Gold Standard for the Global Goals

TEMPLATE

MONITORING REPORT

PUBLICATION DATE **14.10.2020**

VERSION **v. 1.1**

RELATED SUPPORT – **TEMPLATE GUIDE Monitoring Report v. 1.1**

This document contains the following Sections

KEY PROJECT INFORMATION

Key Project Information

GS ID (s) of Project (s)	397
Title of the project (s) covered by monitoring report	Suzhou Qizi Mountain Landfill Gas Recovery Project
Version number of the PDD/VPA-DD (s) applicable to this monitoring report	3.2
Version number of the monitoring report	3.0
Completion date of the monitoring report	20/04/2021
Date of project design certification	22/04/2009
Date of Last Annual Report	20/02/2020
Monitoring period number	2nd of the second crediting period
Duration of this monitoring period	01/04/2018-31/07/2020
Project Representative	South Pole Carbon Asset Management Ltd.
Host Country	China
Activity Requirements applied	☐ Community Services Activities ☒ Renewable Energy Activities ☐ Land Use and Forestry Activities/Risks & Capacities ☐ N/A
Methodology (ies) applied and version number	ACM0001 "Flaring or use of landfill gas" (Version 16.0)
Product Requirements applied	☒ GHG Emissions Reduction & Sequestration ☐ Renewable Energy Label ☐ N/A

Table 1 - Sustainable Development Contributions Achieved

Sustainable Development Goals Targeted	SDG Impact	Amount Achieved	Units/ Products
SDG 13 Climate Action	Emissions Reductions	317,242	VERs

SDG 7 Ensure access to affordable, reliable, sustainable and modern energy for all (Affordable and Clean Energy)	MWh of renewable energy generated	53,601 MWh	MWh
SDG 8 Promote inclusive and sustainable economic growth, employment and decent work for all (Decent Work and Economic Growth)	Number of jobs created	7	/

Table 2 – Product Vintages

		Amount Achieved
Start Dates	**End Dates**	**VERs**
01/04/2018	31/12/2018	99,461
01/01/2019	31/12/2019	135,328
01/01/2020	31/07/2020	82,453

SECTION A. DESCRIPTION OF PROJECT

A.1. General description of project

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'Suzhou Qizi Mountain Landfill Gas Recovery Project', developed by Everbright Environment and Energy (Suzhou) Landfill Gas to Energy Co., Ltd., is located at Qizi Mountain Landfill, Suzhou, Jiangsu Province, China. The purpose of the project is to utilize landfill gas (LFG) for electricity generation. It is a combination project including LFG collection, LFG processing system and electricity generation. LFG collected is used for electricity generation with internal combustion engines and generators.

It was registered as GS project on 22/04/2009, with GS ID of 397. The second crediting period is from 22/04/2014 to 21/04/2021. The first monitoring period is from 22/04/2007 to 31/07/2009. The second monitoring period is from 01/08/2009 to 31/07/2010. The third monitoring period is from 01/08/2010 to 31/12/2011. The fourth monitoring period is from 01/01/2012 to 31/12/2013. The fifth monitoring period is from 01/01/2014 to 21/04/2014. The sixth monitoring period is from 22/04/2014 to 31/03/2018. This is the seventh monitoring period for the project, and the 2nd monitoring period under the second crediting period, from 01/04/2018 to 31/07/2020.

A.2. Location of project

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The project is located on Qizi Mountain, Mudu County, Wuzhong District, Suzhou City, Jiangsu province, P.R.China. It is 13km far from the centre of Suzhou City. The exact location of the project is 31°14'15''N 120°33'9''E. A map indicating the location of the project site is provided in Fig A.1:

Figure A.1 The location of the project

A.3. Reference of applied methodology

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The approved large-scale consolidated methodology ACM0001 "Flaring or use of landfill gas" (Version16.0) is applied to the project activity.

The following tools are also applied:

"Tool to calculate the emission factor for an electricity system（version05.0）"

"Tool to calculate baseline, project and/or leakage emissions from electricity consumption (Version 01)"

"Tool for the demonstration and assessment of additionality (Version 05.2)"

"Emissions from solid waste disposal sites (version 07.0)"

"Tool to determine the remaining lifetime of equipment (version 01)"

A.4. Crediting period of project

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Renewable. The second crediting period is from 22/04/2014 to 21/04/2021, seven years.

SECTION B. IMPLEMENTATION OF PROJECT

B.1. Description of implemented project

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This project uses landfill gas (LFG) for electricity generation. It includes LFG collection, LFG treatment process and electricity generation. The electricity generated is exported to East China Power Grid (ECPG) to replace equivalent amount of electricity from those fossil fuel power plants connected to ECPG.

1.25MW*4 generators are designed, while three generators (generator I, II and III) are in operation.
Generator I and II started construction in November 2005 and started operation on 01/01/2007. Generator III started construction in August 2007 and started operation in September 2008. The fourth generator is still under plan.

The project operates smoothly during this monitoring period. The net electricity export is 53,601,280KWh. The operation time of each generator in this monitoring period is 19,532h (generator 3#), 19,639h (generator 4#) and 19,711h (generator 5#).

There is no change and deviation compared to PDD.

B.1.1. Forward Action Requests

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No FAR from validation and/or previous monitoring period.

B.2. Post-Design Certification changes

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B.2.1. Temporary deviations from the approved Monitoring & Reporting Plan, methodology or standardized baseline

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No temporary deviations from the approved Monitoring & Reporting Plan, methodology or standardized baseline.

B.2.2. Corrections

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No corrections.

B.2.3. Changes to start date of crediting period

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No changes to start date of crediting period.

B.2.4. Permanent changes from the Design Certified monitoring plan, applied methodology or applied standardized baseline

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No permanent changes from the Design Certified monitoring plan, applied methodology or applied standardized baseline.

B.2.5. Changes to project design of approved project

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No changes to project design of approved project.

SECTION C. DESCRIPTION OF MONITORING SYSTEM APPLIED BY THE PROJECT

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1. Electricity Generation

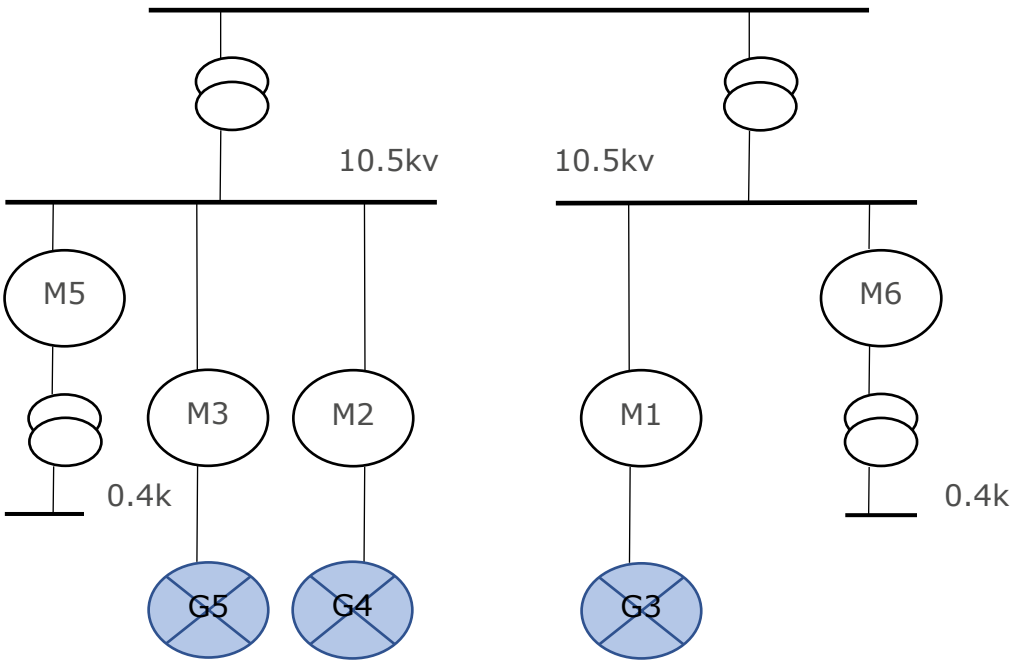

Fig. 1 Simplified Diagram of the Electric Layout

According to the Chinese national standard "Technical Management Code for Electricity Metering" (DL/T448-2016), the electricity metering equipment were properly configured and the metering equipment were checked by both the project owner and the grid company before the project is in operation.

The electricity generation is measured by Meter M1, M2 and M3, which have an accuracy of 0.5S and bidirectional electronic meters. The electricity imported from the grid is measured by M5 and M6, with accuracy of 2. During this monitoring period, M1, M2, M3, M5 and M6 work properly and are the main meters for monitoring data.

2. LFG utilization

Temperature (T) and pressure (P) of the landfill gas are required to determine the density of methane in the landfill gas. Therefore, temperature and pressure meters are installed between gas treatment and generators. The accuracy of temperature meter is 1.5%; The accuracy of pressure meter is 2.5%.

At the same location, there is a flow volume meter which has an accuracy of 0.5% and methane percentage analyzer, which has an accuracy of 0.5%.

Please see Fig. 2, the simplified diagram of pre-processing treatment layout.

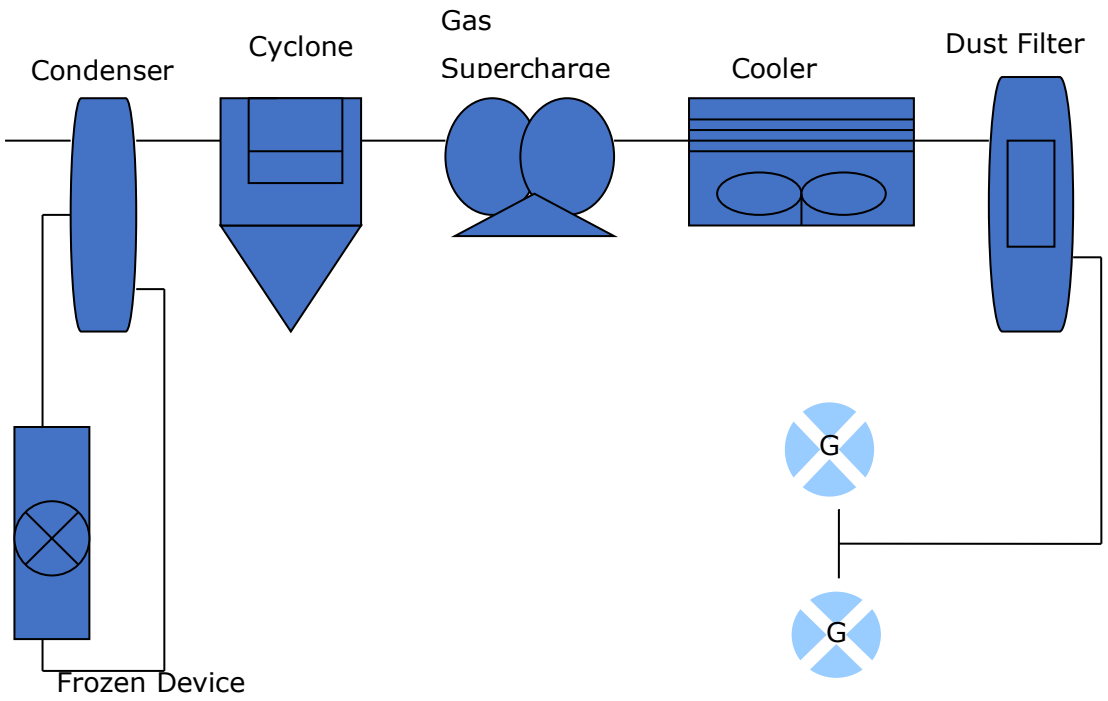

Fig. 2 The simplified diagram of pre-processing treatment layout

3. According to GS requirements, potential mitigation and/or compensation measures from the EIA

In section F of PDD, noise impact and impacts on aquatic environment and air quality can be evaluated. The institute which wrote the EIA, and the Environmental Protection Agency conducted the re-evaluation monitoring for the first phase since the first two generators started operation.

The project meets the following environment standards during operation:

-Air Quality Standard
-Aquatic Environment standard
-Noise Controlling Standard

The ratio ($R_{LFG,y}$) between the LFG collected and the LFG used within the engines on average each year must be a monitoring parameter. During this monitoring period, there is no other way, such as flaring or venting, to treat the collected LFG besides generating electricity. Therefore, this ratio shall be nearly close to 100%, at least higher than 65%. The actual layout of the entire collection pipelines, which covers from the wells to electricity generators, is considered as the evidence.

4. Data Collection

Data related to LFG

The project owner is responsible for operation monitoring of the main meters and guarantee that the measuring equipment are in good operation and completely sealed.

The main monitoring process is as follows:
I. Methane fraction is measured and recorded hourly by project owner using certified equipment.

Flow volume is continuously measured continuously and recorded hourly by project owner using certified equipment.

Temperature and pressure are measured continuously and recorded hourly.

II. The project owner keeps the records of the main meter's data readings for verification by the DOE.

If inaccuracy of the reading data from the main meter exceeds the allowable tolerance, when the meter operates abnormally during a month or any other unexpected problems occur, the amount of LFG generated shall not be counted.

Data related to Electricity Generation

The project owner and the Grid Company are responsible for operation monitoring of the main meters and guarantee that the measuring equipment are in good operation and completely sealed.

The electricity recorded by the main meter alone suffices for the purpose of billing and emission reduction verification as long as the main meter error is within the allowable tolerance. The main monitoring process is as follows:

III. Electricity generation of each generator is measured continuously by electricity meter and recorded monthly.
Electricity internal consumption is measured continuously by electricity meter and recorded monthly.

IV. The project owner and Grid Company read and check the main meter;

V. The project owner sells the electricity to the Grid Company;

VI. The project owner records the net electricity supplied to the grid electronically;

VII. The project owner keeps the records of the main meter's data readings for verification by the DOE.

5. Calibration

The electricity meters are checked by Electricity Supply Company. After verification and calibration, meters are sealed. Meters related to the electricity generation are jointly inspected and sealed on behalf of the project owner and Grid Company and shall not be accessible by either party except in the presence of the other party or its accredited representatives.

Monitoring Parameter	Monitoring equipment Serial number	Date of calibration	Valid till	Accuracy level	Calibration Entity
$EL_{generation}$	1524765942 (M1)	26/06/2017	25/06/2018	0.5S	Jiangsu Electrical Institute
		22/06/2018	21/06/2019	0.5 S	

		18/06/2019	17/06/2020	0.5 S	Measurement Center
		15/06/2020	14/06/2021	0.5 S	
	1528634635(M2)	26/06/2017	25/06/2018	0.5S	
		22/06/2018	21/06/2019	0.5 S	
		18/06/2019	17/06/2020	0.5 S	
		15/06/2020	14/06/2021	0.5 S	
	1524764230(M3)	26/06/2017	25/06/2018	0.5S	
		22/06/2018	21/06/2019	0.5 S	
		18/06/2019	17/06/2020	0.5 S	
		15/06/2020	14/06/2021	0.5 S	
$EL_{internal-consumption}$	2355946(M5)	26/06/2017	25/06/2018	2	
		22/06/2018	21/06/2019	2	
		18/06/2019	17/06/2020	2	
		15/06/2020	14/06/2021	2	
	2008-0577129(M6)	26/06/2017	25/06/2018	2	
		22/06/2018	21/06/2019	2	
		18/06/2019	17/06/2020	2	
		15/06/2020	14/06/2021	2	

$LFG_{electricity,y}$	F1: 01965563	05/02/2018	04/02/2019	0.5	Suzhou Institute of Measurement and Testing Technology
		26/01/2019	25/01/2020	0.5	
		22/01/2020	21/01/2021	0.5	
	F2: FD21246A	01/02/2018	31/01/2019	0.5	
		24/01/2019	23/01/2020	0.5	
		22/01/2020	21/01/2021	0.5	
w_{CH4}	11112050901161825249	05/02/2018	04/02/2019	0.5	Suzhou Institute of Measurement and Testing Technology
		26/01/2019	25/01/2020	0.5	
		22/01/2020	21/01/2021	0.5	
T	01	12/03/2018	11/03/2019	1.5	Suzhou Institute of Measurement and Testing Technology
		06/03/2019	05/03/2020	1.5	
		03/03/2020	02/03/2021	1.5	
	02	12/03/2018	11/03/2019	1.5	Suzhou Institute of Measurement and Testing Technology
		06/03/2019	05/03/2020	1.5	
		03/03/2020	02/03/2021	1.5	
P	110623626	12/03/2018	11/09/2018	2.5	
		10/09/2018	09/03/2019	2.5	
		07/03/2019	06/09/2019	2.5	

		04/09/2019	03/03/2020	2.5	
		02/03/2020	01/09/2020	2.5	
	110623628	12/03/2018	11/09/2018	2.5	
		10/09/2018	09/03/2019	2.5	
		07/03/2019	06/09/2019	2.5	
		04/09/2019	03/03/2020	2.5	
		02/03/2020	01/09/2020	2.5	

6. Data Management

Data were archived at the end of each month using electronic spreadsheets. The electronic files were stored on hard disk. In addition, a printed hard copy is as well archived.

Sales receipts or invoices for the power delivered to the grid are as crosscheck. At the end of each crediting year, a monitoring report is compiled detailing the metering results.

Physical documents were collected and stored by the project owner in a central place, together with the monitoring plan. All data records are kept for 2 years after the end of the crediting period.

SECTION D. DATA AND PARAMETERS

D.1. Data and parameters fixed ex ante or at renewal of crediting period

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SDG 13

Data/parameter	Regulatory requirements related to landfill gas projects

Unit	/
Description	Regulatory requirements related to landfill gas projects
Source of data	Host country relevant regulations for LFG project activities
Value(s) applied	/
Choice of data or Measurement methods and procedures	/
Purpose of data	The information though recorded annually, is used for changes to the adjustment factor (AF) or directly $MD_{BL,y}$ at renewal of the crediting period
Additional comment	Relevant regulations for LFG project activities shall be updated at renewal of each crediting period. Changes to regulation should be converted to the amount of methane that would have been destroyed/combusted during the year in the absence of the project activity ($MD_{BL,y}$). Project participants should explain how regulations are translated into that amount of gas.

Data/parameter	GWP_{CH4}
Unit	tCO_2e/tCH_4
Description	Global warming potential of CH_4
Source of data	IPCC
Value(s) applied	25
Choice of data or Measurement methods and procedures	IPCC
Purpose of data	Calculation of baseline emissions
Additional comment	Shall be updated according to any future COP/MOP decisions.

Data/parameter	D_{CH4}
Unit	tCH_4/m^3CH_4
Description	Methane density
Source of data	ACM0001(V8.0)
Value(s) applied	0.0007168 At standard temperature and pressure (0 degree Celsius and 1,013 bar)
Choice of data or Measurement methods and procedures	/
Purpose of data	Calculation of baseline emissions
Additional comment	/

Data/parameter	$BE_{CH4,SWDS,y}$
Unit	tCO_2e
Description	Methane generation from the landfill in the absence of the project activity at year y
Source of data	Calculated as per the "Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site".
Value(s) applied	/
Choice of data or Measurement methods and procedures	/
Purpose of data	Used for ex-ante estimation of the amount of methane that would have been destroyed/combusted during the year
Additional comment	/

Data/parameter	φ

Unit	tCO_2e
Description	Model correction factor to account for model uncertainties
Source of data	Calculated as per the "Tool to determine methane emissions avoided from dumping waste at a solid waste disposal site".
Value(s) applied	0.75
Choice of data or Measurement methods and procedures	/
Purpose of data	Calculation of baseline emissions
Additional comment	Oonk et el. (1994) have validated several landfill gas models based on 17 realized landfill gas projects. The mean relative error of multi-phase models was assessed to be 18%. Given the uncertainties associated with the model and in order to estimate emission reductions in a conservative manner, a discount of 10% is applied to the model results.

Data/parameter	OX
Unit	/
Description	Oxidation factor (reflecting the amount of methane from SWDS that is oxidized in the soil or other material covering the waste)
Source of data	Conduct a site visit at the solid waste disposal site in order to assess the type of cover of the solid waste disposal site. Use the IPCC 2006 Guidelines for National Greenhouse Gas Inventories for the choice of the value to be applied.
Value(s) applied	0.1 for managed solid waste disposal sites that are covered with oxidizing material such as soil or compost. Use 0 for other types of solid waste disposal sites.

Choice of data or Measurement methods and procedures	/
Purpose of data	Calculation of baseline emissions
Additional comment	/

Data/parameter	F
Unit	/
Description	Fraction of methane in the SWDS gas (volume fraction)
Source of data	IPCC 2006 Guidelines for National Greenhouse Gas Inventories
Value(s) applied	0.5
Choice of data or Measurement methods and procedures	/
Purpose of data	Calculation of baseline emissions
Additional comment	This factor reflects the fact that some degradable organic carbon does not degrade, or degrades very slowly, under anaerobic conditions in the SWDS. A default value of 0.5 is recommended by IPCC.

Data/parameter	DOC_f
Unit	/
Description	Fraction of degradable organic carbon (DOC) that can decompose
Source of data	IPCC 2006 Guidelines for National Greenhouse Gas Inventories
Value(s) applied	0.5

Choice of data or Measurement methods and procedures	/
Purpose of data	Calculation of baseline emissions
Additional comment	/

Data/parameter	MCF
Unit	/
Description	Methane correction factor
Source of data	IPCC 2006 Guidelines for National Greenhouse Gas Inventories
Value(s) applied	Use the following values for MCF: • 1.0 for anaerobic managed solid waste disposal sites. These must have controlled placement of waste (i.e., waste directed to specific deposition areas, a degree of control of scavenging and a degree of control of fires) and will include at least one of the following: (i) cover material; (ii) mechanical compacting; or (iii) leveling of the waste. • 0.5 for semi-aerobic managed solid waste disposal sites. These must have controlled placement of waste and will include all of the following structures for introducing air to waste layer: (i) permeable cover material; (ii) leachate drainage system; (iii) regulating pondage; and (iv) gas ventilation system. • 0.8 for unmanaged solid waste disposal sites – deep and/or with high water table. This comprises all SWDS not meeting the criteria of managed SWDS and which have depths of greater than or equal to 5 meters and/or high water table at near ground level. Latter situation corresponds to filling inland water, such as pond, river or wetland, by waste.

	• 0.4 for unmanaged-shallow solid waste disposal sites. This comprises all SWDS not meeting the criteria of managed SWDS and which have depths of less than 5 metres.
Choice of data or Measurement methods and procedures	/
Purpose of data	Calculation of baseline emissions
Additional comment	The methane correction factor (MCF) accounts for the fact that unmanaged SWDS produce less methane from a given amount of waste than managed SWDS, because a larger fraction of waste decomposes aerobically in the top layers of unmanaged SWDS.

Data/parameter	DOC_j
Unit	/
Description	Fraction of degradable organic carbon (by weight) in the waste type j
Source of data	IPCC 2006 Guidelines for National Greenhouse Gas Inventories (adapted from Volume 5, Tables 2.4 and 2.5)
Value(s) applied	Apply the following values for the different waste types j:

Waste type j	DOC_j (% wet waste)
Wood and wood products	43
Pulp, paper and cardboard (other than sludge)	40
Food, food waste, beverages and tobacco (other than sludge)	15
Textiles	24
Garden, yard and park waste	20
Glass, plastic, metal, other inert waste	0

	If a waste type, prevented from disposal by the proposed project activity, can not clearly be attributed to one of the waste types in the table above, project participants should choose among the waste types that have similar characteristics that waste type where the values of DOCj and kj result in a conservative estimate (lowest emissions), or request a revision of / deviation from this methodology. For example, in the case of empty fruit bunches (EFB), as their characteristics are similar to wood in terms of cellulose, hemi-cellulose, and lignin content, the parameters correspondent of wood should be used.
Choice of data or Measurement methods and procedures	/
Purpose of data	Calculation of baseline emissions
Additional comment	According to 2nd FSR, page 10, wet waste is treated in the propose project

Data/parameter	k_j
Unit	/
Description	Decay rate for the waste type j
Source of data	IPCC 2006 Guidelines for National Greenhouse Gas Inventories (adapted from Volume 5, Table 3.3)
Value(s) applied	Apply the following default values for the different waste types j

Waste type j	Boreal and Temperate (MAT≤20°C)		Tropical (MAT>20°C)	
	Dry (MAP/PET <1)	Wet (MAP/PET >1)	Dry (MAP< 1000mm)	Wet (MAP> 1000mm)

Slowly degrading	Pulp, paper and cardboard (other than sludge), Textiles	0.04	0.06	0.045	0.07
	Wood, wood products and straw	0.02	0.03	0.025	0.035
Moderately degrading	Other (nonfood) organic putrescible garden, yard and park waste	0.05	0.10	0.065	0.17
Rapidly degrading	Food, food waste, sewage sludge, beverages and tobacco	0.06	0.185	0.085	0.40

NB: MAT – mean annual temperature, MAP – Mean annual precipitation, PET– potential evapotranspiration. MAP/PET is the ratio between the mean annual precipitation and the potential evapotranspiration.

If a waste type, prevented from disposal by the proposed project activity, can not clearly be attributed to one of the waste types in the table above, project participants should choose among the waste types that have similar characteristics that waste type where the values of DOCj and kj result in a conservative estimate (lowest emissions), or request a revision of / deviation from this methodology.

For example, in the case of empty fruit bunches (EFB), as their characteristics are similar to wood in terms of cellulose, hemi-cellulose, and lignin content, the parameters correspondent of wood should be used.

Choice of data or Measurement methods and procedures	/
Purpose of data	Calculation of baseline emissions

Additional comment	Document in the CDM-PDD the climatic conditions at the SWDS site (temperature, precipitation and, where applicable, evapotranspiration). Use long-term averages based on statistical data, where available. Provide references. The effective reference is not available; therefore, the conservative value is determined for each waste type.

Data/parameter	$EF_{grid,CM,y}$
Unit	tCO_2/MWh
Description	Combined margin CO_2 emission factor of East China Power Grid in year y
Source of data	China Electric Power Yearbook 2005-2007, China Energy Statistics Yearbook 2007, 2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value(s) applied	0.71694
Choice of data or Measurement methods and procedures	Officially released statistics; publicly accessible and reliable data source
Purpose of data	Calculation of baseline emissions
Additional comment	Based on combined margin calculation of OM and BM of East China Power Grid. Weighting of OM and CM are 0.25 and 0.75. This project uses fixed ex ante emission factor in the second crediting period.

Data/parameter	$TDL_{i,y}$
Unit	%
Description	Average technical transmission and distribution losses for providing electricity to source j in year y
Source of data	As per the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption"

Value(s) applied	20%
Choice of data or Measurement methods and procedures	Default value
Purpose of data	Calculation of baseline emissions
Additional comment	/

Data/parameter	$TDL_{k,y}$
Unit	%
Description	Average technical transmission and distribution losses for providing electricity to source k in year y
Source of data	As per the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption"
Value(s) applied	3%
Choice of data or Measurement methods and procedures	Default value
Purpose of data	Calculation of project emissions
Additional comment	/

D.2. Data and parameters monitored

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SDG 13

Data / Parameter	$\mathbf{LFG}_{electricity,y}$
Unit	m^3
Description	Amount of landfill gas combusted in power plant at Normal Temperature and Pressure
Source of data	Monthly records

Value(s) applied	43,211,617
Measurement methods and procedures	Flow meter
Monitoring frequency	Continuously measured, recorded every hour in daily record, accumulated every month and year in the monthly record.
QA/QC procedures	This amount of landfill gas is measured by flow meter. The flow meter is calibrated by national standard.
Purpose of data	Calculation of baseline emissions
Additional comment	/

Data / Parameter	w_{CH4}
Unit	%
Description	Methane fraction in the landfill gas
Source of data	Monthly records of methane fraction measured by methane analyser.
Value(s) applied	The hourly methane fraction is in the daily record, and averaged each month and each year in the monthly record.
Measurement methods and procedures	Methane Analyzer
Monitoring frequency	Measured and recorded every hour in the daily record, averaged in monthly record
QA/QC procedures	This methane fraction in the landfill gas is measured by the methane analyzer. This instrument is calibrated according national standard.
Purpose of data	Calculation of baseline emissions
Additional comment	/

Data / Parameter	**T**
Unit	°C
Description	Temperature of the landfill gas

Source of data	Daily records of temperature measured by temperature meter. In a certain period (a year or a month), the highest hourly value for temperature is used for calculation. This is also conservative.
Value(s) applied	The hourly temperature in the daily record.
Measurement methods and procedures	Temperature meter
Monitoring frequency	Continuously measured and recorded every hour in the daily record
QA/QC procedures	The temperature is measured by temperature meter. And the temperature meters (T1, T2) are calibrated by national standard.
Purpose of data	Calculation of baseline emissions
Additional comment	/

Data / Parameter	**P**
Unit	KPa
Description	Pressure of the landfill gas
Source of data	Daily record of pressure measured by pressure meter. In a certain period (a year or a month), the lowest hourly value for pressure is used for calculation. This is also conservative.
Value(s) applied	The hourly pressure in the daily record.
Measurement methods and procedures	Pressure meter
Monitoring frequency	Continuously measured and recorded every hour in the daily record
QA/QC procedures	The pressure is measured by pressure meter. The pressure meters (P1, P2) are calibrated by national standard.
Purpose of data	Calculation of baseline emissions
Additional comment	/

Data / Parameter	EL_{LFG}
Unit	MWh
Description	Net amount of electricity generated using LFG
Source of data	Calculated
Value(s) applied	53,601
Measurement methods and procedures	$EL_{LFG} = EL_{generation} - EL_{internal\ consumption}$
Monitoring frequency	Recorded monthly
QA/QC procedures	/
Purpose of data	/
Additional comment	Also used for SDG 7

Data / Parameter	$EL_{generation}$
Unit	MWh
Description	Electricity generation from the generator in the year y
Source of data	Measured by electricity meter (M1, M2, M3)
Value(s) applied	57,394.840
Measurement methods and procedures	It is monitored continuously and recorded on a monthly basis
Monitoring frequency	Continuously
QA/QC procedures	This electricity is measured by electricity meter for each generator. These instruments are considered as critical instruments in the QA/QC procedure. These meters are calibrated and maintained by power supply company.
Purpose of data	Calculation of baseline emissions
Additional comment	/

Data / Parameter	**EL** internal consumption

Unit	MWh
Description	Electricity imported from the grid in the year y. It includes the electricity consumption of the gas collection system.
Source of data	Measured by electricity meter (M5, M6)
Value(s) applied	3,793.560
Measurement methods and procedures	It is monitored continuously and recorded on a monthly basis
Monitoring frequency	Continuously
QA/QC procedures	These meters are calibrated and maintained by power supply company.
Purpose of data	Calculation of project emissions
Additional comment	/

Data / Parameter	Operation of the plant
Unit	hours
Description	Operation of the equipment that consumes LFG
Source of data	This operation hour is measured by TEM EVO System and recorded in monthly record.
Value(s) applied	In this monitoring period, the operation hours of each generator are as follows: 3# (01/04/2018-31/07/2020): 19,532 4# (01/04/2018-31/07/2020): 19,639 5# (01/04/2018-31/07/2020): 19,711
Measurement methods and procedures	TEM EVO System.
Monitoring frequency	Measured and recorded monthly, cumulated annually
QA/QC procedures	This operation hour is measured by TEM EVO System. This instrument is considered as critical instruments in the QA/QC procedure.
Purpose of data	This is monitored to ensure that methane destruction is claimed for methane used in electricity plant when it is operational.

Additional comment	/

SDG 8

Data / Parameter	Employment
Unit	/
Description	Number of people engaged
Source of data	Name list provided by HR
Value(s) applied	7 people are employed for the operation.
Measurement methods and procedures	People engaged during the fiscal year is recorded in the accounting system of the plant.
Monitoring frequency	Annually
QA/QC procedures	Payrolls of these employees are provided as evidence for contribution in employment of local people
Purpose of data	/
Additional comment	/

Data / Parameter	Human and institutional capacity
Unit	/
Description	Training
Source of data	Training records
Value(s) applied	The trainings in this monitoring period are summarized as follows:

No.	Date	Number of participants	Content
1	25/07/2018	6	Operation of main equipment
2	10/11/2018	6	Inspection rules for project equipment
3	19/03/2019	5	Prevention of occupational diseases, Everbright Group training, in total, 35 participants
4	15/04/2019	6	How to change lubricating oil and related accessories

	<table><tr><td>5</td><td>10/10/2019</td><td>6</td><td>How to adjust valves</td></tr><tr><td>6</td><td>16/01/2020</td><td>1</td><td>Biogas utilization workshop in Beijing</td></tr><tr><td>7</td><td>16/03/2020</td><td>6</td><td>Check and maintenance on LFG wells</td></tr></table>
Measurement methods and procedures	For each training, the training content are recorded, and each person attended signed the file.
Monitoring frequency	Annually
QA/QC procedures	/
Purpose of data	/
Additional comment	/

Other parameters from the approved renewed PDD

Data / Parameter	$R_{LFG, y}$
Unit	/
Description	The ratio between the LFG collected and the LFG used within the engines on average each year
Source of data	The actual layout of the entire collection pipelines
Value(s) applied	100%
Measurement methods and procedures	/
Monitoring frequency	Annually
QA/QC procedures	If there is no other way, such as flaring or venting, to treat the collected LFG besides generating electricity, this ratio can be nearly close to 100%, at least higher than 65%.
Purpose of data	/
Additional comment	The actual layout of the entire collection pipelines, which covers from the well to electricity generator, shows that all the collected landfill gas has been used to generate electricity.

Data / Parameter	Continuous Input & Grievance Expression Methods
Unit	/
Description	Methods for continuous input & grievance expression including: • Continuous Input/Grievance Expression Process Book • Telephone access • Internet/email access
Source of data	Expression book; telephone; email
Value(s) applied	The project information, contact person, email and telephone were published in local village, residence and company noticeboard. People could express their comments, grievance, and advice through telephone or writing. Besides, the project information was published on the web of https://www.southpole.com/gold-standard-and-other-stakeholder-consultations. Everyone could see this project. People could also put their comments directly to GS through the email of info@goldstandard.org Grievance book in Qizi village Project information published in local residence Project information on company noticeboard During this monitoring period, no comments were given on this project.
Measurement methods and procedures	/
Monitoring frequency	Each verification
QA/QC procedures	/
Purpose of data	/
Additional comment	/

D.3. Comparison of monitored parameters with last monitoring period

>>

Not applicable for non- Community Service Activities.

D.4. Implementation of sampling plan

>>

N/A

SECTION E. CALCULATION OF SDG IMPACTS

E.1. Calculation of baseline value or estimation of baseline situation of each SDG Impact

>>

SDG 13

$BE_y=BE_{CH4,y}+BE_{EC,y}$ (1)

BE_y	Baseline emission in this monitoring period	320,506	tCO_2
$BE_{EC,y}$	Baseline emission for electricity in year y	42,383	tCO_2
$BE_{CH4,y}$	Baseline emissions of methane from the SWDS in year y	278,123	tCO_2

$$BE_{EC,y}=\sum_k EC_{BL,k,y}\times EF_{EL,k,y}\times(1+TDL_{k,y})$$

(2)

Parameter	Description	Data	Unit
$BE_{EC,y}$	Baseline emission for electricity in year y	42,383	tCO_2
$EC_{BL,k,y}$	Quantity of electricity that would be consumed by the baseline electricity consumption source k in year y. In this project, the equavalent electricity is from ECPG.	57,394.84	MWh
$EF_{EL,k,y}$	Emission factor for electricity generation for source k in year y (tCO_2/MWh). In this project, it is EF of ECPG. $EF_{EL,k,y}=EF_{grid,CM,y}$	0.71694	tCO_2/MWh
$TDL_{k,y}$	Average technical transmission and distribution losses for providing electricity to source k in year y	3%	/

$$BE_{CH_4,y}=((1-OX_{top\_layer})\times F_{CH_4PJ,y}-F_{CH_4BL,y})\times GWP_{CH_4}$$

(3)

Parameter	Description	Data	Unit
$BE_{CH4,y}$	Baseline emissions of methane from the SWDS in year y	278,123	tCO_2
OX_{top_layer}	Fraction of methane in the LFG that would be oxidized in the top layer of the SWDS in the baseline	0.1	/

$F_{CH4,PJ,y}$	Amount of methane in the LFG which is flared and/or used in the project activity in year y	12,361	tCH_4
$F_{CH4,BL,y}$	Amount of methane in the LFG that would be flared in the baseline in year y. No requirement in the baseline,therefor, it is 0.	0	tCH_4
GWP_{CH4}	Global warming potential of CH_4	25	tCO_2/tCH_4

$$F_{CH4,PJ,y}=F_{CH4,flared,y}+F_{CH4,EL,y} \quad (4)$$

Parameter	Description	Data	Unit
$F_{CH4,flared,y}$	Amount of methane in the LFG which is destroyed by flaring in year y	0	tCH_4
$F_{CH4,EL,y}$	Amount of methane in the LFG which is used for electricity generation in year y. The amount of methane is calculated according to the record of landfill gas pressure, temperature, and methane fraction. The calculation is shown the following equation (5)	12,361	tCH_4

$$F_{CH4,EL,y}=LF_{Gelectricity,y}*W_{CH4}*P_1*T_0*\rho_0/(P_0*T_1) \quad (5)$$

$LFG_{electricity}$	Amount of landfill gas combusted in power plant (m^3)
W_{CH4}	Methane fraction in the landfill gas (m^3 CH_4/m^3 LFG)
P_1	Pressure of collected landfill gas (kPa)
T_0	Temperature under standard condition，0 degree Celsius
ρ_0	Density of methane under standard condition, 0.0007168t/m^3
P_0	Pressure under standard condition (101.3 kPa)
T_1	Temperature of collected landfill gas, degree Celsius

SDG7

Baseline situation is 0 MWh.

SDG8

No persons employed and no trainings provided to the employed.

E.2. Calculation of project value or estimation of project situation of each SDG Impact

>>

SDG 13

$PE_y = PE_{EC,y} + PE_{FC,y} + PE_{DT,y}$ (6)

Parameter	Description	Data	Unit
PE_y	Project emissions in year y	3,264	tCO_2
$PE_{EC,y}$	Emissions from consumption of electricity due to the project activity in year y	3,264	tCO_2
$PE_{FC,y}$	Emissions from consumption of fossil fuel due to the project activity, for purpose other than electricity generation, in year y. There is no fossil fuel in the project.	0	tCO_2
$PE_{DT,y}$	Emissions from the distribution of compressed/liquefied LFG using trucks, in year y. No distribution of compressed/liquefied FLG using trucks in the project.	0	tCO_2

$$PE_{EC,y} = \sum_j EC_{PJ,j,y} \times EF_{EL,j,y} \times (1+TDL_{j,y}) \quad (7)$$

Parameter	Description	Data	Unit
$PE_{EC,y}$	Emissions from consumption of electricity due to the project activity in year y	3,264	tCO_2
$EC_{PJ,j,y}$	Quantity of electricity consumed by the project electricity consumption source j in year y	3,793.56	MWh
$EF_{EL,j,y}$	Emission factor for electricity generation for source j in year y	0.71694	tCO_2/MWh
$TDL_{j,y}$	Average technical transmission and distribution losses for providing electricity to source j in year y	20%	/

SDG7

53,601 MWh of renewable energy provided by the project

$EL_{LFG} = EL_{generation} - EL_{internal\ consumption}$ (8)

Parameter	Description	Data	Unit
EL_{LFG}	Net amount of electricity generated using LFG	53,601	MWh
$EL_{generation}$	Electricity generation from the generator in the year y	57,394.840	MWh
$EL_{internal\ consumption}$	Electricity imported from the grid in the year y	3,793.560	MWh

SDG8

7 permanent employment provided and trainings provided to the employed.

E.3. Calculation of leakage

>>

N/A

E.4. Calculation of net benefits or direct calculation for each SDG Impact

SDG	SDG Impact	Baseline estimate	Project estimate	Net benefit
13	Emissions Reductions (VER)	320,506	3,264	317,242
7	MWh of renewable energy generated	0	53,601	53,601
8	Number of jobs created	0	7	7

E.5. Comparison of actual SDG Impacts with estimates in approved PDD

SDG	Values estimated in ex ante calculation of approved PDD for this monitoring period	Actual values[1] achieved during this monitoring period
13	**303,945**	**317,242**

[1] Whenever emission reductions are capped, both the original and capped values used for calculations must be transparently reported. Use brackets to denote original values.

7	**58,406**	**53,601**
8	**N/A**	**7**

E.5.1. Explanation of calculation of value estimated ex ante calculation of approved PDD for this monitoring period

>>

SDG 13

The ERs in the registered renewed PDD is:

2018: 136,478 tCO_2

2019: 129,455 tCO_2

2020: 122,804 tCO_2

This monitoring period is from 01/04/2018 to 31/07/2020. From 01/04/2018 to 31/12/2018, there are 275 days. From 01/01/2020 to 31/07/2020, there are 213 days. Therefore, the ex-ante estimation for this monitoring period is:

136,478*275/365+129,455 +122,804*213/365 = 303,945 tCO_2

SDG 7

In the registered renewed PDD, the exported electricity is estimated to be 24,992 MWh a year on average. This monitoring period is from 01/04/2018 to 31/07/2020 and there are 853 days. Therefore, the ex-ante estimation for this monitoring period is: 24,992 *853/365 = 58,406 MWh

E.6. Remarks on increase in achieved SDG Impacts from estimated value in approved PDD

>>

There is a slight increase in SDG 13 during this monitoring period, i.e., the actual emission reduction is 4.37% above the estimated one in approved PDD.

For LFG power project, with many external factors affecting the amount and quality of LFG generated, including weather, waste status, 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 approved PDD, 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. Therefore, the increase less than 5% is reasonable and acceptable for LFG power project.

In addition, comparing the actual emission reduction since the start of the 2nd crediting period, 786,911 tCO_2, including 469,669 tCO_2 from 22/04/2014 to 31/03/2018 and 317,242 tCO_2 for the monitoring period, with the estimated value in the approved PDD, 870,991 tCO_2, there actually is a decrease of 9.65%.

SECTION F. SAFEGUARDS REPORTING

>>
Besides GHG emission reductions, implementation of the project also has other advantages over baseline scenario in terms of impacts on air quality. By installation of the landfill gas processing unit, the emissions of H_2S, NH_3 and other gases are prevented. The wastewater from the project are properly treated. Therefore, no significant change comparing with baseline, in terms of water quality and quantity. No significant change comparing with baseline for noise.

The project meets the following environment standards during operation:
-Air Quality Standard (GB16297-1996)
-Aquatic Environment standard (GB/T14848-2017)
-Noise Controlling Standard (GB12348-2008)

The monitoring and reporting are as below.

Data / Parameter	AQ_y
Unit	N/A
Description	Air quality
Source of data	Test Report by authorized third party
Value(s) applied	On 28/11/2018, the air condition of each generator was monitored by Suzhou Guohuan Environment Detection Co., Ltd. and the monitoring results met with standard of GB16297-1996 "Comprehensive emission standard of air pollutants".

	On 24/04/2019, the air condition of each generator was monitored by Kang Da Testing Technology (Jiangsu) Co., Ltd. and the monitoring results met with standard of GB16297-1996 "Comprehensive emission standard of air pollutants". On 04/03/2020, the air condition of each generator was monitored by Kang Da Testing Technology (Jiangsu) Co., Ltd. and the monitoring results met with standard of GB16297-1996 "Comprehensive emission standard of air pollutants".
Measurement methods and procedures	Monitored by third party
Monitoring frequency	Annually
QA/QC procedures	Monitored by third party
Purpose of data	/
Additional comment	/

Data / Parameter	WQ_y
Unit	N/A
Description	Water quality
Source of data	Test Report of Environment Check Accept from Local Environment Protection Agency.
Value(s) applied	On 23/05/2018, the underground water was monitored by Kang Da Testing Technology (Jiangsu) Co., Ltd. and the water complied with "GB/T14848-2017 quality standard of underground water". On 10/04/2019, the underground water was monitored by Kang Da Testing Technology (Jiangsu) Co., Ltd, and the water complied with "GB/T14848-2017 quality standard of underground water". On 22/05/2020, the underground water was monitored by Kang Da Testing Technology (Jiangsu) Co., Ltd, and the water complied with "GB/T14848-2017 quality standard of underground water".
Measurement methods and procedures	Monitored by third party

Monitoring frequency	Annually
QA/QC procedures	The water quality was monitored by qualified third party.
Purpose of data	/
Additional comment	/

Data / Parameter	Other pollutant
Unit	N/A
Description	Noise
Source of data	Test Report of Environment Check Accept from Local Environment Protection Agency
Value(s) applied	On 23/05/2018, the boundary noise (both daily and night) was monitored by Kang Da Testing Technology (Jiang Su) Co., Ltd. and it complied with GB12348-2008 Industrial Enterprise Boundary Noise Standard. On 28/04/2019, the boundary noise (both daily and night) was monitored by Kang Da Testing Technology (Jiang Su) Co., Ltd. and it complied with GB12348-2008 Industrial Enterprise Boundary Noise Standard. On 19/06/2020, the boundary noise (both daily and night) was monitored by Kang Da Testing Technology (Jiang Su) Co., Ltd. and it complied with GB12348-2008 Industrial Enterprise Boundary Noise Standard.
Measurement methods and procedures	Monitored by third party
Monitoring frequency	Annually
QA/QC procedures	Monitored by qualified third party.
Purpose of data	/
Additional comment	/

SECTION G. STAKEHOLDER INPUTS AND LEGAL DISPUTES

G.1. List all Inputs and Grievances which have been received via the Continuous Input and Grievance Mechanism together with their respective responses/mitigations.

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The PO has implemented continuous input / grievance mechanism expression process, as discussed with local stakeholders. No inputs/grievances received for the project during this monitoring period. The details about the continuous Input and Grievance Mechanism, refer to parameter "Continuous Input & Grievance Expression Methods" in section D.2.

G.2. Report on any stakeholder mitigations that were agreed to be monitored.

>>

No inputs/grievances received for the project during the monitoring period.

G.3. Provide details of any legal contest that has arisen with the project during the monitoring period

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No legal contest or dispute that has arisen with the project during the monitoring period.

Revision History

Version	Date	Remarks
1.1	14 October 2020	Hyperlinked section summary to enable quick access to key sections Improved clarity on Key Project Information Section for POA monitoring Forward action request section Improved Clarity on SDG contribution/SDG Impact term used throughout Clarity on safeguard reporting Clarity on design changes Leakage section added for VER/CER projects Addition of Comparison of monitored parameters with last monitoring period Provision of an accompanying Guide to help the user understand detailed rules and requirements
1.0	10 July 2017	Initial adoption