



SHIZAIQIAN MSW LANDFILL SITE LFG RECOVERY TO POWER PROJECT



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1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

Shizaiqian MSW landfill site LFG recovery to power project (hereafter referred to as the project) is developed by Quanzhou BCCY New Energy CO., Ltd., which aims to recover and destroy landfill gas (LFG) generated at the municipal solid waste (MSW) landfill site in Quanzhou city, Fujian province, P.R. China. The collected LFG is used for electricity production. The electricity generation offsets carbon emissions from the combustion of fossil fuel. Consequently, ERs are claimed for both methane combustion and power displacement.

Shizaiqian MSW landfill site started operation in 2011 with a total design effective capacity of 3,900,000 m³. The design processing capacity of the landfill is 810 tonnes MSW per day.

The project consists in LFG collection system, LFG treatment system, electricity generation with 5 sets of gas engines with capacity of 1000kW each (a total capacity of 5 MW) and grid connection system. The gas engines combust landfill gas, which contains methane, to produce electricity and export it to the Eastern China Power Grid (ECPG).

The project construction began on 18/06/2018 and was commissioned on 01/07/2019. The total GHG emission reductions generated in this monitoring period from 01/07/2022 to 30/06/2023 (first and last days included) is 146,135tCO₂e.

Audit Type	Period	Program	VVB Name	Number of years
Validation	21/10/2021 (date when FVR was finished)	<u>Verified Carbon Standard</u>	<u>LGA Technological Center, S.A. (Appl us+ Certification)</u>	1
Verification	01-07-2019- 30-06-2021	<u>Verified Carbon Standard</u>	<u>LGA Technological Center, S.A. (Appl us+ Certification)</u>	2 years
Verification	01-07-2021- 30-06-2022	<u>Verified Carbon Standard</u>	<u>CTI Certification Co., Ltd.</u>	1 year
Verification	01-07-2022- 30-06-2023	<u>Verified Carbon Standard</u>	<u>CTI Certification Co., Ltd.</u>	1 year
Total	1	<u>Verified Carbon Standard</u>	1	4 years

1.2 Sectoral Scope and Project Type

Sector scope 1: energy (renewable /Non-renewable) and

Sector scope 13: waste handling and disposal

The project is neither a AFOLU project nor a grouped project.

1.3 Project Proponent

Organization name	Quanzhou BCCY New Energy CO., Ltd.
Contact person	Lei Wang
Title	Minister of carbon emission department
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1.4 Other Entities Involved in the Project

Organization name	Henan BCCY Environmental Energy Co., Ltd.
Role in the Project	Project developer
Contact person	Xu Han
Title	Vice Executive President
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1.5 Project Start Date

01/07/2019 (commercial operation started date)

1.6 Project Crediting Period

The project crediting period runs from 01/07/2019 through 30/06/2029 for 10 years fixed.

1.7 Project Location

The project is located on Shizaiqian Landfill Site, Luojiang District, Quanzhou City of Fujian Province, P.R. China. The geographical coordinates of the project site are longitude 118°37'45.96"E and latitude 24°57'55.72"N. Figure 1.1 shows the location of the project.



Figure 1.1 Location of the project

1.8 Title and Reference of Methodology

Title: ACM0001 Flaring or use of landfill gas --- Version 19.0

Reference: <https://cdm.unfccc.int/methodologies/PAmethodologies/approved>

The methodology also refers to the latest approved versions of the following tools:

“Combined tool to identify the baseline scenario and demonstrate additionality” (Version 7.0);

“Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation” (Version 3.0);

“Emissions from solid waste disposal sites” (Version 8.0);

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

“Tool to determine the mass flow of a greenhouse gas in a gaseous stream”(Version 3.0);

“Positive lists of technologies” (Version 2.0)

1.9 Participation under other GHG Programs

The project was not registered (or seeking registration) under other GHG Program(s).

1.10 Other Forms of Credit and Supply Chain (Scope 3) Emissions

The project didn't reduce GHG emissions from activities that are included in an emissions trading program or any other mechanism that includes GHG allowance trading and include details about any such programs or mechanisms, such as Clean Development Mechanism(CDM), Gold Standard(GS), Chinese Certified Emission Reduction(CCER), Global Carbon Council(GCC) and so on. A declaration of non-registration of emission reductions in other mechanisms signed.

The project hasn't sought or received another form of GHG-related environmental credit, including renewable energy certificates.

The project is not involved to supply chain (Scope 3) emissions and doesn't affect emissions associated with a good or service.

1.11 Sustainable Development Contributions

The project contributes to Sustainable Development Goals in the following aspects:

SDG 13 Climate Action

The project utilizes the LFG for electricity generation, which contains nearly 50% of methane, to substitute the equivalent electricity supplied by the grid. Total GHG emission reductions and removals of 687,053 tCO₂e will be achieved during the fixed 10 years crediting period.

SDG 8 Decent works and Economic Growth

The project can provide permanent and full-time job opportunities over project lifetime.

SDG 7 Affordable and Clean Energy

The project utilizes the LFG from the Shizaiqian landfill site to generate electricity by gas engines. Total electricity generation supplied by the project to the grid is estimated to be 123,139 MWh, which could replace the equivalent electricity from fossil fuel based grid.

Sustainable development priorities are illustrated in the People's Republic of China National Report on Sustainable Development issued on 01/06/2012. Sustainable development priorities of the Report related to the project are promoting new energy development, strengthening environmental pollution control and responding to climate change. Methane is an ideal clean fuel. Each cubic meter of methane contains about 360000kJ calorific value, LFG recovery and utilization will supplement the energy supply of the grid and contributes to the new energy development in China. Odour from landfill negatively impacts on residents around the landfill. Implementation of the project will reduce odours through LFG collection and will thus mitigate the impact of landfill odour on people's daily lives. Landfill gas contains nearly 50% of methane and methane is a greenhouse gas some 28 times more potent than carbon dioxide. LFG recovery and utilization is contribution to mitigating global warming. Therefore, the project is contribution to sustainable development priorities regarding to promoting new energy development, strengthening environmental pollution control and responding to climate change involved in the Report mentioned above.

Table 1: Sustainable Development Contributions

Row number	SDG Target	SDG Indicator	Net Impact on SDG Indicator	Current Project Contributions	Contributions Over Project Lifetime
1)	13.0	Tonnes of greenhouse gas emissions avoided or removed	Implemented activities to increase	The project avoided anthropogenic emissions of greenhouse gases (GHG) of 146, 135tCO ₂ e during the reporting period (01/07/2022 to 30/06/2023).	During the period from 01/07/2019 to 30/06/2023, 567,185 tonnes of greenhouse gas emissions were avoided.
2)	8.5	Total number of job opportunities	Implemented activities to increase	The project activity employs 5 permanent and full-time employees through its operational company Quanzhou BCCY New Energy Co., Ltd. during the reporting period (01/07/2022 to 30/06/2023).	During the period from 01/07/2019 to 30/06/2023, five permanent and full-time job opportunities were increased.
3)	7.2	Affordable and Clean Energy	Implemented activities to increase	Total 26, 186.946MWh of renewable energy generated during the reporting period (01/07/2022 to 30/06/2023).	During the period from 01/07/2021 to 30/06/2023, 53,607,373MWh of renewable energy were generated.

2 SAFEGUARDS

2.1 No Net Harm

During this period, all the mitigation measures proposed by EIA report were implemented:

Waste water

Domestic sewage and a small amount of condensate were treated by the landfill leachate treatment station. After the treatment, it can meet the requirements of Table 2 of “Domestic Waste Landfill Pollution Control Standard” (GB16889-2006). Then, they were discharged into urban sewage treatment plants through the municipal sewage pipeline network for treatment

Waste Gas

The exhaust gas produced by this project is mainly the exhaust gas of the generators. Each generator unit is equipped with a 15m high exhaust funnel for high-altitude emissions, with a total of four 15m high exhaust funnels. The concentration of the exhaust gas during this monitoring can meet the requirements of “Ambient air quality standard” (GB13223-2011).

Noise pollution

Low noise equipment were selected and reasonably arranged. Effective sound insulation, noise reduction and shock absorption measures were used to low the noises caused by Roots blower, generator set, and air compressor. After implementation of the above measures, it can meet class 2 standard of “Emission standard for Environmental Noise at Boundary of Industry and Enterprises” (GB12348-2008).

Solid waste

The site of this project is located within the landfill site, and domestic waste were directly sent to the landfill area for landfill. The empty oil drum were regularly recycled by the manufacturer. Hazardous waste was managed by dedicated personnel, temporarily stored according to hazardous waste storage requirements, and promptly recycled and disposed of by qualified units.

According to the annual monitoring Report from 2022 to 2023 issued by a professional qualification environment monitoring agency- Fujian Heying Occupational Health Evaluation Co., Ltd, waste water, waste gas and noise pollution of the project can meet the relevant standards.

As mentioned above, the project was considered not causing significant environmental impacts during this monitoring period. On the contrary, the project benefits the environment by reducing emission of local air pollutants and greenhouse gases.

2.2 Local Stakeholder Consultation

The project owner held a local stakeholder consultation meeting on 23/10/2018 in the Quanzhou Shizaiqian Landfill Site. Before the stakeholder consultation meeting, the project information with contact information and the stakeholder meeting notice were published on the bulletins at the project site and nearby on 08/10/2018. Local stakeholders were invited to attend.

During the meeting, a survey was carried out on the local residents and comments received from the survey are summarized as follows. The survey was conducted through distributing and collecting responses to a questionnaire. In total 25 out of 25 questionnaires were returned with a 100% response rate. The survey shows the stakeholders believe that the project will have positive impacts on the local ecology and employment. All stakeholders expressed their support to the project and no negative comments have been received.

During the meeting, the project information and the continuous input/grievance mechanism have been introduced to the local stakeholders. The project information with contact information has also been posted on the bulletins at the project site and nearby, which states that there is grievance book at the project site, and everyone is welcome to give comments. The continuous input/grievance mechanism is as below.

Table 2.1 Continuous input/grievance mechanism

	Method Chosen (include all known details e.g. location of book, phone number)	Justification
Continuous Input/Grievance Expression Process Book	A grievance book is put at the project site.	The grievance book is kept at the project owner office. Anyone can go there to record their grievance or comment in the book. The project owner personnel will review and respond to the comments and record the response in the book as well.
Telephone access	+86 18737823320	Ms.Lei Wang,Quanzhou BCCY New Power Co.,Ltd.
	+86 37156737901	MR.Xu Han,Henan BCCY Environmental Energy Co.,Ltd.
Email access	lwang@bccynewpower.com	Ms.Lei Wang,Quanzhou BCCY New Power Co.,Ltd.
	xhan@bccynewpower.com	MR.Xu Han,Henan BCCY Environmental Energy Co.,Ltd.

LSC during the operation period

Communications with Local stakeholders have been carried out at periodic intervals. Key implementation schedules and changes of the project have been communicated to the local authority, the neighbourhood committee, and local residents. The comments and suggestions from residents were collected by the local authority, if any.

During the crediting period permanent communication has been maintained with the community. The mechanism for on-going communication with local stakeholders include the following channel: Periodic meetings with representatives of Quanzhou BCCY New Energy CO., Ltd. The meetings were organized at Shizaiqian Landfill site on 19/09/2022 and 17/04/2023 to collect comments from all stakeholders, such as representatives of local residents, Shizaiqian solid waste management station and the project owner and so on. The project owner appointed one person to make a meeting minute.

At the stakeholder meeting on 19/09/2022. This meeting was introduced by Xue Shengming, the plant manager, who described the scale of the project construction, the process flow, the operation of the project and the impact of the application as an emission reduction project on the company. The director of the landfill plant thought that the project had significantly improved the air quality of the landfill during its operation and reduced safety hazards, and that the wastewater and solid waste generated by the project's operation were handled in strict accordance with the requirements to achieve the expected results. The villagers raised questions about whether the project would generate noise in the future, and the plant manager said that effective sound insulation, noise reduction and shock absorption measures were used to low the noises caused by Roots blower, generator set, and air compressor. After implementation of the above measures, the noise of the project would not have an impact on the lives of the residents. The power plant has mitigated noise through vibration and noise reduction devices in the generator room and green belts around the plant, and the noise of the project was also annually tested by the third qualified agency and it could meet class 2 standard of "Emission standard for Environmental Noise at Boundary of Industry and Enterprises" (GB12348-2008). The villagers were very satisfied with the above measures and unanimously praised the project at this meeting.

At the stakeholder meeting on 17/04/2023. This meeting consisted of a main presentation by the plant manager about the project during its operation. The landfill employees expressed their views on the project, he believed that the project could be implemented in accordance with the relevant regulations, and through grid-connected power generation, it could achieve energy saving and emission reduction, which is in line with the national dual-carbon target. The villagers asked questions about whether the project could provide more job opportunities in the future and the environmental impacts generated, and the plant manager said that the demand for jobs in the future would be prioritized to the nearby villagers, that the environment of the plant had been implemented in strict accordance with the requirements, and that the equipment management had been put in place, and that it would not have an impact on the lives of the residents.

As a whole, the impacts of operation of the project are basically positive. All stakeholders were pleased with the development of the project. The VCS project actually facilitates the development of the local economy and increase the income of local residents. In line with VCS requirements all the processes have been implemented to receive comments from local stakeholders as well as communicate with them at periodic intervals. During this monitoring period, there were no negative comments received for the project.

2.3 AFOLU-Specific Safeguards

Not applicable. The project is non-AFOLU project.

3 IMPLEMENTATION STATUS

3.1 Implementation Status of the Project Activity

The project consists in LFG collection, transmission and treatment system, with subsequent electricity generation and grid connection system.

LFG collection system

LFG is extracted from MSW under negative pressure by blower pumps and moved through wells, then collected by gas collection stations and transferred by sub-pipes and a main pipe to LFG treatment equipment. Flow rate of the LFG is regulated at the collection points in order to always fit with the consumption capacity of the generation engines.

LFG treatment system

Prior to electricity generation, LFG is treated to remove impurities and moisture, to avoid corrosion in the engines. The treatment consists of filtration, de-moisturing, cooling and pressurization.

Electricity generation and grid connection system

According to project design, 5 gas engines of 1MW rated power each are fed with the LFG and generate electricity, which is then exported to the grid. Since project implementation (i.e. commercial operation started date on 01/07/2019), the installed engines (engine 1#,2# ,3# and 4#) are sufficient to combust all the landfill gas generated and the engine 5# is not installed (incl. this monitoring period). The project doesn't involve in a flare system.

Table 3.1 Equipment technical parameters

Main Equipment	Parameter	Value
Gas engine	Type	1000GF-NK

	Manufacturer	CNPC JICHAI POWER EQUIPMENT COMPANY
	Rated capacity	1200 kW
	Rated rotation speed	1000 r/min
Generator	Type	1000GF-NK
	Manufacturer	CNPC JICHAI POWER EQUIPMENT COMPANY
	Rated Capacity	1000 kW
	Rated rotation speed	1000 r/min
	Capacity factor	0.8 (lagging)

Table 3.2 Main event list during this monitoring period

Duration	Main Event
19/10/2022 23:00-20/10/2022 02:00	1# gas engine shut down for maintenance of utility equipment
30/11/2022 8:00-05/12/2022 8:00	1# gas engine shut down for minor maintenance
13/09/2022 8:00-17/09/2022 16:00	2# gas engine shut down for minor maintenance
19/10/2022 23:00-20/10/2022 02:00	2# gas engine shut down for maintenance of utility equipment
16/12/2022 08:00-25/12/2022 08:00	2# gas engine shut down for major maintenance
19/10/2022 23:00-20/10/2022 02:00	3# gas engine shut down for maintenance of utility equipment
27/10/2022 12:00-31/10/2022 11:00	3# gas engine shut down for minor maintenance
02/10/2022 12:00-07/10/2022 08:00	4# gas engine shut down for minor maintenance
19/10/2022 23:00-20/10/2022 02:00	4# gas engine shut down for maintenance of utility equipment
06/12/2022 23:00-13/12/2022 02:00	4# gas engine shut down for major maintenance
23/12/2022 11:00-23/12/2022 15:00	4# gas engine shut down for fault
21/01/2023 01:00-	1# gas engine shut down for maintenance of utility equipment

21/01/2023 04:00	
08/03/2023 12:00- 08/03/2023 18:00	1# gas engine shut down for fault
12/03/2023 09:00- 12/03/2023 14:00	1# gas engine shut down for main pipe line
28/03/2023 08:00- 06/04/2023 08:00	1# gas engine shut down for major maintenance
20/05/2023 08:00- 28/05/2023 08:00	1# gas engine shut down for medium maintenance
11/06/2023 08:00- 16/06/2023 08:00	1# gas engine shut down for minor maintenance
21/01/2023 01:00- 21/01/2023 04:00	2# gas engine shut down for maintenance of utility equipment
06/03/2023 11:00- 14/03/2023 08:00	2# gas engine shut down for medium maintenance
26/03/2023 09:00- 30/03/2023 18:00	2# gas engine shut down for minor maintenance
06/01/2023 08:00- 13/01/2023 13:00	3# gas engine shut down for major maintenance
21/01/2023 01:00- 21/01/2023 04:00	3# gas engine shut down for maintenance of utility equipment
12/03/2023 09:00- 12/03/2023 14:00	3# gas engine shut down for main pipe line
25/04/2023 08:00- 29/04/2023 12:00	3# gas engine shut down for minor maintenance
06/05/2023 10:00- 14/05/2023 09:00	3# gas engine shut down for medium maintenance
19/05/2023 13:00- 19/05/2023 17:00	3# gas engine shut down for fault
21/01/2023 01:00- 21/01/2023 04:00	4# gas engine shut down for maintenance of utility equipment
12/03/2023 09:00- 12/03/2023 14:00	4# gas engine shut down for main pipe line
02/04/2023 12:00- 10/04/2023 09:00	4# gas engine shut down for medium maintenance
13/04/2023 08:00- 17/05/2023 17:00	4# gas engine shut down for minor maintenance

The electricity export during this monitoring period is 26,186.946 MWh. The operation time of each generator in this monitoring period is 7,970h (generator 1#), 8,037h (generator 2#) and 8,067h (generator 3#), 8,029h (generator 4#). All of the monitoring data are fully recorded and

archived by DCS automatically during this monitoring period. The project operates smoothly during this monitoring period.

The project uses the recovered landfill gas for electricity generation, and the destruction efficiency of gas generators is 100%. When one or more generator is not operational, the destruction efficiency of the LFG for all generators monitored by a single flow meter is 100%. It is claimed as paragraph 5 (a) & (b) in Appendix of CDM Tool 08- Tool to determine mass flow of greenhouse gas in a gaseous stream:

During the operation period, the LFG flow can be adjusted based on LFG demand of the project. Even in case all the gas generators have to stop operation for emergency and the landfill site is able to hold LFG. The solenoid valve on the intake pipeline at the front end of the each gas generator will also be automatically activated.

The LFG will be temporarily stored in the landfill site and pipelines and impossible pass into the atmosphere. During the operation period, the LFG flow can be adjusted based on LFG demand of the project. When the engines are scheduled to shut down, the LFG collection system reduces the gas in advance. When all 4 generators were shut down at the same time (12/03/2023 09:00-12/03/2023 14:00, 12/03/2023 09:00-12/03/2023 14:00, 21/01/2023 01:00-21/01/2023 04:00), there was no LFG collected and left in the entire project system during the planned shutdown. At the beginning of the design process, the design took into account the length of the pipeline and the safety features, and the pipeline has the capacity to store the LFG. Safety has been taken into account during the design and commissioning stages of the project and the design is compliant. At this point in time, LFG did not enter through the roots blower pumps, LFG was stored in the pipeline between the landfill and the pre-treatment facility, the landfill was equipped with gas wells that have the capacity to hold the amount of LFG generated. When the unit is shut down in an emergency, intake pressure is increased and the roots blower pumps will reduce its frequency and extract less LFG from the landfill site. It is a type of interlocking control, ensuring that the pressure in the unit is balanced and that a very small portion of the LFG stored in the pipework can be accommodated. At the same time, the maintenance personnel will handle the malfunction as soon as possible. So the LFG won't pass into the atmosphere. After the engines return to normal, the LFG collection system will adjust to increase the intake volume. It meets the conditions listed under paragraph 5 (a) in Appendix of CDM Tool 08.

During this monitoring period, the shutdowns were categorised into two states, case 1 where only one generator was not operating and the other three generators were operating normally, and case 2 where all generators were not operating. In Case 1, the average hourly methane handled by each of the remaining 3 generators was calculated based on the total gas flow, average methane fraction, and methane density, which ranged from 0.13 to 0.23 tCH₄/h. Each generator is designed to handle methane at a maximum of 0.25¹ tCH₄/h, so the three remaining

¹ Sourced from TECHNICAL AGREEMENT of GAS GENERATOR.

generators in normal operation are capable of handling methane. In case two, there is no monitored gas flow and LFG does not enter the unit. Thus, the actual capacity of remaining generators to destroy methane can meet the designed capacity of each gas generator, the remaining generators have the capacity to destroy the LFG recorded during the period. As the calculation in the Section 5.1 and ER, amount of methane in the LFG which is used in the project activity ($F_{CH_4,PJ,y}$) is 6,645.43 tCH₄ from 01/07/2022 to 30/06/2023, and the calculated destroyed methane based on the actual power generation using the following Equation² from Equation (6) in the AMS-III.G(version 10.0) is 6705.55 tCH₄ during this monitoring period. So the actual gas flow recorded during this monitoring period is completely destroyed by the gas generators, the output corresponds to the flow of gas. Therefore, that a single flow meter is applied to monitor flow of LFG to all 4 engines is in line with the conditions listed under paragraph 5(b) in Appendix of CDM Tool 08.

3.2 Deviations

3.2.1 Methodology Deviations

There are no methodology deviations applied during this monitoring period.

3.2.2 Project Description Deviations

There are no project description deviations applied during this monitoring period.

3.3 Grouped Projects

The project is not a grouped project.

4 DATA AND PARAMETERS

4.1 Data and Parameters Available at Validation

The parameter of methane generation from the landfill in the absence of the project ($BE_{CH_4,SWDS,y}$) is used for ex-ante estimation of relevant parameter $F_{CH_4,PJ,y}$. For $F_{CH_4,PJ,y}$, there is an ex post determination method. Thus, in this monitoring period, $BE_{CH_4,SWDS,y}$ and the relevant basic parameters (ϕ_y , OX, F, DOC_f, MCF_f, K_j, W_{j,x}, DOC_j, f_y , η_{PJ}) for calculation of $BE_{CH_4,SWDS,y}$ are not included here.

Data / Parameter

OX_{top_layer}

² $F_{CH_4} = \frac{EG_y \times 3600 \times D_{CH_4}}{NCV_{CH_4} \times EE_y}$, EG_y is the electricity generated in the project from the Monthly report, 27986.552 MWh; D_{CH_4} is 0.0007168 tCH₄/m³CH₄ (Normal conditions: 0 °C and 101.325 kPa), same as ρ_{CH_4} in Section 4.1; NCV_{CH_4} is 35.9 MJ/Nm³, which is the default value in AMS-III.G(version 10.0); EE_y is the Energy Conversion Efficiency of the project equipment, 30% is provided from supplier which is high value of the efficiency of the generator; 3600 is the Conversion factor (1 MWh = 3600 MJ).

Data unit	-
Description	Fraction of methane that would be oxidized in the top layer of the SWDS in the baseline
Source of data	"Emission from the solid waste disposal sites" (version 8.0)
Value applied	0.1
Justification of choice of data or description of measurement methods and procedures applied	-
Purpose of Data	Calculation of baseline emissions
Comments	-

Data / Parameter	GWP _{CH4}
Data unit	tCO ₂ e/tCH ₄
Description	Global warming potential of CH ₄
Source of data	IPCC
Value applied	Default value of 28. Shall be updated according to any future COP/CMP decisions
Justification of choice of data or description of measurement methods and procedures applied	-
Purpose of Data	Calculation of baseline emissions
Comments	-

Data / Parameter	ρ_{CH4}
Data unit	t/m ³
Description	Density of methane gas at Normal Conditions
Source of data	-
Value applied	0.0007168 (Normal conditions: 0°C and 101.325 kPa)
Justification of choice of data or description of	-

measurement methods and procedures applied	
Purpose of Data	Calculation of baseline emissions
Comments	-

Data / Parameter	$EF_{grid,OM,y}$
Data unit	tCO ₂ /MWh
Description	Operation margin emission factor of ECPG
Source of data	2019 China baseline emission factor of regional power grid.
Value applied	0.7921
Justification of choice of data or description of measurement methods and procedures applied	The value is published by Ministry of Ecology and Environment of the People's Republic of China, based on China Electric Yearbook (2016-2018), Electricity Industry Statistics (2015-2017), China Energy Statistic Yearbook (2016-2018) and IPCC data.
Purpose of Data	Calculation of baseline emissions
Comments	-

Data / Parameter	$EF_{grid,BM,y}$
Data unit	tCO ₂ /MWh
Description	Build margin emission factor of ECPG
Source of data	2019 China baseline emission factor of regional power grid.
Value applied	0.3870
Justification of choice of data or description of measurement methods and procedures applied	The value is published by Ministry of Ecology and Environment of the People's Republic of China, based on China Electric Yearbook (2016-2018), Electricity Industry Statistics (2015-2017), China Energy Statistic Yearbook(2016-2018) and IPCC data.
Purpose of Data	Calculation of baseline emissions
Comments	-

Data / Parameter	TDL _{j,y} and TDL _{k,y}
Data unit	%
Description	Average technical transmission and distribution losses for providing electricity to source j, k in year y
Source of data	Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation (version 03.0)
Value applied	Use as default values of 20% for project consumption sources; Use as default values of 3% for baseline electricity consumption sources. i.e.: TDL _{j,y} =3%, TDL _{k,y} =20%
Justification of choice of data or description of measurement methods and procedures applied	-
Purpose of Data	-
Comments	-

4.2 Data and Parameters Monitored

Data / Parameter	F _{CH₄,BL,R,y}
Data unit	tCH ₄ /yr
Description	Amount of methane in the LFG which is flared due to a requirement in year y
Source of data	Information of the host country's regulatory requirements relating to LFG, contractual requirements, or requirements to address safety and odour concerns.
Description of measurement methods and procedures to be applied	-
Frequency of monitoring/recording	Annually
Value applied	1,329.13tCH ₄ during this monitoring period
Monitoring equipment	-

QA/QC procedures to be applied	-
Purpose of data	Calculation of baseline emissions
Calculation method	-
Comments	Applicable to Case 2 of section 5.4.1.3 of ACM0001 “Flaring or use of landfill gas” (version 19.0)

Data / Parameter	$P_{reg,y}$
Data unit	Dimensionless
Description	Fraction of LFG that is required to be flared due to a requirement in year y
Source of data	Information of the host country’s regulatory requirements relating to LFG, contractual requirements, or requirements to address safety and odour concerns.
Description of measurement methods and procedures to be applied	-
Frequency of monitoring/recording	Annually
Value applied	20%
Monitoring equipment	-
QA/QC procedures to be applied	-
Purpose of data	Calculation of baseline emissions
Calculation method	-
Comments	Applicable to Case 2 of section 5.4.1.3 of ACM0001 “Flaring or use of landfill gas” (version 19.0)

Data / Parameter	$EG_{PJ,y}$
Data unit	MWh
Description	Amount of electricity generated using LFG by the project activity in

	year y														
Source of data	Project participant														
Description of measurement methods and procedures to be applied	Measured continuously by electricity meter(bi-directional) installed at the project site. All data will be monitored and archived electronically. Double check by receipt of electricity sales.														
Frequency of monitoring/recording	The recording frequency is continuously measured and record, and monthly aggregated.														
Value applied	26,186.946MWh during this monitoring period														
Monitoring equipment	Electricity meter E shown in the monitoring system as below.														
	<table><tr><td>Name</td><td>Model</td><td>Serial number</td><td>Accuracy class</td><td>Date calibration</td><td>Validity</td></tr><tr><td rowspan="2">Electricity meter E</td><td rowspan="2">DSZ188</td><td rowspan="2">010129540186</td><td rowspan="2">0.2s</td><td>14/06/2022</td><td>13/06/2023</td></tr><tr><td>06/06/2023</td><td>05/06/2024</td></tr></table>	Name	Model	Serial number	Accuracy class	Date calibration	Validity	Electricity meter E	DSZ188	010129540186	0.2s	14/06/2022	13/06/2023	06/06/2023	05/06/2024
	Name	Model	Serial number	Accuracy class	Date calibration	Validity									
	Electricity meter E	DSZ188	010129540186	0.2s	14/06/2022	13/06/2023									
06/06/2023					05/06/2024										
QA/QC procedures to be applied	The calibration should be done once a year by a qualified third party.														
Purpose of data	Calculation of baseline emissions														
Calculation method	-														
Comments	-														

Data / Parameter	$EG_{EC,y}$
Data unit	MWh
Description	Amount of electricity consumed by the project activity in year y
Source of data	Project participant
Description of measurement methods and procedures to be applied	Measured continuously by electricity meter(bi-directional) installed at the project site. All data will be monitored and archived electronically. Double check by Off-grid power notification form.
Frequency of monitoring/recording	The recording frequency is continuously hourly measured and recorded, and monthly aggregated.
Value applied	0.33MWh during this monitoring period

Monitoring equipment	Electricity meter					
	Name	Model	Serial number	Accuracy class	Date of calibration	Validity
	Electricity meter E	DSZ188	010129540186	0.2s	14/06/2022	13/06/2023
					06/06/2023	05/06/2024
QA/QC procedures to be applied	The calibration should be done once a year by a qualified third party.					
Purpose of data	Calculation of baseline emissions					
Calculation method	-					
Comments	-					

Data / Parameter	$V_{t,db}$					
Data unit	m ³ dry gas/h					
Description	Volumetric flow of the gaseous stream in time interval t on a dry basis					
Source of data	Monitored by project participant					
Description of measurement methods and procedures to be applied	Volume flow measurement always refer to the actual pressure and temperature.					
Frequency of monitoring/recording	Measured continuously by a flow meter F (average hourly value should be used in the calculations of baseline emission reductions). Data to be aggregated monthly.					
Value applied	The average value is 2051.52 Nm ³ /h during this monitoring period.					
Monitoring equipment	Flow meter					
	Name	Model	Serial number	Accuracy class	Date of calibration	Validity
	Flow meter F	RVM-VS12IIF63N2	18070801	0.5	02/06/2022	01/06/2023
					31/05/2023	30/05/2024
QA/QC procedures to be	Flow meter should be subject to a regular maintenance and					

applied	testing regime to ensure accuracy
Purpose of data	Calculation of baseline emissions
Calculation method	-
Comments	Flow meter F is employed to monitor the temperature of the gaseous stream at the flow measurement point. The temperature of the gaseous stream is 286.45~304.05K during this monitoring period, which is less than 333.15 K(60°C). Thus the gaseous stream is dry for calculating flow measurement of LFG $F_{CH4,PJ,y}$ on a dry basis($F_{CH4,PJ,y}$ is calculated as volumetric flow of the gaseous stream in time interval t on a dry basis multiplied by volumetric fraction of greenhouse gas i in a time interval t on dry basis).

Data / Parameter	V _{i,t,db}					
Data unit	m ³ gas i/m ³ dry gas					
Description	Volumetric fraction of greenhouse gas i in a time interval t on dry basis					
Source of data	Monitored by the project participant					
Description of measurement methods and procedures to be applied	Continuous gas analyzer operating in dry-basis. Volumetric flow measurement should always refer to the actual pressure and temperature.					
Frequency of monitoring/recording	Continuous					
Value applied	The average value is 51.59% during this monitoring period.					
Monitoring equipment	Gas analyzer					
	Name	Model	Serial number	Accuracy class	Date of calibration	Validity
	Gas analyzer G	GTR 196 IR	56403/8	2%	22/06/2022	21/06/2023
					20/06/2023	19/06/2024
QA/QC procedures to be applied	Gas analyzer should be subject to a regular maintenance and testing regime to ensure accuracy					
Purpose of data	Calculation of baseline emissions					

Calculation method	-
Comments	Flow meter F is employed to monitor the temperature of the gaseous stream at the flow measurement point. The temperature of the gaseous stream is 286.45~304.05K during this monitoring period, which is less than 333.15 K(60°C). Thus the gaseous stream is dry for calculating flow measurement of LFG $F_{CH_4,PJ,y}$ on a dry basis($F_{CH_4,PJ,y}$ is calculated as volumetric flow of the gaseous stream in time interval t on a dry basis multiplied by volumetric fraction of greenhouse gas i in a time interval t on dry basis).

Data / Parameter	Management of SWDS
Data unit	-
Description	Management of SWDS
Source of data	Original design of the landfill
Description of measurement methods and procedures to be applied	Project participants should refer to the original design of the landfill to ensure that any practice to increase methane generation have been occurring prior to the implementation of the project activity. Any change in the management of the SWDS after the implementation of the project activity should be justified by referring to technical or regulatory specifications
Frequency of monitoring/recording	Annually
Value applied	Since the implementation of the project activity, no changes have taken place in the management of the landfill. By the end of the implementation of the project, the provisions on methane recovery and utilization have not changed in the current effective laws and standards in China, and it is a common phenomenon in China that methane is discharged into the atmosphere without utilization.
Monitoring equipment	-
QA/QC procedures to be applied	-
Purpose of data	-

Calculation method	-
Comments	-

Data / Parameter	Op _{j,h}
Data unit	-
Description	Operation of the equipment that consumes the LFG
Source of data	Project participant
Description of measurement methods and procedures to be applied	Operation of the gas generators is automatically monitored and recorded in the daily records.
Frequency of monitoring/recording	Hourly
Value applied	In this monitoring period, the operation hours of each generation are as follows: generator 1#: 7,970h generator 2#: 8,037h generator 3#: 8,067h generator 4#: 8,029h
Monitoring equipment	The generator set controller continuously monitors and records the operation hours of gas generators by a built-in programme when receiving voltage and speed signals from the gas generators.
QA/QC procedures to be applied	-
Purpose of data	-
Calculation method	-
Comments	The operation hours of the generator are timed by a built-in programme, which belongs to the control module of the generator set, and the probability of problems with this controller is very small, so it does not require daily calibration and maintenance.

Data / Parameter	CAPEX and OPEX
Data unit	CNY
Description	Total investment to implement the project and total cost to operate the project
Source of data	Engineering, procurement and construction contracts; and maintenance contracts
Description of measurement methods and procedures to be applied	-
Frequency of monitoring/recording	At the first issuance request after each phase of the project is fully implemented
Value applied	CAPEX: 31,312,376.86 RMB OPEX: 5,896,838.01 RMB
Monitoring equipment	-
QA/QC procedures to be applied	Audited by professional, independent financial auditors. The DOE should only verify that the data provided corresponds to the data from independent financial auditors
Purpose of data	Identify the baseline scenario and demonstrate additionality
Calculation method	-
Comments	The information provided for CAPEX shall indicate the investment made: (i) in the collection and flaring system; (ii) in the powerplant and connection to the grid (if applicable); and (iii) in the purchase of the new boiler or refurbishment of the existing one and in the steam/hot air pipeline if steam/hot air is exported out of the project boundary (if applicable). The information supplied for OPEX shall indicate the costs for: (i) staff and maintenance involved in the operation of the collection and flaring system; and (ii) staff and maintenance involved in the operation of the collection and power generation system. The monitoring of this parameter is only required for project applying the simplified procedures to identify the baseline scenario and demonstrate additionality.

Data / Parameter	Tariff of electricity exported
Data unit	CNY/KWh
Description	Tariff of the electricity exported
Source of data	Power purchase agreement
Description of measurement methods and procedures to be applied	-
Frequency of monitoring/recording	At the first issuance request after each phase of the project is fully implemented
Value applied	0.629
Monitoring equipment	-
QA/QC procedures to be applied	Audited by professional, independent financial auditors. The DOE should only verify that the data provided corresponds to the data from independent financial auditors
Purpose of data	-
Calculation method	-
Comments	The monitoring of this parameter is only required for projects applying the simplified procedures to identify the baseline scenario and demonstrate additionality.

4.3 Monitoring Plan

1. The requirement of monitoring plan

The project participants will monitor the emission reductions by methods, indicators, and frequency required by Monitoring Methodology ACM0001 (Version 19.0) to ensure project ERs are measurable and real. The monitoring methodology is based on direct measurement of the amount of landfill gas captured and destroyed by the project and electricity generating units.

2. Responsibilities of operational and management structure

The project participant will implement this monitoring plan. The plan could be revised according to suggestions from VVB and the practical circumstances, in order to keep it consistent, transparent and conservative during the monitoring process.

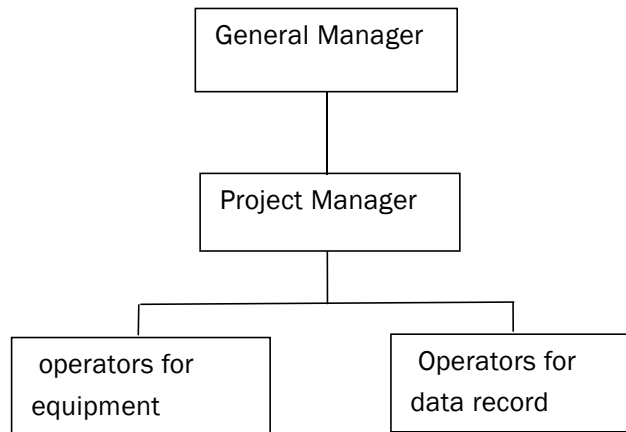


Figure 4.1: Monitoring system

(1) Principal of the monitoring procedure

The general manager of the project is the leader of the monitoring tasks: he sets out the responsibility of everyone in the monitoring system, and establishes the related documents. The general manager ensures that staff in the monitoring system has the ability to deal with the assigned tasks.

(2) Executive person of the monitoring procedure

Project Manager: a Project Manager is appointed, specifically responsible for training, checking the daily operation, reporting forms and archiving emergency situation reports. The Project Manager reports monthly to the General Manager (GM) about the project performance and monitored data. In the event that non-conformance in the performance to the mentioned procedures and/or functioning problems of the monitoring equipment are identified, the Project manager will inform the GM about the situation and work out relevant measures to be taken. The Project manager will also be responsible for aggregating the monitored data monthly and yearly, archiving and keeping data during the crediting period and two years after.

(3) Operators of the monitoring procedure

Operators will take turns to work in the control center 24 hours a day. They will be in charge of data supervision, filling operation report forms and, checking and inspecting the system. If necessary, they will have the responsibility for executing the emergency plan and drafting emergency situation reports.

3. Monitoring system

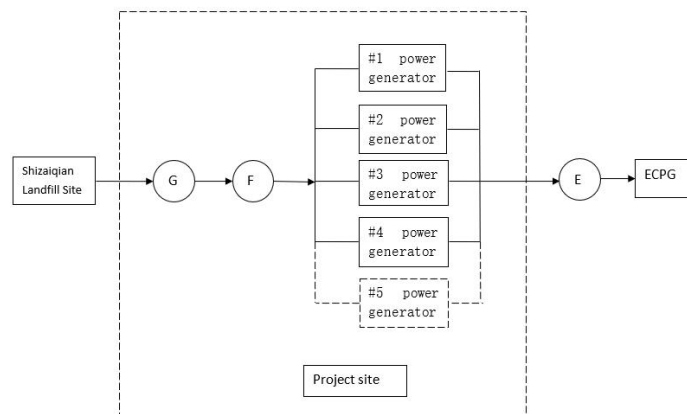


Figure 4.2: Chart of the monitoring meters

Main parameters:

G	Gas analyzer to continuously measure methane fraction in LFG
F	Flow meter to continuously measure flow rate of total captured LFG, with automatic measure adjustment for temperature and pressure
E	Electricity meter (main meter, bi-directional) to continuously measure the electricity supplied to the ECPG and the electricity supplied by the grid

4. Data collection procedures

The data are fully recorded and archived by DCS automatically and shown in the control system. The data are recorded once per hour. DCS of a historian database, primarily to provide data backup to the sheet of excel. Ultimately it forms the Monitoring Operating Record. All data are kept 2 years after the end of the crediting period.

Flow of LFG fed to the Power Plant ($V_{t,db}$)

Flow of LFG fed to the Power Plant is continuously measured by a flow meter and the data are recorded and electronic archived once per hour by computer automatically. The monitoring data are checked every day and summarized every month. The flow meter is calibrated annually to ensure the accuracy.

Methane fraction in the landfill gas ($V_{i,t,db}$)

Methane fraction in the landfill gas is continuously measured by a gas analyzer and the data are recorded and electronic archived once per hour by computer automatically. The monitoring data are checked by the operators every day and reported to General Manager by Project manager monthly. The gas analyzer meter is calibrated annually to ensure the accuracy.

Amount of electricity generated using the LFG by the project ($EG_{PJ,y}$)

This meter is bi-directional and has two-way metering, recording both the electricity exported to the grid and the electricity imported from the grid. The electricity meter E is installed and sealed at the control room of project site by Quanzhou grid company. The data of electricity exports and imports are recorded and archived by DCS per hour automatically and shown in the control system. The monitoring data are checked by the operators every day and reported to General Manger by Project manager monthly. The electricity meter E is calibrated annually to ensure the accuracy. The data could be cross-check by the sale receipts provided by the Quanzhou grid company.

Electricity imported from the grid ($EG_{EC,y}$)

E is the bi-directional electricity meter, it could continuously measure the electricity imported from ECPG simultaneously, when the power plant is shut down and non-operation.

4. QA and QC

In order to ensure monitoring plan with high quality, QA/QC measures are carried out in monitoring data recording and checking, equipment calibrating and staff training.

Data recording: all data collected are recorded in electronic files which are regularly backed up. The data are checked by the specific staff every day and reported to General Manger by Project manager monthly.

Equipment calibration and maintenance: Flow meter, gas analyzer, other critical project equipment are subject to regular maintenance and testing according to technical specifications from the manufactures to ensure accuracy and good performance.

5. Emergency procedures

Once a meter in fault, it shall be immediately repaired or replaced with another calibrated meter by a professional engineer, and the LFG or electricity generated during the period of erroneous measurement and replacement of the fault meter shall not be accounted for conservative consideration.

Table4.1: Detailed calibration information

Name	Model	Serial number	Accuracy class	Date calibration of	Validity
Electricity meter E	DSZ188	010129540186	0.2s	14/06/2022	13/06/2023
				06/06/2023	05/06/2024
Flow meter F	RVM-VS12IIF63N2	18070801	0.5	02/06/2022	01/06/2023
				31/05/2023	30/05/2024
Gas analyzer G	GTR 196 IR	56403/8	2%	22/06/2022	21/06/2023
				20/06/2023	19/06/2024

5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

5.1 Baseline Emissions

$$BE_y = BE_{CH_4,y} + BE_{EC,y} \quad \text{Equation(1)}$$

Parameter	Description	Unit	2022	2023	Total
BE_y	Baseline emissions	tCO ₂ e	83,616	62,521	146,137
$BE_{CH_4,y}$	Baseline emissions of methane from the SWDS	tCO ₂ e	74,521	55,722	130,243
$BE_{EC,y}$	Baseline emissions associated with electricity generation	tCO ₂ e	9,095	6,799	15,894

$$BE_{CH_4} = ((1 - OX_{top_layer}) \times F_{CH_4,PJ,y} - F_{CH_4,BL,y}) \times GWP_{CH_4} \quad \text{Equation(2)}$$

$$F_{CH_4,PJ,y} = F_{CH_4,EL,y} \quad \text{Equation(3)}$$

Parameter	Description	Unit	2022	2023	Total
$BE_{CH_4,y}$	Baseline emissions of methane from the SWDS in year y	tCO ₂ e	74,521	55,722	130,243
OX_{top_layer}	Fraction of methane in the LFG that would be oxidized in the top layer of the SWDS in the baseline (dimensionless)	/	0.1	0.1	/
$F_{CH_4,PJ,y}$ ($F_{CH_4,EL,y}$)	Amount of methane in the LFG which is flared and/or used in the project activity in year y	tCH ₄	3,802.30	2,843.13	6,645.43
$F_{CH_4,BL,y}$	Amount of methane in the LFG that would be flared in the baseline in year y	tCH ₄	760.48	568.65	1,329.13

GWP_{CH_4}	Global warming potential of CH_4	tCO ₂ e/tCH ₄	28	28	/
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$$BE_{EC,y} = EC_{BL,k,y} \times EF_{EF,k,y} \times (1 + TDL_{k,y}) \quad \text{Equation(4)}$$

Parameter	Description	Unit	2022	2023	Total
$BE_{EC,y}$	Baseline emission from electricity consumption in year y	tCO ₂	9,095	6,799	15,894
$EC_{BL,k,y}$	Quantity of electricity that would be consumed by the baseline electricity consumer k in year y	MWh	14,984.83 1	11,202.11 5	26,186.94 6
$EF_{EF,k,y}$	Emission factor for electricity generation for source k in year y	tCO ₂ /MWh	0.58955	0.58955	/
$TDL_{k,y}$	Average technical transmission and distribution losses for providing electricity to source k in year y	/	3%	3%	/

5.2 Project Emissions

Project emissions are calculated as follows:

$$PE_y = PE_{EC,y} \quad \text{Equation(5)}$$

Parameter	Description	Unit	2022	2023	Total
PE_y	Project emission in year y	tCO ₂	1	1	2
$PE_{EC,y}$	Emissions from consumption of electricity due to the project activity in year y	tCO ₂	1	1	2

$$PE_{EC,y} = \sum_j EC_{PJ,j,y} * EF_{EL,j,y} * (1 + TDL_{j,y}) \quad \text{Equation(6)}$$

Parameter	Description	Unit	2022	2023	Total
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$PE_{EC,y}$	Project emissions from electricity consumption in year y	tCO ₂	1	1	2
$EC_{PJ,j,y}$	Quantity of electricity consumed by the project electricity consumption source j in year y	MWh	0.09	0.24	0.33
$EF_{EL,j,y}$	Emission factor for electricity generation for source j in year y	tCO ₂ /MWh	0.58955	0.58955	/
$TDL_{j,y}$	Average technical transmission and distribution losses for providing electricity to source j in year y	/	20%	20%	/

5.3 Leakage

According to ACM0001, no leakage effects need to be accounted.

5.4 Net GHG Emission Reductions and Removals

Emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y \quad \text{Equation(7)}$$

Where:

ER_y = Emission reduction in year y (t CO₂e/yr)

BE_y = Baseline emissions in year y (t CO₂e/yr)

PE_y = Project emissions in year y (t CO₂e/yr)

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)
01/07/2022-31/12/2022	83,616	1	0	83,615
01/01/2023-30/06/2023	62,521	1	0	62,520

Total	146,137	2	0	146,135
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The monitoring period covers from 01/07/2022 to 30/06/2023, with totally 365 days. Based on the registered VCS PD, the amount of estimated emission reductions for this monitoring period would be $157,647/365 \times 184 + 117,931/365 \times 181 = 137,951 \text{tCO}_2\text{e}$. The actual emission reductions in this monitoring period is 146,135tCO₂e, which is 5.93% more than the estimation in the registered VCS PD.

<u>Ex-ante emissions reductions /removals</u>	<u>Achieved emissions reductions /removals</u>	<u>Percent difference</u>	<u>Justification for the difference</u>
137,951	146,135	5.93%	For LFG power project, with many external factors affecting the amount and quality of LFG generated, including climate, quantity of domestic waste landfill, waste composition, gas collection efficiency and technology etc., it is reasonable that the amount of LFG generated differs with the estimated value based on hypothetical model given by the tool given by CDM EB, and the actual LFG methane fraction is different with the estimated value used in the hypothetical model. According to the ex ante calculation, emission reductions mainly come from CH ₄ destruction comparing to the baseline scenario, and electricity generation depends on the amount of CH ₄ consumption as well. Comparing to the estimated emission reductions, the mainly reasons of the difference are for that (1) actual LFG methane fraction is 51.59%(average value),however the estimated value is 50%, (2) with the improvement of gas collection efficiency and technology, actual LFG captured is 3.41% more than the estimated (3) actual generators operation hour is more than ex ante calculation resulting in that the electricity generated by using the LFG is accordingly 0.19% higher than the estimated value. Therefore, the increase 5.93% is reasonable and acceptable for LFG power project.

APPENDIX 1: SUPPORTING EVIDENCE

Supporting evidence for contribution #1

Evidence: Emission reductions achieved during the Second Monitoring Period

5.4 Net GHG Emission Reductions and Removals

Emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y \quad \text{Equation(7)}$$

Where:

ER_y = Emission reduction in year y (t CO₂e/yr)

BE_y = Baseline emissions in year y (t CO₂e/yr)

PE_y = Project emissions in year y (t CO₂e/yr)

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)
01/07/2022-31/12/2022	83,616	1	0	83,615
01/01/2023-30/06/2023	62,521	1	0	62,520
Total	146,137	2	0	146,135

The monitoring period covers from 01/07/2022 to 30/06/2023, with totally 365 days. Based on the registered VCS PD, the amount of estimated emission reductions for this monitoring period would be 157,647/365*184+117,931/365*181=137,951tCO₂e. The actual emission reductions in this monitoring period is 146,135tCO₂e, which is 5.93% more than the estimation in the registered VCS PD.

Estimated emissions reductions/ removals	Achieved emissions reductions/ removals	Percent difference	Justification for the difference
137,951	146,135	5.93%	For LFG power project, with many external factors affecting the amount and quality of LFG generated, including climate, quantity of domestic waste landfill, waste composition, gas collection efficiency and technology etc., it is reasonable that the amount of LFG generated differs with the estimated value based on hypothetical model given by the tool given by CDM EB, and the actual LFG methane fraction is different with the estimated value used in the hypothetical model. According to the <u>ex-ante</u> calculation, emission reductions mainly come from CH ₄ destruction comparing to the baseline scenario, and electricity generation depends on the amount of CH ₄ consumption as well. Comparing to the estimated emission reductions, the mainly reasons of the difference are for that (1) actual LFG methane fraction is 51.59%(average value), however the estimated value is 50%, (2) with the improvement of gas collection efficiency and technology, actual LFG captured is 3.41% more than the estimated (3) actual generators operation hour is more than ex ante calculation resulting in that the electricity generated by using the LFG is accordingly 0.19% higher than the estimated value. Therefore, the increase 5.93% is reasonable and acceptable for LFG power project.

Source: Section E5.4 of the Second Monitoring Report of VCS Project 2352.

Supporting evidence for contribution #2

Evidence: Total number of job opportunities: Quanzhou BCCY New Energy CO., Ltd.

No.	Power plant name	Staff name	Date of hire	On the job time	Job title	Sex	Person status	Highest education	Job rank	Specialized subject
1	Quanzhou power plant	Shengming Xue	13/05/2019	From 13/05/2019 to now	Director of power plant	Male	On the job	College	Manager	Electronic instruments and maintenance
2	Quanzhou power plant	Wenshuai Liu	20/05/2019	From 20/05/2019 to now	Person for operation and maintenance	Male	On the job	College	Commissioner	Power supply
3	Quanzhou power plant	Lafen He	18/05/2019	From 18/05/2019 to now	Cook	Female	On the job	Junior high school	Commissioner	/
4	Quanzhou power plant	Aoxiang Feng	27/05/2019	From 27/05/2019 to now	Person for operation and maintenance	Male	On the job	College	Commissioner	Software technology (Java development engineer)
5	Quanzhou power plant	Junguang Zhang	01/06/2019	From 01/06/2019 to now	Person for operation and maintenance	Male	On the job	College	Commissioner	Electrical automation

Quanzhou BCCY New Energy CO., Ltd
30/10/2023



Source: Employee file of Quanzhou BCCY New Energy CO., Ltd., dated on 30/10/2023.

Supporting evidence for contribution #3

Evidence: Affordable and Clean Energy: Quanzhou BCCY New Energy CO., Ltd.

Period	EG _{PJ,y}	EG _{EC,y}
	Monthly quantity of electricity exported to the grid	Monthly electricity from grid to project
	MWh	MWh
01/07/2022-31/07/2022	2,652.385	0
01/08/2022-31/08/2022	2,660.914	0
01/09/2022-30/09/2022	2,481.544	0
01/10/2022-31/10/2022	2,445.128	0.09
01/11/2022-30/11/2022	2,535.568	0
01/12/2022-31/12/2022	2,209.292	0
2022total	14,984.831	0.09
01/01/2023-31/01/2023	1,988.222	0.09
01/02/2023-28/02/2023	1,890.554	-
01/03/2023-31/03/2023	1,845.363	0.15
01/04/2023-30/04/2023	1,687.853	-
01/05/2023-31/05/2023	1,850.935	-
01/06/2023-30/06/2023	1,939.188	-
2023total	11,202.115	0.24
Total	26,186.946	0.33

Source: Daily operation records from Quanzhou BCCY New Energy CO., Ltd.