-30/04/2017	149.11	148.36	408
01/05/2017-31/05/2017	168.37	167.53	461
01/06/2017-30/06/2017	356.42	354.64	975
01/07/2017-31/07/2017	331.97	330.31	908
01/08/2017-31/08/2017	468.49	466.14	1,282
01/09/2017-30/09/2017	373.87	372.00	1,023
01/10/2017-31/10/2017	281.20	279.79	769

01/11/2017-30/11/2017	456.06	453.78	1,248
01/12/2017-31/12/2017	383.84	381.92	1,050
Total	14,169.62	14,098.77	38,772

5.2.3 Un-combusted methane from end uses

Not all of the methane used to generate electricity will be combusted, and a small amount will escape into the atmosphere.

$$PE_{UM} = GWP_{CH_4} \times MM_{ELEC} \times (1 - Eff_{ELEC})$$

Table 5-15 Un-combusted methane from end uses in Baijiao coal mines

Year	MM_{ELEC}	Total CH ₄ emissions	PE_{UM}
	(tCH ₄)	(tCH ₄)	(tCO ₂ e)
	B	L=B*(1-Eff_{ELEC})	M=L*GWP_{CH_4}
01/01/2013-31/01/2013	353.42	1.77	49
01/02/2013-28/02/2013	273.97	1.37	38
01/03/2013-31/03/2013	384.11	1.92	54
01/04/2013-30/04/2013	322.85	1.61	45
01/05/2013-31/05/2013	550.02	2.75	77
01/06/2013-30/06/2013	484.68	2.42	68
01/07/2013-31/07/2013	192.90	0.96	27
01/08/2013-31/08/2013	137.94	0.69	19
01/09/2013-30/09/2013	274.82	1.37	38
01/10/2013-31/10/2013	439.11	2.20	61
01/11/2013-30/11/2013	192.82	0.96	27
01/12/2013-31/12/2013	342.78	1.71	48
01/01/2014-31/01/2014	317.95	1.59	45
01/02/2014-28/02/2014	153.22	0.77	21
01/03/2014-31/03/2014	375.63	1.88	53

01/04/2014-30/04/2014	572.76	2.86	80
01/05/2014-31/05/2014	503.78	2.52	71
01/06/2014-30/06/2014	172.39	0.86	24
01/07/2014-31/07/2014	486.39	2.43	68
01/08/2014-31/08/2014	357.60	1.79	50
01/09/2014-30/09/2014	151.47	0.76	21
01/10/2014-31/10/2014	366.11	1.83	51
01/11/2014-30/11/2014	423.75	2.12	59
01/12/2014-31/12/2014	378.49	1.89	53
01/01/2015-31/01/2015	264.46	1.32	37
01/02/2015-28/02/2015	182.37	0.91	26
01/03/2015-31/03/2015	321.84	1.61	45
01/04/2015-30/04/2015	464.35	2.32	65
01/05/2015-31/05/2015	287.19	1.44	40
01/06/2015-30/06/2015	465.37	2.33	65
01/07/2015-31/07/2015	453.52	2.27	63
01/08/2015-31/08/2015	401.19	2.01	56
01/09/2015-30/09/2015	310.57	1.55	43
01/10/2015-31/10/2015	332.55	1.66	47
01/11/2015-30/11/2015	340.21	1.70	48
01/12/2015-31/12/2015	301.38	1.51	42
01/01/2016-31/01/2016	291.14	1.46	41
01/02/2016-29/02/2016	483.70	2.42	68
01/03/2016-31/03/2016	322.15	1.61	45
01/04/2016-30/04/2016	509.29	2.55	71
01/05/2016-31/05/2016	218.27	1.09	31
01/06/2016-30/06/2016	407.27	2.04	57
01/07/2016-31/07/2016	265.73	1.33	37

01/08/2016-31/08/2016	486.46	2.43	68
01/09/2016-30/09/2016	440.65	2.20	62
01/10/2016-31/10/2016	389.29	1.95	55
01/11/2016-30/11/2016	191.01	0.96	27
01/12/2016-31/12/2016	476.70	2.38	67
01/01/2017-31/01/2017	397.13	1.99	56
01/02/2017-28/02/2017	327.34	1.64	46
01/03/2017-31/03/2017	214.80	1.07	30
01/04/2017-30/04/2017	573.57	2.87	80
01/05/2017-31/05/2017	414.49	2.07	58
01/06/2017-30/06/2017	275.95	1.38	39
01/07/2017-31/07/2017	494.36	2.47	69
01/08/2017-31/08/2017	371.92	1.86	52
01/09/2017-30/09/2017	300.94	1.50	42
01/10/2017-31/10/2017	442.18	2.21	62
01/11/2017-30/11/2017	451.35	2.26	63
01/12/2017-31/12/2017	290.71	1.45	41
Total	21,370.32	106.85	2,992

Table 5-16 Un-combusted methane from end uses in Gongquan coal mine

Year	MM_{ELEC}	Total CH ₄ emissions	PE_{UM}
	(tCH ₄)	(tCH ₄)	(tCO ₂ e)
	B	L=B*(1-Eff_{ELEC})	M=L*GWP_{CH_4}
01/01/2013-31/01/2013	224.24	1.12	31
01/02/2013-28/02/2013	255.79	1.28	36
01/03/2013-31/03/2013	202.50	1.01	28
01/04/2013-30/04/2013	256.92	1.28	36
01/05/2013-31/05/2013	221.21	1.11	31

01/06/2013-30/06/2013	358.00	1.79	50
01/07/2013-31/07/2013	350.40	1.75	49
01/08/2013-31/08/2013	364.75	1.82	51
01/09/2013-30/09/2013	166.53	0.83	23
01/10/2013-31/10/2013	343.32	1.72	48
01/11/2013-30/11/2013	301.26	1.51	42
01/12/2013-31/12/2013	255.40	1.28	36
01/01/2014-31/01/2014	290.12	1.45	41
01/02/2014-28/02/2014	211.01	1.06	30
01/03/2014-31/03/2014	143.44	0.72	20
01/04/2014-30/04/2014	263.56	1.32	37
01/05/2014-31/05/2014	372.07	1.86	52
01/06/2014-30/06/2014	292.86	1.46	41
01/07/2014-31/07/2014	245.48	1.23	34
01/08/2014-31/08/2014	340.78	1.70	48
01/09/2014-30/09/2014	179.63	0.90	25
01/10/2014-31/10/2014	270.90	1.35	38
01/11/2014-30/11/2014	379.94	1.90	53
01/12/2014-31/12/2014	215.55	1.08	30
01/01/2015-31/01/2015	269.36	1.35	38
01/02/2015-28/02/2015	244.17	1.22	34
01/03/2015-31/03/2015	311.02	1.56	44
01/04/2015-30/04/2015	202.73	1.01	28
01/05/2015-31/05/2015	189.52	0.95	27
01/06/2015-30/06/2015	231.88	1.16	32
01/07/2015-31/07/2015	184.56	0.92	26
01/08/2015-31/08/2015	206.69	1.03	29
01/09/2015-30/09/2015	234.87	1.17	33

01/10/2015-31/10/2015	320.98	1.60	45
01/11/2015-30/11/2015	306.67	1.53	43
01/12/2015-31/12/2015	256.70	1.28	36
01/01/2016-31/01/2016	174.40	0.87	24
01/02/2016-29/02/2016	220.34	1.10	31
01/03/2016-31/03/2016	218.45	1.09	31
01/04/2016-30/04/2016	278.25	1.39	39
01/05/2016-31/05/2016	259.18	1.30	36
01/06/2016-30/06/2016	230.98	1.15	32
01/07/2016-31/07/2016	282.33	1.41	40
01/08/2016-31/08/2016	296.51	1.48	42
01/09/2016-30/09/2016	328.67	1.64	46
01/10/2016-31/10/2016	255.84	1.28	36
01/11/2016-30/11/2016	211.73	1.06	30
01/12/2016-31/12/2016	280.84	1.40	39
01/01/2017-31/01/2017	333.40	1.67	47
01/02/2017-28/02/2017	288.75	1.44	40
01/03/2017-31/03/2017	191.82	0.96	27
01/04/2017-30/04/2017	238.19	1.19	33
01/05/2017-31/05/2017	252.52	1.26	35
01/06/2017-30/06/2017	176.49	0.88	25
01/07/2017-31/07/2017	307.76	1.54	43
01/08/2017-31/08/2017	283.92	1.42	40
01/09/2017-30/09/2017	283.22	1.42	40
01/10/2017-31/10/2017	223.66	1.12	31
01/11/2017-30/11/2017	274.78	1.37	38
01/12/2017-31/12/2017	231.05	1.16	32
Total	15,587.89	77.94	2,182

Table 5-17 Un-combusted methane from end uses in Shanmushu coal mine

Year	MM_{ELEC}	Total CH ₄ emissions	PE_{UM}
	(tCH ₄)	(tCH ₄)	(tCO ₂ e)
	B	L=B*(1-Eff_{ELEC})	M=L*GWP_{CH_4}
01/01/2013-31/01/2013	0.00	0.00	0
01/02/2013-28/02/2013	0.00	0.00	0
01/03/2013-31/03/2013	0.00	0.00	0
01/04/2013-30/04/2013	0.00	0.00	0
01/05/2013-31/05/2013	0.00	0.00	0
01/06/2013-30/06/2013	0.00	0.00	0
01/07/2013-31/07/2013	0.00	0.00	0
01/08/2013-31/08/2013	0.00	0.00	0
01/09/2013-30/09/2013	117.57	0.59	16
01/10/2013-31/10/2013	103.21	0.52	14
01/11/2013-30/11/2013	178.11	0.89	25
01/12/2013-31/12/2013	169.15	0.85	24
01/01/2014-31/01/2014	193.19	0.97	27
01/02/2014-28/02/2014	226.89	1.13	32
01/03/2014-31/03/2014	186.49	0.93	26
01/04/2014-30/04/2014	251.81	1.26	35
01/05/2014-31/05/2014	209.08	1.05	29
01/06/2014-30/06/2014	189.48	0.95	27
01/07/2014-31/07/2014	253.75	1.27	36
01/08/2014-31/08/2014	165.91	0.83	23
01/09/2014-30/09/2014	154.95	0.77	22
01/10/2014-31/10/2014	155.99	0.78	22
01/11/2014-30/11/2014	184.80	0.92	26
01/12/2014-31/12/2014	161.72	0.81	23

01/01/2015-31/01/2015	196.96	0.98	28
01/02/2015-28/02/2015	193.15	0.97	27
01/03/2015-31/03/2015	254.89	1.27	36
01/04/2015-30/04/2015	227.45	1.14	32
01/05/2015-31/05/2015	181.77	0.91	25
01/06/2015-30/06/2015	147.70	0.74	21
01/07/2015-31/07/2015	237.07	1.19	33
01/08/2015-31/08/2015	188.78	0.94	26
01/09/2015-30/09/2015	234.98	1.17	33
01/10/2015-31/10/2015	317.46	1.59	44
01/11/2015-30/11/2015	364.27	1.82	51
01/12/2015-31/12/2015	385.48	1.93	54
01/01/2016-31/01/2016	366.93	1.83	51
01/02/2016-29/02/2016	353.73	1.77	50
01/03/2016-31/03/2016	436.35	2.18	61
01/04/2016-30/04/2016	341.80	1.71	48
01/05/2016-31/05/2016	363.01	1.82	51
01/06/2016-30/06/2016	282.42	1.41	40
01/07/2016-31/07/2016	226.95	1.13	32
01/08/2016-31/08/2016	291.98	1.46	41
01/09/2016-30/09/2016	272.07	1.36	38
01/10/2016-31/10/2016	541.13	2.71	76
01/11/2016-30/11/2016	276.79	1.38	39
01/12/2016-31/12/2016	353.66	1.77	50
01/01/2017-31/01/2017	464.80	2.32	65
01/02/2017-28/02/2017	405.45	2.03	57
01/03/2017-31/03/2017	391.19	1.96	55
01/04/2017-30/04/2017	149.11	0.75	21

01/05/2017-31/05/2017	168.37	0.84	24
01/06/2017-30/06/2017	356.42	1.78	50
01/07/2017-31/07/2017	331.97	1.66	46
01/08/2017-31/08/2017	468.49	2.34	66
01/09/2017-30/09/2017	373.87	1.87	52
01/10/2017-31/10/2017	281.20	1.41	39
01/11/2017-30/11/2017	456.06	2.28	64
01/12/2017-31/12/2017	383.84	1.92	54
Total	14,169.62	70.85	1,984

5.2.4 Total Project Emissions

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

Table 5-18 Project emissions of Baijiao coal mine

Year	PE_{ME}	PE_{MD}	PE_{UM}	PE_y
	(tCO ₂ e)	(tCO ₂ e)	(tCO ₂ e)	(tCO ₂ e)
	I	K	M	N=I+K+M
01/01/2013-31/01/2013	143	967	49	1,159
01/02/2013-28/02/2013	108	750	38	896
01/03/2013-31/03/2013	134	1,051	54	1,239
01/04/2013-30/04/2013	133	883	45	1,061
01/05/2013-31/05/2013	190	1,505	77	1,772
01/06/2013-30/06/2013	197	1,326	68	1,591
01/07/2013-31/07/2013	68	528	27	623
01/08/2013-31/08/2013	48	377	19	445
01/09/2013-30/09/2013	96	752	38	886
01/10/2013-31/10/2013	125	1,202	61	1,388
01/11/2013-30/11/2013	76	528	27	631

01/12/2013-31/12/2013	106	938	48	1,092
01/01/2014-31/01/2014	108	870	45	1,022
01/02/2014-28/02/2014	66	419	21	507
01/03/2014-31/03/2014	120	1,028	53	1,201
01/04/2014-30/04/2014	173	1,567	80	1,820
01/05/2014-31/05/2014	162	1,378	71	1,611
01/06/2014-30/06/2014	71	472	24	567
01/07/2014-31/07/2014	149	1,331	68	1,548
01/08/2014-31/08/2014	121	978	50	1,150
01/09/2014-30/09/2014	56	414	21	492
01/10/2014-31/10/2014	124	1,002	51	1,177
01/11/2014-30/11/2014	147	1,159	59	1,366
01/12/2014-31/12/2014	113	1,036	53	1,202
01/01/2015-31/01/2015	94	724	37	855
01/02/2015-28/02/2015	66	499	26	591
01/03/2015-31/03/2015	107	881	45	1,033
01/04/2015-30/04/2015	167	1,271	65	1,502
01/05/2015-31/05/2015	94	786	40	920
01/06/2015-30/06/2015	156	1,273	65	1,495
01/07/2015-31/07/2015	163	1,241	63	1,468
01/08/2015-31/08/2015	138	1,098	56	1,292
01/09/2015-30/09/2015	118	850	43	1,012
01/10/2015-31/10/2015	145	910	47	1,101
01/11/2015-30/11/2015	140	931	48	1,119
01/12/2015-31/12/2015	131	825	42	998
01/01/2016-31/01/2016	130	797	41	968
01/02/2016-29/02/2016	172	1,324	68	1,563
01/03/2016-31/03/2016	142	881	45	1,069

01/04/2016-30/04/2016	191	1,394	71	1,655
01/05/2016-31/05/2016	111	597	31	738
01/06/2016-30/06/2016	162	1,114	57	1,333
01/07/2016-31/07/2016	106	727	37	871
01/08/2016-31/08/2016	166	1,331	68	1,565
01/09/2016-30/09/2016	151	1,206	62	1,418
01/10/2016-31/10/2016	177	1,065	55	1,297
01/11/2016-30/11/2016	90	523	27	640
01/12/2016-31/12/2016	170	1,304	67	1,541
01/01/2017-31/01/2017	178	1,087	56	1,321
01/02/2017-28/02/2017	148	896	46	1,090
01/03/2017-31/03/2017	109	588	30	727
01/04/2017-30/04/2017	170	1,569	80	1,819
01/05/2017-31/05/2017	131	1,134	58	1,323
01/06/2017-30/06/2017	128	755	39	922
01/07/2017-31/07/2017	187	1,353	69	1,609
01/08/2017-31/08/2017	161	1,018	52	1,231
01/09/2017-30/09/2017	136	823	42	1,002
01/10/2017-31/10/2017	158	1,210	62	1,430
01/11/2017-30/11/2017	183	1,235	63	1,481
01/12/2017-31/12/2017	128	795	41	965
Total	7,941	58,475	2,992	69,407

Table 5-19 Project emissions of Gongquan coal mine

Year	PE_{ME}	PE_{MD}	PE_{UM}	PE_y
	(tCO ₂ e)	(tCO ₂ e)	(tCO ₂ e)	(tCO ₂ e)
	I	K	M	N=I+K+M

01/01/2013-31/01/2013	16	614	31	661
01/02/2013-28/02/2013	19	700	36	755
01/03/2013-31/03/2013	16	554	28	599
01/04/2013-30/04/2013	13	703	36	752
01/05/2013-31/05/2013	13	605	31	649
01/06/2013-30/06/2013	13	980	50	1,043
01/07/2013-31/07/2013	14	959	49	1,022
01/08/2013-31/08/2013	14	998	51	1,063
01/09/2013-30/09/2013	13	456	23	492
01/10/2013-31/10/2013	14	939	48	1,001
01/11/2013-30/11/2013	13	824	42	879
01/12/2013-31/12/2013	9	699	36	744
01/01/2014-31/01/2014	16	794	41	850
01/02/2014-28/02/2014	17	577	30	624
01/03/2014-31/03/2014	17	392	20	429
01/04/2014-30/04/2014	17	721	37	776
01/05/2014-31/05/2014	15	1,018	52	1,085
01/06/2014-30/06/2014	17	801	41	860
01/07/2014-31/07/2014	15	672	34	721
01/08/2014-31/08/2014	15	932	48	995
01/09/2014-30/09/2014	14	492	25	531
01/10/2014-31/10/2014	14	741	38	793
01/11/2014-30/11/2014	9	1,040	53	1,102
01/12/2014-31/12/2014	9	590	30	629
01/01/2015-31/01/2015	9	737	38	784
01/02/2015-28/02/2015	15	668	34	718
01/03/2015-31/03/2015	13	851	44	908
01/04/2015-30/04/2015	15	555	28	598

01/05/2015-31/05/2015	13	519	27	558
01/06/2015-30/06/2015	13	634	32	680
01/07/2015-31/07/2015	14	505	26	544
01/08/2015-31/08/2015	14	566	29	609
01/09/2015-30/09/2015	12	643	33	688
01/10/2015-31/10/2015	8	878	45	932
01/11/2015-30/11/2015	19	839	43	901
01/12/2015-31/12/2015	15	702	36	754
01/01/2016-31/01/2016	18	477	24	519
01/02/2016-29/02/2016	17	603	31	651
01/03/2016-31/03/2016	14	598	31	643
01/04/2016-30/04/2016	20	761	39	820
01/05/2016-31/05/2016	9	709	36	755
01/06/2016-30/06/2016	10	632	32	675
01/07/2016-31/07/2016	15	773	40	828
01/08/2016-31/08/2016	13	811	42	865
01/09/2016-30/09/2016	13	899	46	959
01/10/2016-31/10/2016	9	700	36	745
01/11/2016-30/11/2016	17	579	30	626
01/12/2016-31/12/2016	16	768	39	824
01/01/2017-31/01/2017	13	912	47	972
01/02/2017-28/02/2017	11	790	40	841
01/03/2017-31/03/2017	14	525	27	566
01/04/2017-30/04/2017	14	652	33	699
01/05/2017-31/05/2017	12	691	35	738
01/06/2017-30/06/2017	14	483	25	522
01/07/2017-31/07/2017	9	842	43	894
01/08/2017-31/08/2017	9	777	40	826

01/09/2017-30/09/2017	9	775	40	824
01/10/2017-31/10/2017	15	612	31	658
01/11/2017-30/11/2017	13	752	38	803
01/12/2017-31/12/2017	14	632	32	679
Total	824	42,652	2,182	45,659

Table 5-20 Project emissions of Shanmushu coal mine

Year	PE_{ME}^4	PE_{MD}	PE_{UM}	PE_y
	(tCO ₂ e)	(tCO ₂ e)	(tCO ₂ e)	(tCO ₂ e)
	I	K	M	N=I+K+M
01/01/2013-31/01/2013	0	0	0	0
01/02/2013-28/02/2013	0	0	0	0
01/03/2013-31/03/2013	0	0	0	0
01/04/2013-30/04/2013	0	0	0	0
01/05/2013-31/05/2013	0	0	0	0
01/06/2013-30/06/2013	0	0	0	0
01/07/2013-31/07/2013	0	0	0	0
01/08/2013-31/08/2013	0	0	0	0
01/09/2013-30/09/2013	0	322	16	338
01/10/2013-31/10/2013	0	282	14	297
01/11/2013-30/11/2013	0	487	25	512
01/12/2013-31/12/2013	0	463	24	487

⁴ Before the operation of the CMM power plant in Shanmushu coal mine, the CMM of Shanmushu coal mine was supplied to the CMM power plant in Bajiao coal mine, so project emissions from additional energy use in Bajiao coal mine and Shanmushu coal mine were considered as the project emission of the CMM power plant in Bajiao coal mine in the first monitoring report. After the operation of the CMM power plant in Shanmushu coal mine, part of the CMM of Shanmushu coal mine is still supplied to the CMM power plant in Bajiao coal mine, so, the project emissions from additional energy use in Bajiao coal mine and Shanmushu coal mine can not be separated. Project emissions from additional energy use in Bajiao coal mine and Shanmushu coal mine were considered as the project emission of the CMM power plant in Bajiao coal mine and the project emissions from additional energy use in Shanmushu coal mine was considered as Zero.

01/01/2014-31/01/2014	0	529	27	556
01/02/2014-28/02/2014	0	621	32	653
01/03/2014-31/03/2014	0	510	26	536
01/04/2014-30/04/2014	0	689	35	724
01/05/2014-31/05/2014	0	572	29	601
01/06/2014-30/06/2014	0	518	27	545
01/07/2014-31/07/2014	0	694	36	730
01/08/2014-31/08/2014	0	454	23	477
01/09/2014-30/09/2014	0	424	22	446
01/10/2014-31/10/2014	0	427	22	449
01/11/2014-30/11/2014	0	506	26	532
01/12/2014-31/12/2014	0	442	23	465
01/01/2015-31/01/2015	0	539	28	567
01/02/2015-28/02/2015	0	529	27	556
01/03/2015-31/03/2015	0	697	36	733
01/04/2015-30/04/2015	0	622	32	654
01/05/2015-31/05/2015	0	497	25	523
01/06/2015-30/06/2015	0	404	21	425
01/07/2015-31/07/2015	0	649	33	682
01/08/2015-31/08/2015	0	517	26	543
01/09/2015-30/09/2015	0	643	33	676
01/10/2015-31/10/2015	0	869	44	913
01/11/2015-30/11/2015	0	997	51	1,048
01/12/2015-31/12/2015	0	1,055	54	1,109
01/01/2016-31/01/2016	0	1,004	51	1,055
01/02/2016-29/02/2016	0	968	50	1,017
01/03/2016-31/03/2016	0	1,194	61	1,255
01/04/2016-30/04/2016	0	935	48	983

01/05/2016-31/05/2016	0	993	51	1,044
01/06/2016-30/06/2016	0	773	40	812
01/07/2016-31/07/2016	0	621	32	653
01/08/2016-31/08/2016	0	799	41	840
01/09/2016-30/09/2016	0	744	38	783
01/10/2016-31/10/2016	0	1,481	76	1,556
01/11/2016-30/11/2016	0	757	39	796
01/12/2016-31/12/2016	0	968	50	1,017
01/01/2017-31/01/2017	0	1,272	65	1,337
01/02/2017-28/02/2017	0	1,109	57	1,166
01/03/2017-31/03/2017	0	1,070	55	1,125
01/04/2017-30/04/2017	0	408	21	429
01/05/2017-31/05/2017	0	461	24	484
01/06/2017-30/06/2017	0	975	50	1,025
01/07/2017-31/07/2017	0	908	46	955
01/08/2017-31/08/2017	0	1,282	66	1,347
01/09/2017-30/09/2017	0	1,023	52	1,075
01/10/2017-31/10/2017	0	769	39	809
01/11/2017-30/11/2017	0	1,248	64	1,312
01/12/2017-31/12/2017	0	1,050	54	1,104
Total	0	38,772	1,984	40,755

5.3 Leakage

The formula for leakage is given as follows:

$$LE_y = LE_{d,y} + LE_{o,y}$$

Where:

LE_y Leakage emissions in year y (tCO_{2e})

$LE_{d,y}$ Leakage emissions due to displacement of other baseline thermal energy uses of methane in year y (tCO₂e)

$LE_{o,y}$ Leakage emissions due to other uncertainties in year y (tCO₂e)

According to the approved revised PDD, the leakage is 0.

5.4 Net GHG Emission Reductions and Removals

Year	Baseline emissions or removals (tCO ₂ e)	Project emissions or removals (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Net GHG emission reductions or removals (tCO ₂ e)
Year 2013	254286	24077	0	230209
Year 2014	320025	29771	0	290254
Year 2015	328692	30485	0	298207
Year 2016	380717	35380	0	345337
Year 2017	388986	36110	0	352876
Total	1672706	155823	0	1516883

The value of, GWP_{CH_4} was increase from 21 to 28 as per AR5 of IPCC . In order to fairly compare the estimated annual emission reductions and actual emission reductions, 28 of GWP_{CH_4} was introduced in the ER calculation of the registered ER calculation.

Year	Net GHG emission reductions or removals in the registered ER calculation (tCO ₂ e) with 28 of GWP_{CH_4}	Net GHG emission reductions or removals (tCO ₂ e)
Year 2013	274,949	230209
Year 2014	284,770	290254

Year 2015	304,422	298207
Year 2016	314,253	345337
Year 2017	314,243	352876
Total	1492637	1516883

By comparison, the actual emission reduction is only 1.62% higher than the estimated emission reduction. , the increase of 1.62% is tiny and have no impact on the additonality of the project

APPENDIX X: <EVIDENCE FOR SD CONTRIBUTIONS >

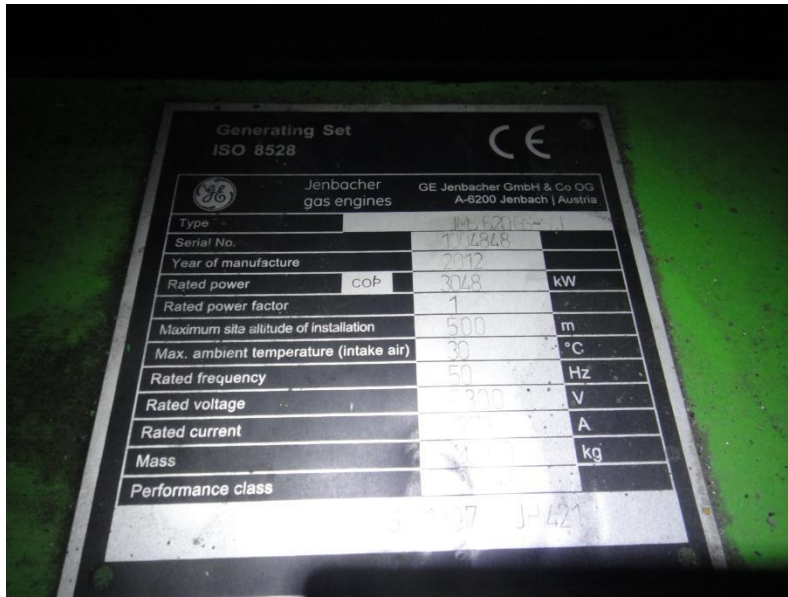
1. The employee list for the project

序号	岗位名称	人数	姓名	职责	其他
	负责经理	2	张红革、刘小童	总体负责	代表集团负责瓦斯电厂的管理
1	工程师 (电控)	3	王飞云、陈贵平、刘日军	负责完成电厂电控专业管理及技术方面的制度、规程、系统图、措施等的编制与监督执行工作。	1.了解高压电气相关国家标准和规定，熟悉供配电一、二次系统，较好掌握供配电电气系统安装、调试及运维工作； 2.掌握电气设备结构、原理； 3.掌握电气保护原理； 4.熟悉发电机组主要设备及主要辅机的构造、性能及工作原理。
2	工程师 (机修)	2	孙力军、张亮	负责全面实施电厂设备维修保养计划、对设备突发故障的应急维修及抢修。	1.熟悉各种泵、阀、风机、发电机等机械维护，熟知设备保养、维修流程及规范和标准；能够对工程机械设备进行维修维护及故障排除并能从事现场工作； 2.掌握瓦斯电厂相关设备各种自动控制、热工保护和测量仪表的作用、工作原理及实验方法； 3.掌握瓦斯电厂相关设备的保护自动装置； 4.熟悉瓦斯电厂主要设备及主要辅机的构造、性能及工作原理； 5.熟悉DCS控制系统原理。
3	值长	6	王越建 刘润生 孙成红 王利 韩刚龙 郝瑛连	负责当班期间动力安全、经济运行、生产操作、故障处理。	1.熟悉“两票三制”相关规定，熟悉电厂各专业运行规程及调度规程； 2.具备电厂事故处理经验，能准确判断处理设备常见故障。
4	主值	6	王翔 孙丽萍 丁芹 王银 陈桂平 朱斯	主要负责集控室DCS中控的监盘、操作、定期切换试验、事故处理等工作。	熟悉掌握DCS中控设备及PLC操作规程。
5	检修班长	6	杨福林 贾小龙 石双厚 马树 林飞 石今春	负责设备的日常维护和检修，确保设备运行正常，对设备故障及时组织处理。	了解电厂机、炉、电、水处理专业技术知识，能准确判断并处理常见故障。
6	检修员	6	郭旦 贾桂林 石桂成 马占云 申彩玲 李天荣	了解厂区内全部设备的运行状态，有效地处理各种临时性、突发性设备故障等。	了解电厂机、炉、电、水处理专业技术知识，能准确判断并处理常见故障。
7	调度员	5	刘埃生 石利军 杨万富 马祥 刘龙	负责及时准确的将生产现场情况向各车间传达生产任务、生产调度指令、各项通知通报等。	了解电厂运行规程，能及时准确的将现场情况上传下达。
8	瓦斯抽采员	4	吴七七 王路 程斯语 乔军	负责高、低负压瓦斯抽放泵站及系统的管理工作。	有瓦斯抽采证件者优先。
9	供热员	3	蔡农中 高强 尤帅齐	负责电厂供热区域内供暖及采暖工作。	熟悉电厂供热管网、锅炉、换热设备的运行管理。
10	总人数	43人			

2, the employee list for Shanmushu CMM power plant

杉木树员工		
值长	2	韩刚龙 郝埃连
主值	2	陈桂平 朱斯
检修班长	2	林飞 石今春
检修员	2	申彩玲 李天荣
调度员	2	马祥 刘龙
瓦斯抽采员	1	乔军
供热员	1	尤帅齐
总人数	12人	

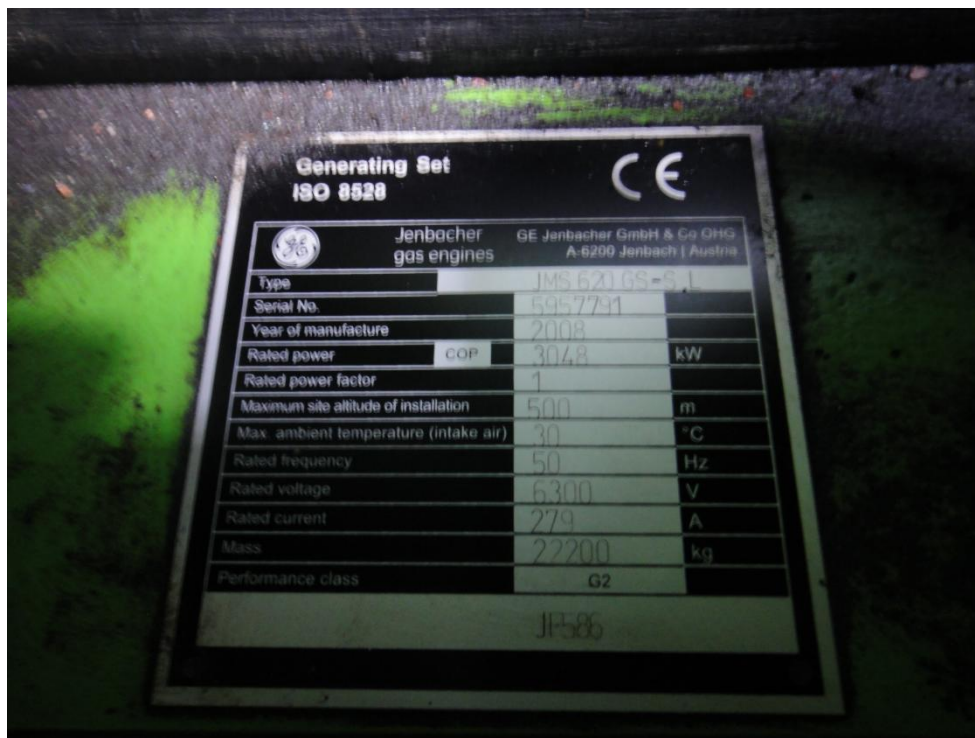
3. The generator nameplate of the GE JMS620GS-S.L 3MW level gas generators



The nameplate of 1# Generators for Shanmushu CMM power plant



The nameplate of 2# Generators for Shanmushu CMM power plant



The nameplate of 1# Generators for Baijiao CMM power plant



The nameplate of 2# Generators for Baijiao CMM power plant