



VERIFICATION REPORT FOR HUINENG LOW CONCENTRATION COAL MINE METHANE UTILIZATION PROJECT



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Ltd.

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Summary:

China Classification Society Certification Co., Ltd. (hereafter referred to as “CCSC”) has been commissioned by Vitol (China) Energy Co., Ltd to perform the verification of greenhouse gas emission reductions of the project activity “Huineng Low Concentration Coal Mine Methane Utilization Project ” (UNFCCC Ref. No. 8006, VCS Ref. No. 2830, hereafter referred to as “the project activity”) reported in the monitoring report during monitoring period 01/01/2019 to 31/12/2021.

The verification scope is defined as a periodic independent and objective review and ex-post determination by the Designated Operational Entity of the monitored reductions in GHG emissions during defined verification period, and consisted of the following three phases: i) desk review of the project design and the baseline and monitoring plan; ii) follow-up on-site visit and interviews with project stakeholders; iii) resolution of outstanding issues and the issuance of the final verification report and opinion. The overall verification, from Contract Review to Verification Report & Opinion, was conducted using CCSC internal procedures.

No Corrective Action Request (CAR) and four Clarification Request (CL) were raised in the verification process and successfully closed upon the project participant taken actions and submitted the revised monitoring report and supporting evidence. No Forward Action Request (FAR) was raised during this verification.

In summary, CCSC confirms that the Project is implemented as planned and described in the validated and approved CDM-PDD and VCS-PD, which can be found on the VCS project webpage <https://registry.verra.org/app/projectDetail/VCS/2830>. Actual monitoring activities complied with the monitoring plan. Installed equipment being essential for generating emission reduction runs reliably and is calibrated appropriately. The monitoring system is in place and the Project reduces GHG emission. The GHG emission reduction is calculated without material misstatements, and the emission reductions verified totalize 546,071 tons of CO₂e for the monitoring period.

Our opinion relates to the Project’s GHG emissions and the resulting GHG emission reductions viz. Verified Carbon Units (VCUs) reported are based on the valid project baseline, monitoring plan and associated documents. Based on the evidence and information that are considered necessary to guarantee that GHG emission reductions are

appropriately calculated, CCSC confirms following statement:

Vintage	BE (tCO ₂)	PE (tCO ₂)	LE (tCO ₂)	ER (tCO ₂)
2019	257,046	23,692	-	233,354
2020	216,143	19,792	-	196,351
2021	128,002	11,636	-	116,366
Total	601,191	55,120	0	546,071

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1 INTRODUCTION

1.1 Objective

Vitol (China) Energy Co., Ltd has commissioned Classification Society Certification Company (hereafter referred to as “CCSC”) to verify the emission reductions of the Verified Carbon Units (VCU) of Huineng Low Concentration Coal Mine Methane Utilization Project (hereafter referred to as “the Project”), which is located in Xincheng Village, Zhangzhuang Town, Pingding County, Yangquan City, Shanxi Province, People’s Republic of China for the period from 01/01/2019 to 31/12/2021.

CCSC as the validation/verification body (VVB) of the Project has been accredited as a VVB by VERRA and also meets the competence requirements as set out in ISO 14065:2013.

The objective of verification is to verify the reported voluntary emission reductions generated by the Project for the period from 01/01/2019 to 31/12/2021 and to confirm that actual monitoring systems and procedures are in compliance with that described in the monitoring plan and the additional requirements stated by Verra.

1.2 Scope and Criteria

The verification scope is defined as an independent and objective review of the CDM-PDD and VCS-PD, the Project’s baseline study and Monitoring Report (MR) and other relevant documents. The information in these documents is reviewed against VCS Version 4.3 requirements, UNFCCC rules and associated interpretations.

The verification is not meant to provide any consulting towards the client. However, stated requests for forward actions and/or corrective actions may provide input for improvement of the Project monitoring towards reductions in the GHG emissions.

1.3 Level of Assurance

CCSC has undertaken a reasonable assurance engagement in accordance with VCS version 4.3. It requires a reasonable level of assurance in verification that GHG assertions are free of material errors, omissions and misrepresentations. The verification conclusion is based on the VCS-MR, CDM-PDD, supporting evidences made available to the verifier and information collected through performing interviews and during the on-site inspection.

1.4 Summary Description of the Project

Project title	Huineng Low Concentration Coal Mine Methane Utilization
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Project	
UNFCCC reference number	8006
VCS reference number	2830
Crediting period (VCS)	04/11/2013 to 30/06/2023 (9 years 239 days) As per clarification 2 of Verra 19 April 2022 clarifications document, the VCS project crediting period must start on the same day as the project start date and the project may not issue VCUs with vintages prior to 1 Jan 2016. Therefore the project proponent will not claim VCUs for vintage prior to 01/01/2016. Besides, the crediting period start date must still equal the project start date. Thus the crediting period starts on 04/11/2013 and will end on 30/06/2023, on which the CDM crediting period will end.
Monitoring period	01/01/2019 to 31/12/2021
Applied Methodology/Version	ACM0008 version 07
Scope/Technical Area	Scope 8 / TA 8.1 Scope 10/TA 10.1
UNFCCC link:	https://cdm.unfccc.int/Projects/DB/CEC1351854040.36/view
VCS link:	https://registry.verra.org/app/projectDetail/VCS/2830
Project Participants	Beijing Yonder Environmental Energy Technology Co., Ltd (Project Owner, host country, P. R. China)
Location of the project	Located in Xincheng Village, Zhangzhuang Town, Pingding County, Yangquan City, Shanxi Province, People's Republic of China Geographic coordinates: The geographic coordinates of the project: 113°34'15"~113°39'40" east and 37°41'11"~ 37°43'57" north

The Huineng Low Concentration Coal Mine Methane Utilization Project (hereafter referred to as the project) developed by Beijing Yonder Environmental Energy Technology Co., Ltd (hereafter referred to as the project proponent) is a CMM utilization project located in Xincheng Village, Zhangzhuang Town, Pingding County, Yangquan City, Shanxi Province, People's Republic of China . The total installed capacity of the Project is 12MW consisting of 16 sets of gas engine with unit capacity of 8 * 500kW + 8 * 1000 kW. The project started construction on 18/09/2012, and the first gas engine started operation 04/11/2013. Below Table 1 presents the milestone

of the gas generators operation.

Table 1: Milestone of operation

Units and capacity	Operation start date
6 * 500kW	04/11/2013
4 * 1000 kW	29/11/2014
2 * 500 kW	08/05/2015
4 * 1000 kW	08/09/2017

According to the CDM-PDD, the project is expected to capture and utilize 16,329.50 tCH₄ for power generation. The expected annual net electricity supply is 68,500 MWh. The electricity generated by the project is sold to the North China Power Grid. The annual amount of emission reductions are expected to be 352,106 tCO₂e over the crediting period.

2 VERIFICATION PROCESS

2.1 Method and Criteria

The overall validation, from Contract Review to Validation Report & Opinion, was conducted using CCSC internal procedures. CCSC verified the information contained in the documents reviewed against the requirements set in VCS Standard Version 4.3, CDM M&P, the latest version of the CDM Validation and Verification Standard, and relevant UNFCCC requirements and applying standard auditing techniques.

2.2 Document Review

Verification was conducted using CCSC's procedures in line with the requirements specified in the VCS Standard version 4.3, VCS Validation and Verification Manual, v3.2, VCS Registration & Issuance Process, v4.2, Template of VCS Monitoring Report, v4.1, Template of VCS Verification Report, v4.1 VCS Program Guide (version 4.2), CDM M&P, the latest version of the CDM Validation and Verification Standard, and relevant UNFCCC requirements and applying standard auditing techniques.

The Monitoring Report (VCS-MR) submitted by Vitol (China) Energy Co., Ltd, the CDM Project Design Document (CDM-PDD) and additional background documents related to the project design and baseline, i.e. country Law, validation report, Approved methodology, Clarifications on Validation Requirements to be Checked by a certified validation body were reviewed.

Furthermore, crosschecks were made between information provided in the CDM-PDD and VCS-PD and information from sources other than those used.

2.3 Interviews

The follow-up interview was conducted the physical site visit on 05/08/2022 by Mr. TAN Wenbin (Team Leader), Mr. LI Xingtong (Remote verification) and Ms. Wang Chen (Trainee) from CCSC, which is focused on the issues identified during the desk review. The main topics of the interviews are summarized in Table 2.

Table 2. Interview topics

Interviewed Organization and Persons	Interview Topics
Huineng Low Concentration Coal Mine Methane Utilization Project Mr. JIAO Xuefeng, Director of the plant Mr. ZHAO Shuhua, Operation staff Mr. WANG Yijia, Operation Staff Beijing Yonder Environmental Energy Technology Co., Ltd Mr. WANG Chao, Carbon Project Manager,	↪ Project background information ↪ Project technology, operation, maintenance and monitoring capability. ↪ Project monitoring and management plan. ↪ The evidences of construction status and operation of key equipment, parameters monitoring and data processing activities, monitor equipment and calibration. ↪ Monitoring data. ↪ Quality Management; organizational structure, responsibilities and competencies; Internal QA/QC Management procedures and document control. ↪ Compliance with National Laws and Regulations.
Vitol (China) Energy Co., Ltd Ms. Livia LI, Project Manager	↪ Applicability of selected methodology. ↪ Baseline determination. ↪ Emission reductions calculation. ↪ Emission reduction monitoring plan.

2.4 Site Inspections

The assessment team performed the physical on-site verification on 05/08/2022. Site inspection was conducted as follows:

Duration of on-site inspection: 05/08/2022				
No.	Activity performed on-site	Site location	Date	Team member
1.	Open meeting - Scope of work - VCS rules and regulations - Verification methodology/tool/guideline - Timeframe - Procedures for verification	project site	05/08/2022	Mr. TAN Wenbin Ms. WANG Chen Mr. LI Xingtong (Remotely)

	- CCSC internal approval process - Confidentiality			
2.	Management interview - Implementation & Operation - Monitoring System - Information flow - Management & Operation Procedure - Local stakeholder consultation - Sustainable development contribution	project site	05/08/2022	Mr. TAN Wenbin Ms. WANG Chen Mr. LI Xingtong (Remotely)
3.	Site visit - Inspection of installations (gas generators, Centre control room, On-site Meters, etc.) - Interviews about operation procedures, meter reading, training, etc.	Project site	05/08/2022	
4.	Documents review - Implementation - Calibration - QA/QC procedures - Qualification & Training - Monitoring records - Cross-check data - ER calculations	Project site	05/08/2022	
5.	Close meeting - Summary of findings - Follow-up actions	Project site	05/08/2022	

The interviewed personnel and objective are listed in above table.

Through onsite inspection, the verification can confirm that the project is implemented as planned and described in the validated CDM-PDD. Actual monitoring activities complied with the monitoring plan (since the monitoring plan has been revised and approved by the CDM-EB, monitoring plan of this project means approved revised monitoring plan in this report). Installed equipment being essential for generating emission reduction runs reliably and is calibrated appropriately. The monitoring system is in place and the project reduces GHG emission.

2.5 Resolution of Findings

The objective of this phase of the validation is to resolve issues that require further elaboration, research or expansion prior to CCSC's positive conclusion on the project design.

A Corrective Action Request (CAR) is raised, if one of the following situations occurs:

- (a) The project participants have made mistakes that will influence the ability of the project activity to achieve real, measurable, verifiable and additional emission reductions;

- (b) The applicable VCS requirements have not been met;
- (c) There is a risk that emission reductions cannot be monitored or calculated.

A Clarification Request (CL) is raised, if information is insufficient or not clear enough to determine whether the applicable VCS requirements have been met.

A Forward Action Request (FAR) may also be raised during validation, to identify issues related to project implementation that require review during the first verification of the project activity.

To guarantee the transparency of the validation process, the issues raised, the responses provided by the project participants, the means of validation of such responses and references to any resulting changes in the CDM-PDD or supporting annexes are documented in the Appendix A.

2.5.1 Forward Action Requests

No FAR was raised during the verification process. Also there are no remaining from former verification and validation.

2.6 Eligibility for Validation Activities

Not applicable as China Classification Society Certification Co., Ltd. holds the accreditation for the validation and verification for projects under scope 1.

3 VALIDATION FINDINGS

3.1 Participation under Other GHG Programs

Through reviewing the CDM-PDD and validation report at UNFCCC website, it was validated that the project has also been registered as a CDM project with reference No. 8006. By checking <https://registry.verra.org/app/projectDetail/VCS/2830>, it is confirmed that the project also registered as a VCS project. The project does not participate in the other emissions trading program by checking public information on Internet and interviewing with project owner. The project would claim for either CERs or VCUs, however CERs and VCUs would not been claimed together in the same period confirmed by checking statement issued by project owner.

The verification team reviewed issuance information in VCS/CDM registry system, and confirmed that GHG Emission Reductions Credits have been issued as follows:

Table 3. List of GHG emission reduction credits

Monitoring period	GHG emission reductions (tCO ₂ e)	Credit Type	Program

01/07/2013 to 24/09/2015	360993	CER	CDM
01/01/2016 to 31/12/2018	Under verification	VER	VER

Besides, the PP has issued the statement that the PP will not request the issuance of CERs under CDM and the VCU's will not be double counted./8/ Therefore, CCSC consider the project is eligible to participate under the VCS Program as there is no double counting for the emission reduction during any period.

Since China has initiated ETS in July 2021, and As per the Notice (Huan ban qi hou [2021]No.9) issued by Ministry of Ecology and Environment of P.R.China (MEE), the fossil fuel power and/or heat generation plants in Gansu Province are covered by China ETS, and also other seven industries will be included in the future. However, as per the notice, the project activity is not covered by the mandatory emission control scheme and there is no emission cap enforced for the project owner. Also, the CCSC verification team reviewed the regulation, and realises that the allowance (CEA) for power generation industries will be allocated on the basis of carbon emission intensity, i.e. the CEA allocation is not related with the components of local grid. Furthermore, the CCSC verification team checked the Declaration of Non-double counting, issued by the Project Owner on 01/03/2022, and confirms the PP has not issued and will not issue the GHG emission reductions generated during this monitoring period. In summary, CCSC verification team can conclude that net GHG emission reductions generated during this monitoring period have not been used and will not be used for compliance under other programs or mechanisms.

3.2 Methodology Deviations

Not applicable as no deviation for methodology.

3.3 Project Description Deviations

A PRC was approved by CDM EB on 09/11/2017, the following changes were included:

- name of the transformer station of which the project connected to;
- the quantity of the monitoring equipment, i.e. electricity meter,
- the quantity and capacity of gas generators

CCSC confirms that the deviations have no impact on the applicability of the methodology or the additionality of the project nor the appropriateness of the baseline scenario, and the project still meets all appropriate rules and requirements of the VCS standard. During this monitoring period, the project was implemented in line with the approved revised PDD. There is no other project description deviation applied.

3.4 Grouped Project

Not applicable as this is not a grouped project.

4 VERIFICATION FINDINGS

4.1 Project Implementation Status

Project description

CCSC verification team has performed an on-site visit and found that the Project has been put into operation. The methane concentration in Huineng coal mine is around 25 % but may vary between 10 % and 30 %, which belongs to low-concentration range. To ensure safe operation and to be able to utilize the gas effectively, the project activity uses domestically-manufactured internal combustion engines which are suitable for low-concentration CMM. It's witnessed that the Project installs 16 sets of gas engine with unit capacity of 8 * 500kW + 8 * 1000 kW and the total installed capacity of the Project is 12MW. The electricity generated is supplied to North China Power Grid according to the signed Power Purchase Agreement (PPA). Through checking the Technical Agreement of the Gas engines, the verification team can confirm the information of the physically installed facilities has been consistently reported in the monitoring report. The technical parameters of the gas engines are listed as following tables:

Table 4. Key technical data for the equipment of the Project

Manufacturer	Shandong Jichai Green Energy Power Equipment Co. Ltd.	Manufacturer	Shandong Jichai Green Energy Power Equipment Co. Ltd.
Model	500GF-W1	Model	1000GF9-W2
Number of sets	8	Number of sets	8
Rated capacity	500kW	Rated capacity	1000kW
Continuous rating	500kW	Continuous rating	1000kW
Rated voltage	400V	Rated voltage	400V
Rated frequency	50Hz	Rated frequency	50Hz
Rated rotation speed	1,000r/min	Rated rotation speed	1,000r/min
Power factor	0.8 (lagging)	Power factor	0.8 (lagging)
Lifetime	10-15 years	Lifetime	10-15 years

Therefore, the verification confirmed there is no changes from the project design to actual implementation have been identified during this verification. The operation of the project activity has been conducted in accordance with the description of the CDM-PDD. Therefore there is no any discrepancy between project implementation and the project description.

The verification team has checked the Statement for completeness report of the gas engines and can confirm that the first gas engine started operation on 04/11/2013, on which the project began generating GHG emission reductions, which is the project start date.

Monitoring plan

[Metering System]

a.1 Methane mass flow monitoring system

Table 5: Data to be Monitored and Recorded

Details of monitoring parameters	Parameters to be measured	Monitoring equipment	Monitoring frequency
Additional electricity consumption by the project activity	$CONS_{ELEC,PJ}$	Three-phase electricity meter	Continuously monitored and monthly recorded
Methane sent to the power plant	MM_{ELEC}	Gas flow meter	Continuously monitored and recorded monthly
Concentration (in mass) of methane in extracted gas	PC_{CH4}	Methane concentration analyzer	Daily recorded and averaged monthly
Carbon emission factors for combusted non methane hydrocarbons	CEF_{NMHC}	Samples to be taken annually and analysed at a qualified laboratory	Obtained from annual gas composition analysis. When the share of NMHC is less than 1 %, this factor is not needed.
NMHC concentration in the CMM supply	PC_{NMHC}	Samples to be taken annually and analysed at a qualified laboratory	The analysis is undertaken by the certified independent lab.
Electricity generation supplied to the grid by the project activity	GEN_y	Three-phase electricity meter	Continuously monitored and monthly recorded

This project involves monitoring the mass flow of methane utilised under conditions of normal temperature and pressure, and the mass flow is measured using international standard methods. Input data from the transducers are recorded at daily intervals.

a.2 Other parameters monitoring

An electricity meter E is installed in the grid-connection point at the grid company's side. During normal

operation, power is supplied to the grid after first meeting the demand of auxiliary equipment at the project site, and therefore the electricity generation (GEN_y) is measured as net generation supplied to the grid via Xincun transformer station. When the gas generators are not in operation, electricity may be taken from grid through the main line to support functions of auxiliary equipment or for maintenance purposes. This amount of electricity is also measured by E and is included in $CONS_{ELEC,PJ}$.

Below diagram specifies the monitoring points:

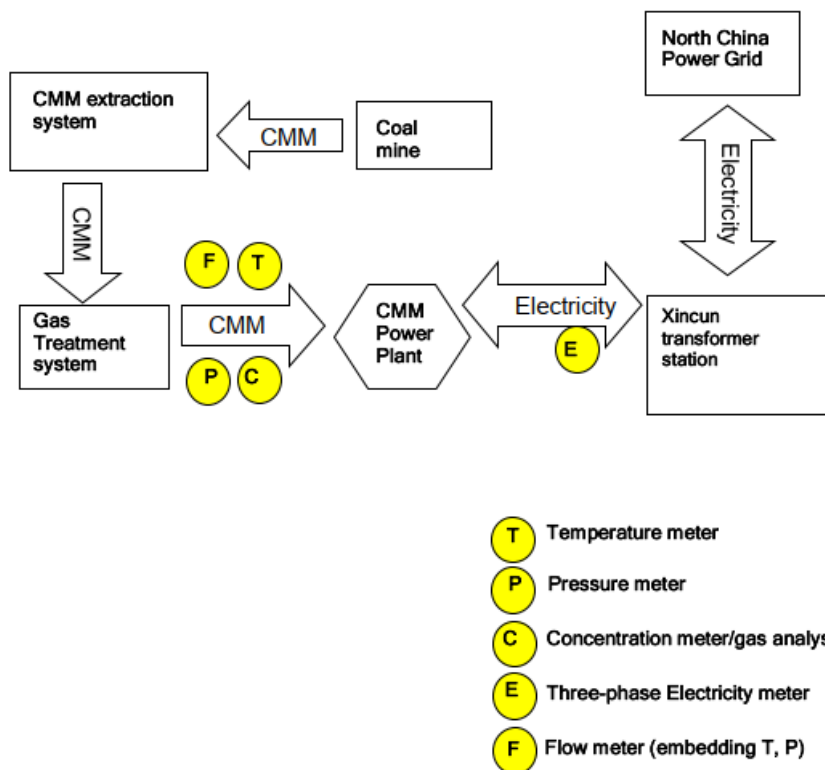


Figure 1: Monitoring points

[Information flow]

The electricity generation and consumption are continuously measured and monthly recorded. At the 24:00 of the end date of each month, the electricity records will be recorded by the operator of the power grid company.

CMM gas concentration is measured by methane concentration analyzer. All the equipment are serviced, calibrated and maintained in accordance with the national or industry standards (and the manufacturer's instructions where applicable) and complete records will be kept.

The NMHC samples are analysed by samples taken annually and analysed by a qualified organization.

The verification team can confirm that the implementation of the monitoring plan complies with the

monitoring plan and the completeness of monitoring is ensured, through onsite interview, onsite inspection, and document review. There is no any material discrepancy between the actual monitoring system and the monitoring plan.

Other GHG program

Based on the PP's statement /8/, the PP will not seek request of issuance of any other kind of GHG emission reductions including CERs under CDM. Refer to the section 3.1 of this report.

The CERs of the period 01/07/2013 to 24/09/2015 have been issued. Besides, the project has not participated or been rejected under any other GHG programs. The project has not received or sought any other form of environmental credit since previous verification, or has not become eligible to do so since previous verification. The GHG emission reductions or removals generated by the project have not become included in an emissions trading program or any other mechanism that includes GHG allowance trading except for VCS.

The project can only request VCU issuance from 01/01/2016 determined during the gap validation of the VCS project. The VCUs of the period 01/01/2016 to 31/12/2018 are requesting VCU issuance. This monitoring period starts from 01/01/2019 to 31/12/2021, and there is no gap between the previous monitoring period and this monitoring period.

Furthermore, as per the Section 3.1 of this report, CCSC verification team can conclude that net GHG emission reductions generated during this monitoring period have not been used and will not be used for compliance under other programs or mechanisms.

Sustainable development contributions

The project contribute to sustainable development as a renewable energy generation project by means of:

- The project generated 79,881.1 MWh electricity during this monitoring period, thus reduced the consumption of the corresponding fossil fuels of NCPG and contributed to increasing China's energy security. Total cumulative electricity generated is 186,120.1 MWh by the end of the reporting period.
- The project has created 15 jobs each year and annual average salary paid to the skilled worker is above the average level of local period.
- The project has prevented the release of 546,071 tonnes of CO₂e into the atmosphere during this monitoring period and the cumulative tonnes of greenhouse gas emissions avoided is 1,278,355 tCO₂e by the end of the reporting period.

The verification team has checked the Feasibility Study Report, CDM-PDD, VCS-MR, and can confirm the contributions to the sustainable development of the project.

4.2 Safeguards

4.2.1 No Net Harm

By checking the EIA summary and conclusion provided in the CDM-PDD, it is confirmed that the project does not have significant impacts on the environment or on the local society and economy. There is no transboundary impact involved with the project. Negative impacts are mitigated with a set of environmental protection measures in consistent with national and local laws and regulations.

After the completion of the construction, the project was put into operation after inspection and acceptance by the local environmental protection department. During the project operation, the project continues to contribute to the local society and economy.

Also, no potential environment or social economic matter was found during the site visit. The project is renewable energy project and thus no net harm observed on-site.

4.2.2 Local Stakeholder Consultation

According to the CDM-PDD, local stakeholders were invited to provide comments In 03/2012. The processes by which comments from local stakeholders have been invited and compiled, has been described within the CDM-PDD. Furthermore, representatives from the local community were interviewed, the relevant evidences were presented to CCSC for assessment. In general, the interviewees show adequate understanding of the nature of the Project and agreed that the Project would benefit the environment, society and economic development. The response is overall supportive.

The verification team has tested the on-going stakeholder communication mechanism and confirm the mechanism is functional. The local stakeholders can contact the contact person to submit their comments and the contact person will feedback in time. During this monitoring period, the project proponent conducted a survey among local stakeholders on 06/03/2020. 30 questionnaires were distributed and collected. The survey shows all local respondents know about the project, most of them are supportive of the project, all of the local residents believe the project will benefit the environment and will increase number of employees, reduce emission reduction and provide power supply. The verification team checked the local stakeholder consultation survey records and confirmed that no negative comments were received. The local stakeholders generally expressed their support to the project.

4.3 AFOLU-Specific Safeguards

Not applicable as this is a non-AFOLU project.

4.4 Accuracy of GHG Emission Reduction and Removal Calculations

[Fixed ex-ante parameters]

The data and parameters fixed ex-ante have been reported in the MR, and have been checked against the monitoring plan and the applied methodology by the verification team. There are no whether manual transposition errors between data sets which have occurred during this monitoring period and the parameters fixed ex-ante parameters are assessed as follows:

Parameter	Description	Applied Value	VVB Assessment
Eff _{ELEC}	Efficiency of methane destruction/oxidation in power plant	99.5 %	Consistent with the ACM0008 version 07 and CDM-PDD
EF _{grid,CM,y}	Combined margin grid CO ₂ emission factor in year y	0.81145 tCO ₂ e/MWh	Consistent with the CDM-PDD
ρ	Methane density	0.67kg/m ³ under normal conditions	Consistent with the ACM0008 version 07 and CDM-PDD
GWP _{CH4}	Global warming potential of methane	28 tCO ₂ e/tCH ₄	The project completed gap validation on 14/07/2022, thus the project proponent chooses to use AR5 for the GWP value. This value is in compliance with the 3.14.4 of VCS Standard Version 4.3: for GHG emission reductions occurring on or after 1 January 2021, all ex-ante estimates and ex-post calculations shall be converted to CO₂e using GWP values from the IPCC Fifth Assessment Report (AR5).
CEF _{CH4}	Carbon emission factor for combusted methane	2.75 tCO ₂ e/tCH ₄	

[Monitoring parameters]

The monitoring parameters have been carried out in accordance with the monitoring plan. All parameters were monitored and determined as per the monitoring plan which is listed in below table:

Means of verification	The verification team has performed the following activities to determine whether the monitoring of parameters related to the GHG emission reductions has been implemented in accordance with the monitoring plan. • Through the on-site inspection of the monitoring system, interview with the operation staff, document review including relevant records, procedures and technical specifications, the verification team has assessed the implementation of the monitoring plan followed by the PP; • The parameters stated in the monitoring plan have been checked by means above; • The verification team has checked the installation of the monitoring equipments against the monitoring plan and calibration reports by qualified third party; • The data sources were checked by the team to confirm the monitoring results; • Based on the interview with the top management and operation staff and the review of the VCS Monitoring & Management Manual, the verification team has assessed the quality assurance and quality control procedures applied by the PP. No sampling plan was involved in the project activity.
Findings	Monitoring parameters required by the monitoring plan and the way CCSC has verified the information flow (from data generation, aggregation, to recording, calculation and reporting for these parameters) including the values in the monitoring reports are described below: 1) $CONSELEC,PJ$ Additional electricity consumption for capture and use or destruction of methane. $CONSELEC,PJ$ is measured by electricity meter E with accuracy of 0.5S installed at the grid-operator (Yangquan Grid) side. The electricity consumption is continuously measured and monthly recorded at the 24:00 of the end date of each month. The data of $CONSELEC,PJ$ is crosschecked between the project owner and the grid company. The monitoring results from the project owner and the grid company are found consistent. 2) MM_{ELEC} Methane sent to power plant The installed gas flow meter indicates the CMM flow under the normal condition which is adjusted by the temperature and pressure monitored by the gas flow meter. The installed methane concentration analyzer measures the methane concentration in the extracted CMM. This parameter is continuously monitored and recorded monthly. The data of MM_{ELEC} is crosschecked between the monitoring results from the project and the coalmine which supplies the CMM utilized by the project. The monitoring results from the project owner and the coalmine are found

	consistent. 3) PC_{CH_4} Concentration (in mass) of methane in extracted gas (%) This parameter is measured from annual gas composition analysis by the methane concentration analyzer. This parameter is daily recorded and averaged monthly. Since the share of NMHC is less than 1 % the values of PC_{CH_4} are not used in the emission reductions calculation. 4) CEF_{NMHC} Carbon emission factor for combusted non methane hydrocarbons (NMHC) Since the share of NMHC is less than 1 %, this parameter is unnecessary. 5) PC_{NMHC}: NMHC concentration (in mass) in extracted gas This parameter has been measured annually by the third party, Shanxi Kelin Mineral Testing Technology Co., Ltd . During this monitoring period, the parameter is lower than 1%. 6) GEN_y Electricity generation by project This parameter is measured by electricity meter E with accuracy of 0.5S installed at the grid-operator (Yangquan Grid) side. The electricity consumption is continuously measured and monthly recorded at the 24:00 of the end date of each month. The data of GEN_y is crosschecked between the project owner and the grid company. The monitoring results from the project owner and the grid company are found consistent. There are no whether manual transposition errors between data sets which have occurred during this monitoring period. Management and operational system: The PP has the responsibility of overall monitoring, which has established a monitoring team for monitoring of power generation, maintenance and operation of the Project activity. All the records related to generation and maintenance have been satisfactorily maintained. Responsibilities have been allocated to well-trained monitoring staff as per the monitoring plan. The QA/QC procedures are part of management system and are documented in management procedures. The records and all relevant information are well archived by the project owner and available for verification. The responsibilities and the procedures included in the CDM Monitoring & Management Manual have been verified. VCS Monitoring & Management Manual and internal training records have been provided and verified by the verification team.
Conclusion	CCSC verification team confirms that:

	- The monitoring has been carried out in accordance with the monitoring plan. - All parameters required by the monitoring plan have been sufficiently monitored and correctly listed. The monitored data for required parameters have been verified by checking the whole information flow.
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[Calibration information]

Meter ID	Equipment type	Measuring parameter	Serial number	Calibration date	Calibration frequency	Validity	Calibration entity
E	electricity meter	CON _{ELEC,PJ} GEN _y	1200703399	30/11/2018 30/11/2019 30/11/2020 30/11/2021	annually	Yes	Yangquan Grid of Shanxi Province, State Power grid
F	Gas flow meter	MM _{ELEC}	1501125763 0045	04/05/2016 24/04/2019	Once every three years	Yes	Anhui Tiankang (Group) Holdings Limited
C	Methane concentration analyzer	MM _{ELEC} PC _{CH4}	2015102203 4 (till 10/07/2019) ES10170408 1701 (from 10/07/2019)	21/08/2016 10/07/2019	Once every three years	Yes	Shenzhen Academy of Metrology & Quality Inspection

The monitoring plan requires that the accuracy of the electricity meter is no less than 0.5S. Accuracy of the meters is not lower than required in the monitoring plan. The calibration frequency meets the requirements in the monitoring plan that the monitoring equipments shall be calibrated regularly according to national or industry standards.

[Calculation of baseline GHG emissions]

Means of verification	The verification team has performed the following activities to assess the data and calculations of GHG emission reductions achieved by the Project as per the methodology: Through desk review and on-site inspection on the monthly electricity reports and electricity invoice, to verify that a complete set of data for the specified monitoring period is available.
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	- Information provided in the monitoring report has been cross-checked with other sources. - Review the calculations of baseline GHG emissions have been carried out in accordance with the formulae and methods described in the CDM-PDD, and the methodology; - Review emission factors, IPCC default values, GWPs and other reference values as per the CDM-PDD.
Findings	As per the methodology and the CDM-PDD, baseline emissions are calculated according to the followings: $BE_y = BE_{MD,y} + BE_{MR,y} + BE_{Use,y}$ 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). $BE_{MD,y} = 0$ as in the baseline scenario the CMM is fully vented into the atmosphere and no methane is destroyed. $BE_{MR,y}$ = Baseline emissions from release of methane into the atmosphere in year y that is avoided by the project activity (tCO₂e). $BE_{MR,y} = GWP_{CH4} \times MM_{ELEC}$ $BE_{Use,y}$ = Baseline emissions from the production of power, heat or supply to gas grid replaced by the project activity in year y (tCO₂e). $BE_{Use,y} = GEN_y \times EF_{ELEC} = GEN_y \times EF_{grid,CM,y}$ The values of parameters for calculating the baseline emissions have been verified against the relevant records by the verification team, which are shown in the Emission Reductions Calculation Spreadsheet. Accordingly, the baseline emissions in this monitoring period can be calculated as: $BE_y = BE_{MD,y} + BE_{MR,y} + BE_{Use,y} = 0 + GWP_{CH4} \times MM_{ELEC} + GEN_y \times EF_{ELEC}$ $= 601,191tCO_2e$ Detailed calculations in the Emission Reductions Calculation Spreadsheet have been checked and confirmed by the verification team.
Conclusion	CCSC verification team confirms that: - A complete set of data for the monitoring period is available. - Information on the baseline GHG emission calculation provided in the monitoring report has been cross-checked with other sources. - Calculations of baseline emissions have been carried out in accordance with the formulae and methods described in the monitoring plan and the applied methodology document.

	• There are no assumptions applied. • Appropriate emission factors have been correctly applied.
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[Calculation of project GHG emissions]

Means of verification	The verification team has performed the following activities to assess the data and calculations of GHG emission reductions achieved by the Project as per the methodology: • Through desk review and on-site inspection on the monthly electricity reports and electricity invoice, to verify that a complete set of data for the specified monitoring period is available. • Information provided in the monitoring report has been cross-checked with other sources. • Review the calculations of project GHG emissions have been carried out in accordance with the formulae and methods described in the CDM-PDD, and the methodology; • Review emission factors, IPCC default values, GWPs and other reference values as per the CDM-PDD.
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Findings	As per the methodology and the CDM-PDD, baseline emissions are calculated according to the followings: $PE_y = PE_{ME} + PE_{MD} + PE_{UM}$ Where: PE_y = Project emissions in year y (tCO₂e) PE_{ME} = Project emissions from energy use to capture and use methane (tCO₂e). $PE_{ME} = CONS_{ELEC,PJ} \times CEF_{ELEC} = CONS_{ELEC,PJ} \times EF_{grid,CM,y}$ PE_{MD} = Project emissions from methane destroyed (tCO₂e). $PE_{MD} = MD_{ELEC} \times (CEF_{CH4} + r \times CEF_{NMHC}) = MM_{ELEC} \times Eff_{ELEC} \times CEF_{CH4}$ PE_{UM} = Project emissions from un-combusted methane (tCO₂e). $PE_{UM} = GWP_{CH4} \times MM_{ELEC} \times (1 - Eff_{ELEC})$ The values of parameters for calculating the project emissions have been verified against the relevant records by the verification team, which are shown in the Emission Reductions Calculation Spreadsheet. Accordingly, the project emissions in this monitoring period can be calculated as: $PE_y = PE_{ME} + PE_{MD} + PE_{UM} = CONS_{ELEC,PJ} \times EF_{grid,CM,y} + MM_{ELEC} \times Eff_{ELEC} \times CEF_{CH4} + GWP_{CH4} \times MM_{ELEC} \times (1 - Eff_{ELEC})$ $= 55,120tCO_2e$ Detailed calculations in the Emission Reductions Calculation Spreadsheet have been checked and confirmed by the verification team.
Conclusion	CCSC verification team confirms that: • A complete set of data for the monitoring period is available. • Information on the project GHG emission calculation provided in the monitoring report has been cross-checked with other sources. • Calculations of project emissions have been carried out in accordance with the formulae and methods described in the monitoring plan and the applied methodology document. • There are no assumptions applied. • Appropriate emission factors have been correctly applied.

[Calculation of Leakage GHG emissions]

CCSC verification team confirms that the leakage emissions equal to zero as per the CDM-PDD.

Detailed ER calculations in the Emission Reductions Calculation Spreadsheet have been checked and confirmed quantified correctly in accordance with the CDM-PDD and applied methodology ACM0008 version 07 by the verification team.

4.5 Quality of Evidence to Determine GHG Emission Reductions and Removals

The monitoring has been carried out in accordance with the monitoring plan.

As a result of verification of the ER calculation process, the assessment team confirmed that all the parameters required for the determination of the emission reductions have been included in the MR and ER Calculation Spreadsheet and are consistent with the applied methodology and the monitoring plan. The parameters are complete in this monitoring period.

A complete set of data for the monitoring period has been checked by the CCSC verification team. All data sources for the determination of GHG emission reductions are documented evidences. Information flow from data generation and aggregation, to recording, calculation and final transposition into the monitoring report has been checked by the CCSC verification team and has been confirmed reliable by the CCSC verification team. After verifying the reported figures with the raw data sources, it's confirmed that the values of the parameters from the raw data sources are consistent with those quoted in the ER Calculation Spreadsheet and the MR. Information flow from data generation and aggregation, to recording, calculation and final transposition into the monitoring report has been checked and has been assessed by the verification team which is described in the section 4.4 of the report. The calibration frequency meets the requirements in the monitoring plan. The verification process for the same has been clearly described above in section 4.4 of the report.

4.6 Non-Permanence Risk Analysis

Not applicable as the project is not an AFOLU project.

5 VERIFICATION CONCLUSION

CCSC has been commissioned by Vitol (China) Energy Co., Ltd to perform the verification of greenhouse gas emission reductions of the project activity "Huineng Low Concentration Coal Mine Methane Utilization Project" (UNFCCC Ref. No. 8006, VCS Ref. No. 2830).

The management of Vitol (China) Energy Co., Ltd is responsible for the preparation of the GHG emissions data and the reported GHG emissions reductions on the basis set out within the project's Monitoring Plan.

Our verification approach was based on the requirements as defined under the applicable VCS standards and relevant UNFCCC requirements. Our approach is risk-based, drawing on an understanding of the risks associated with reporting GHG emissions data and the controls in place to mitigate these. The verification can confirm that:

- the project is implemented and operated as per the monitoring plan;
- the monitoring plan is as per the applied methodology;
- the monitoring activities comply with the monitoring plan;
- the monitoring report and other supporting documents provided are complete and verifiable and in accordance with the applicable VCS and CDM requirements;
- the installed equipment being essential for generating emission reduction runs reliably and is calibrated appropriately;
- the monitoring system is in place and generates GHG emission reductions data;
- the GHG emission reductions are calculated without material misstatements.

In our opinion, the GHG emission reductions for “Huineng Low Concentration Coal Mine Methane Utilization Project ” during the monitoring period 01/01/2019 to 31/12/2021 as reported in Monitoring Report, prepared on the basis of the project's Monitoring Plan are fairly stated. Based on the information we have seen and evaluated, we confirm the following statement:

Verification period: 01/01/2019 to 31/12/2021

Verified GHG emission reductions and removals in the above verification period:

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)
2019	257,046	23,692	-	233,354
2020	216,143	19,792	-	196,351
2021	128,002	11,636	-	116,366
Total	601,191	55,120	0	546,071

APPENDIX A: ABBREVIATIONS

Abbreviations	Full texts
AFOLU	Agriculture, Forestry and Other Land Use
BM	Build Margin
CAR	Corrective Action Request
CCSC	China Classification Society Certification Co., Ltd.
CCER	China Certified Emission Rrdutions
CDM	Clean Development Mechanism
CER	Certified Emission Reduction (CDM)
CL	Clarification Request
CM	Combined Margin
CO ₂	Carbon dioxide
CMM	Coal mine methane
CO ₂ e	Carbon dioxide equivalent
DNA	Designated National Authority
CDM-EB	CDM Executive Board
EF	Emission Factor
EIA	Environmental Impact Assessment
FAR	Forward Action Request
FSR	Feasibility Study Report
GHG(s)	Greenhouse gas(es)
GS	Golden Standard
GWP	Global warming potential
IPCC	Intergovernmental Panel on Climate Change
MEE	Ministry of Ecology and Environment of the People's Republic of China

MP	Monitoring Plan
OM	Operating Margin
PD	Project Description
PDD	Project Design Document
PP	Project Participant
PPA	Power Purchase Agreement
UNFCCC	United Nations Framework Convention on Climate Change
VCS	Verified Carbon Standard
VCU	Voluntary Carbon Unit
VVB	Validation / Verification Body
VVS	Verification and Validation Standard (CDM)

APPENDIX B: COMPETENCE OF TEAM MEMBERS AND TECHNICAL REVIEWERS

CCS 认证公司
CHINA CERTIFICATION SERVICE

Appendix 9

CERTIFICATE OF COMPETENCE

Date of issue: 20/01/2022

Mr. Tan Wenbin

Has been qualified in accordance with *CDM Personnel Competence Requirements and Professional Competence Evaluation Instructions (CDMI0301)* as

- CDM validator for Technical Area(s): TA1.2/TA5.2/TA8.1/TA10.1
- CDM verifier for Technical Area(s): TA1.2/TA5.2/TA8.1/TA10.1
- ☐ Technical expert for Technical Area(s): _____


Li Honglin
CCSC General Manager

CCS 认证公司
CHINA CERTIFICATION SERVICE

Appendix 9

CERTIFICATE OF COMPETENCE

Date of issue: 20/01/2022

Mr. Li Xingtong

Has been qualified in accordance with *CDM Personnel Competence Requirements and Professional Competence Evaluation Instructions (CDMI0301)* as

- CDM validator for Technical Area(s): TA1.1/TA1.2/TA3.1/TA9.2/TA13.1/TA14.1
- CDM verifier for Technical Area(s): TA1.1/TA1.2/TA3.1/TA9.2/TA13.1/TA14.1
- ☐ Technical expert for Technical Area(s): _____


Li Honglin
CCSC General Manager

CCS 认证公司
CHINA CERTIFICATION SERVICE

Appendix 9

CERTIFICATE OF COMPETENCE

Date of issue: 20/01/2022

Mr. Zhao Xin

Has been qualified in accordance with *CDM Personnel Competence Requirements and Professional Competence Evaluation Instructions (CDMI0301)* as

- CDM validator for Technical Area(s): TA8.1/TA10.1
- CDM verifier for Technical Area(s): TA8.1/TA10.1
- ☐ Technical expert for Technical Area(s): _____


Li Honglin
CCSC General Manager

APPENDIX C: DOCUMENTS REVIEWED OR REFERENCED

- /1/ Monitoring report, Version 03 dated 23/09/2022
- /2/ ER calculation spreadsheet
- /3/ CDM-PDD, version 05, dated 02/05/2017
- /4/ CDM Validation report, Version 0, dated 22/03/2010
- /5/ CDM Approved revised monitoring plan
- /6/ Previous VCS verification report
- /7/ VCS Standard version 4.3
- /8/ Declaration of Non-double counting, issued by the Project Owner on 01/03/2022
- /9/ Methodology ACM0008 version 07 Consolidated 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 through flaring or flameless oxidation
- /10/ VCS Monitoring Manual
- /11/ Technical Agreement of the Gas engines
- /12/ Diagram of the power connection system
- /13/ Meter Reading Record
- /14/ Electricity Sales Receipts
- /15/ Coal mine methane supply quantities recorded by the supplier, Huineng coal mine
- /16/ Signed Power Purchase Agreement (PPA) with grid company
- /17/ Calibration certificates of meters covering the whole monitoring period
- /18/ Accreditation certificates for the calibrators
- /19/ Huanbanqihou[2021]No.9,
http://www.mee.gov.cn/xxgk2018/xxgk/xxgk05/202103/t20210330_826728.html
- /20/ Statement for completeness report of the gas engines

APPENDIX D: RESOLUTION OF CORRECTIVE ACTION REQUESTS AND CLARIFICATION REQUESTS

Zero CAR, 4 CL and Zero FAR were raised in this verification.

Findings	PP's response	Verification teams conclusion
CL1: As per the VCS monitoring report template version 4.3, "Where a section is not applicable, explain why the section is not applicable (i.e., do not delete the section from the final document and do not only write "not applicable").", the sections 2.1 and 2.2 of the monitoring report shall not only indicate "n.a."	Sections 2.1 and 2.2 of the monitoring report have been revised accordingly to indicate the reason why the sections are not applicable.	Revised monitoring report has been checked and confirmed in compliance of the requirements of the template. This CL is closed.
CL2: Section 3.1 of the monitoring report shall be detailed with implementation status of the project activity.	Section 3.1 of the monitoring report have been revised to include the detailed implementation status of the project activity.	Revised monitoring report has been checked and confirmed in compliance of the requirements of the template. This CL is closed.
CL3: Purpose of data in section 4.1 and 4.2 of the monitoring report of some parameters including $EF_{grid, CM, y, \rho}$, GWP_{CH4}, CEF_{CH4} is to be corrected.	Purpose of data in section 4.1 and 4.2 of the monitoring report has been revised accordingly.	Revised monitoring report has been checked and confirmed in compliance of the requirements of the template. This CL is closed.
CL4: Information on type, accuracy class, and serial number of monitoring equipment as well as the calibration date and validity of each calibration is missing.	The monitoring report has been revised to include the type, accuracy class, SN of the monitoring equipment and the calibration information.	Information on type, accuracy class, and serial number of monitoring equipment as well as the calibration date and validity of each calibration has been included in the revised monitoring report which is consistent with the evidence. This CL is closed.