



**Verified Carbon
Standard**

NANHAI MSW INCINERATION II PROJECT



Document Prepared By LGAI Technological Center, S.A. (Applus+
Certification)

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Summary:

LGAI Technological Center, S.A. (hereafter referred to as “Applus+ Certification”) has been commissioned by Climate Bridge Ltd. to perform the verification of greenhouse gas emission reductions of the project activity “Nanhai MSW Incineration II Project” (VCS Ref. No. 2098, hereafter referred to as “the project activity”) reported in the monitoring report /1/ during monitoring period 01/06/2011 to 31/12/2018¹.

The project activity has been validated by GLC based on the CDM PDD /3/ version 11 dated 06/01/2012 and reported in the validation report No. 008008 /4/, version 11, completed on 19/01/2012. The project activity was registered as a CDM project activity on 27/02/2012 which is available at <https://cdm.unfccc.int/Projects/DB/Germanischer1317298382.09/view>. A gap validation was performed by Applus+ Certification which is available at <https://registry.terra.org/app/projectDetail/VCS/2098>.

The project activity is an MSW incineration project located at Shougouling, Shishan Forestry Centre, Shishan Town, Nanhai District, Foshan City, Guangdong Province, People’s Republic of China which is to use MSW resource for electricity generation. The installed capacity of the project activity is 40 MW, consisting of 3 set of 500t/d mechanical grate incinerators matched with two sets of 15 MW steam turbine and two sets of 20 MW generators. The project will process 495,000 tons of MSW every year. The average annual power generated by the project is expected to be 168,655 MWh of which 134,924 MWh will be exported to the grid. The Project can reduce GHG emissions by replacing the electricity generated by fossil fuel fired power plants of South China Power Grid (SCPG). Meanwhile by combusting MSW that would otherwise be disposed of at landfill, the project activity avoids the emission of methane that would be generated under landfill condition. It’s estimated that the proposed project could achieve GHG emission reductions of 212,736 tCO₂e annually in this crediting period.

The purpose and scope of this verification is to ensure that reported emission reductions are complete and accurate in accordance with applicable VCS standards and relevant UNFCCC requirements in order to be certified.

¹ A exemption has been made from VERRA which allow the verification exceeds the limitation for 6 consecutive years. Moreover, the PP has given up emission reductions generated from 01/06/2011 to 26/02/2012. As during this period, the project was under normal operation, therefore, it is eligible for the project owner to consider the emission reductions in this period as zero. And ERs generated from 27/02/2012 to 28/02/2015 has been issued under CDM, which has been considered as zero also under VERRA.

A desk review and a site visit have been conducted to verify the data submitted in the monitoring report /1/. Applus+ Certification confirms the following has been reviewed:

- Monitoring plan included in the registered VCS PD /3/, version 3.0, dated 20/05/2020;
- Validation report No. 008008 /4/, version 11, completed on 19/01/2012 by GLC;
- Gap Validation report No. A+SH_SYST_VCS_GAP VAL_2620 /4/, completed on 20/05/2020 by Applus+ Certification;
- Approved methodology, AM0025 /9/, version 12.0, dated 13/08/2010;
- VCS standards and guidance version 4.0, as well as relevant UNFCCC requirements;
- All information and references relevant to the project activity's resulting in emission reductions.

During this verification, no finding was identified related to the monitoring, implementation or operations of the project activity in relation to relevant VCS standards, guidance and UNFCCC requirements and relevant host party criteria and the applied baseline and monitoring methodology etc.

Applus+ Certification confirms that the project is implemented in accordance with the registered PD /3/. The monitoring plan complies with the applied methodology AM0025 /7/ version 12.0 and the monitoring has been carried out in accordance with the monitoring plan in the registered PD /3/. The monitoring system is in place and the emission reductions are calculated without material misstatements. The level of assurance of the verification is reasonable. Our opinion relates to the projects GHG emissions and the resulting GHG emission reductions reported and related to the valid and registered project baseline and monitoring and its associated documents. Based on the information reviewed and evaluated Applus+ Certification confirms that the implementation of the project has resulted in 960,750 tCO₂e emission reductions during period 01/06/2011 to 31/12/2018.

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1 INTRODUCTION

1.1 Objective

LGAI Technological Center, S.A. (Applus+ Certification) has been commissioned by Climate Bridge Ltd. to perform the verification of greenhouse gas emission reductions of the project activity “Nanhai MSW Incineration II Project” (VCS Ref. No. 2098) reported in the Monitoring Report /1/ during monitoring period 01/06/2011 to 31/12/2018.

LGAI Technological Center, S.A. (Applus+ Certification) as the verification body of the project activity has been accredited as a DOE by UNFCCC and also meets the competence requirements as set out in ISO 14065:2007.

The objective of verification is to have an independent review and ex post determination by a Designated Operational Entity (DOE) of the monitored reductions in GHG emissions that have occurred as a result of the registration of VCS project. Certification is the written assurance by the DOE that, during a specific time period, a proposed VCS project activity achieved the reductions in anthropogenic emissions by sources of GHGs as verified.

The objective of this verification/certification is to verify and certify emission reductions, reported for the “Nanhai MSW Incineration II Project” in China for the period 01/06/2011 to 31/12/2018.

1.2 Scope and Criteria

The verification scope is defined as an independent and objective review of the registered PD, the Project’s baseline study and Monitoring Report (MR) and other relevant documents. The information in these documents is reviewed against VCS Version 4.0 requirements, UNFCCC rules and associated interpretations.

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

1.3 Level of Assurance

The verification report is based on the VCS-PD, the VCS Monitoring Report (MR), supporting evidences made available to the verifier and information collected through performing interviews and during the on-site assessment.

The verification conclusion is assured a reasonable level of assurance.

1.4 Summary Description of the Project

Project title	Nanhai MSW Incineration II Project
VCS reference number	2098
Project Participants	Foshan Nanhai Green Renewable Energy Co., Ltd. (Project Owner, host country, P. R. China) Climate Bridge Ltd. (VER Buyer, United Kingdom of Great Britain and Northern Ireland) Climate Bridge Ltd. (VER Buyer, Netherlands)
Location of the project	Shougouling, Shishan Forestry Centre, Shishan Town, Nanhai District, Foshan City, Guangdong Province, People's Republic of China Geographic coordinates: Longitude: 113.0328° E Latitude: 23.1575° N
Project start date	Construction start date: 08/05/2009 Operation start date: 01/06/2011
Version of VCS PD or CDM PDD	Version 11, dated 06/01/2012 (CDM PDD) Version 3.0, dated 20/05/2020 (VCS PD and basis for verification)
Monitoring period	01/06/2011 to 31/12/2018
First monitoring report	Version 1.0, dated 20/07/2020
Final monitoring report	Version 3.0, dated 01/09/2020
Applied Methodology/Version	AM0025, version 12.0, dated 13/08/2010
Scope/Technical Area	1/1.1

	13/13.1
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The project activity is an MSW incineration project located at Shougouling, Shishan Forestry Centre, Shishan Town, Nanhai District, Foshan City, Guangdong Province, People's Republic of China which is to use MSW resource for electricity generation. The installed capacity of the project activity is 40 MW, consisting of 3 set of 500t/d mechanical grate incinerators matched with two sets of 15 MW steam turbine and two sets of 20 MW generators. The project will process 495,000 tons of MSW every year. The average annual power generated by the project is expected to be 168,655 MWh of which 134,924 MWh will be exported to the grid. The Project can reduce GHG emissions by replacing the electricity generated by fossil fuel fired power plants of South China Power Grid (SCPG). Meanwhile by combusting MSW that would otherwise be disposed of at landfill, the project activity avoids the emission of methane that would be generated under landfill condition. It's estimated that the proposed project could achieve GHG emission reductions of 212,736 tCO₂e annually in this crediting period.

The project activity has been validated by GLC based on the CDM PDD /3/ version 11 dated 06/01/2012 and reported in the validation report No. 008008 /4/, version 11, completed on 19/01/2012. The project activity was registered as a CDM project activity on 27/02/2012 which is available at <https://cdm.unfccc.int/Projects/DB/Germanischer1317298382.09/view>. A gap validation was performed by Applus+ Certification which is available at <https://registry.terra.org/app/projectDetail/VCS/2098>.

2 VERIFICATION PROCESS

2.1 Method and Criteria

Verification was conducted using Applus+ Certification's procedures in line with the requirements specified in the VCS Standard version 4.0, CDM M&P, the latest version of the CDM Validation and Verification Standard, and relevant UNFCCC requirements and applying standard auditing techniques.

Applus+ Certification completed a strategic review and risk assessment of the projects activities and processes in order to gain a full understanding of:

- Activities associated with all the sources contributing to the project emissions and emission reductions, including leakage if relevant;
- Protocols used to estimate or measure GHG emissions from these sources;
- Collection and handling of data;
- Controls on the collection and handling of data;
- Means of verifying reported data; and
- Compilation of the monitoring report.

Applus+ Certification verified the implementation of the monitoring plan and the data presented in the Monitoring Report /1/ for the period in question. This involved a site visit and a desk review of the Monitoring Report. This Verification Report describes the findings of this assessment.

The information of the assessment team is included in below:

Assessment team

According to the sectoral scopes / technical area and experiences in the sectoral or national business environment, Applus+ Certification has composed a project assessment team in accordance with the appointment rules in Applus+ Certification. The composition of assessment team has to be approved by the Applus+ Certification ensuring that the required skills are covered by the team. The four qualification levels for team members that are assigned by formal appointment rules as below:

- Leader Auditor (LA)
- Auditor (A)/ Auditor Trainee (AiT)

- Technical Reviewer (TR)
- Technical Experts (TE)

Name	Qualification	Coverage of scope	Coverage of Technical Area	Host country experience
<i>Denny Xue</i>	<i>LA/TE</i>	<i>Y (1.2)</i>	<i>Y</i>	<i>Y</i>
<i>Simon Shen</i>	<i>TR</i>	<i>Y (1.2)</i>	<i>Y</i>	<i>Y</i>

Denny Xue (Master Degree in Environmental Engineering, Bachelor Degree in Thermal Engineering) is a lead auditor appointed by Applus+ Certification for the GHG project assessment. He is based on Shanghai. He has 1.5 years of work experiences in CDM project development. Before he joined Applus+ Certification, he has been worked for Shanghai Chuanji Investment and Management which is a CDM consultancy company as a project manager for CDM project development.

Simon Shen (Master Degree in Thermal Energy Engineering, Bachelor Degree in Environmental Engineering) is a Lead Auditor appointed by Applus+ Certification for the GHG project assessment. He is based in Shanghai. He has several years of work experience in environmental protection field. Before he joined Applus+ Certification, he had been worked for TÜV SÜD as a GHG Validator/Assessment team and ISO 9001/14001 Lead Auditor for 3.5 years.

2.2 Document Review

The VCS monitoring report /1/ version 1.0 dated 20/07/2020, version 3.0 dated 01/09/2020 and the emission reduction calculations spreadsheet /2/, were assessed as part of the verification. In addition, the registered PD /3/ version 3.0 dated 20/05/2020 in particular the baseline estimations and the monitoring plan, the CDM validation report /04/ version 11 dated 19/01/2012 and the gap validation report /4/ version 01.2 dated 20/05/2020, as well as relevant documents, were reviewed. A detailed documents reviewed are listed in Appendix 1 of the report.

2.3 Interviews

The key personnel interviewed are summarized in the table below:

Interviewed personnel	Role	Organization	Subject
Mr. Wang Wen	Vice General Manager	Foshan Nanhai Green Renewable Energy Co., Ltd.	Operation of the project activity; Implementation of the monitor plan of the project activity; Data collection and data achievement; Calibration of meters and equipment maintenance.
Mr. Liu Lvexuan	Manager assistant	Foshan Nanhai Green Renewable Energy Co., Ltd.	
Mr. Tan Yonghua	Engineer	Foshan Nanhai Green Renewable Energy Co., Ltd.	
Ms. Chen Genrong	Project Manager	Climate Bridge Ltd.	Data collection and ER calculation.

2.4 Site Inspections

The assessment team performed the on-site verification (Shougouling, Shishan Forestry Centre, Shishan Town, Nanhai District, Foshan City, Guangdong Province, People's Republic of China) on 03-04/08/2020. The interviewed personnel and objective are listed in above table.

2.5 Resolution of Findings

As an outcome of the verification process, the team can raise different types of findings.

Where a non-conformance arises the assessment team shall raise a Corrective Action Request (CAR). A CAR is issued, where:

- Non-compliance with the monitoring plan or methodology are found in monitoring and reporting and has not been sufficiently documented by the project participants, or if the evidence provided to prove conformity is insufficient;
- Modifications to the implementation, operation and monitoring of the project activity has not been sufficiently documented by the project participants;

c) Mistakes have been made in applying assumptions, data or calculations of emission reductions that will impact the quantity of emission reductions;

d) Issues identified in a FAR during validation to be verified during verification or previous verification(s) have not been resolved by the project participants.

The assessment team shall raise a Clarification Request (CL) if information is insufficient or not clear enough to determine whether the applicable CDM requirements have been met.

All CARs and CLs raised during verification shall be resolved prior to submitting a request for issuance.

There is no CARs and CLs raised for this monitoring period for the project.

2.5.1 Forward Action Requests

None FAR was raised during the verification process. Also there are no remaining from former verification and validation.

2.6 Eligibility for Validation Activities

Not applicable as LGAI Technological Center, S.A. holds the accreditation for the validation and verification for projects under scope 1.

3 VALIDATION FINDINGS

3.1 Participation under Other GHG Programs

Through reviewing the registered PDD /3/ and validation and verification report /4/, it was validated that the project has been registered as a CDM project with reference No. 5297 first which is available at <https://cdm.unfccc.int/Projects/DB/Germanischer1317298382.09/view>. Then the project has been registered as VCS project which is available at <https://registry.verra.org/app/projectDetail/VCS/2098>. The project does not participate in the other emissions trading program by checking public information on Internet, interviewing with project owner and statement issued by project owner.

During the period from 01/06/2011 to 31/05/2021 as the first VCS crediting period, the project would claim only for VCU or CERs. But both VCS and CERs will not be claimed in the same period. During the period from 27/27/2012 to 28/02/2015, the project has applied for the issuance of CERs under CDM mechanism.

Therefore, Applus+ Certification consider the project is eligible to participate under the VCS Program as there is no double counting for the emission reduction during any period.

3.2 Methodology Deviations

Not applicable as not deviation for methodology.

3.3 Project Description Deviations

In the registered VCS PD, the monitoring equipment of parameter of “ $A_{msw,y}$ ” which is weighing machine should be calibrated every 3 months. However according to the industrial regulation of “Digital Indicating Weighing Instruments (JJG539-2016)”, the calibration frequency for digital displayed scale is once a year. Therefore, during this monitoring period, the calibration frequency of weighing machine has been revised annually in line with industrial regulation.

Moreover, there is a deviation regarding to the monitoring of W_x (total amount of organic waste prevented from disposal in year x). Based on registered CDM PDD (version 11), the W_x should be the same with $A_{MSW,y}$ and A_i . However, during this monitoring period, for conservative manner, W_x is calculated as $A_{MSW,y}$ multiplied by $P_{n,j,y}$ (95% confidence level low) used for calculation of base line emission. Meanwhile A_i is calculated as $A_{MSW,y}$ multiplied by $P_{n,j,y}$ (95% confidence level high), used for calculation of project emission, this approach is the same as pervious verification and considered as conservative.

The deviations of project description will not affect the nature and monitoring accuracy of the project.

3.4 Grouped Project

Not applicable as not a grouped project.

4 VERIFICATION FINDINGS

4.1 Project Implementation Status

By means of on-site visit, the assessment team confirms that all physical features of the proposed CDM project activity proposed in the registered VCS PD /3/ are in place and the PP has operated the project as per registered VCS PD /3/. The installed capacity of the project activity is 40 MW, consisting of 3 set of 500t/d mechanical grate incinerators matched with two sets of 15 MW steam turbine and two sets of 20 MW generators. The project will process 495,000 tons of MSW every year. The average annual power generated by the project is expected to be 168,655 MWh of which 134,924 MWh will be exported to the grid. The Project can reduce GHG emissions by replacing the electricity generated by fossil fuel fired power plants of South China Power Grid (SCPG). Meanwhile by combusting MSW that would otherwise be disposed of at landfill, the project activity avoids the emission of methane that would be generated under landfill condition. The construction of the project started on 08/05/2009, the project started operation on 01/06/2011 verified by checking information on the UNFCCC website. There are no changes on the key equipment and technology since the validation of the project. No special event which would affect the monitoring of the project has been observed during the monitoring period.

The project activity would contribute sustainable development in the region in following aspects confirmed by site visit:

- (1) Reduce GHG emission compared to common practice.
- (2) Relieve the pressure of power demand, and improve the innovation in urban resource integrated utilization sector.
- (3) Provide a solution to local MSW sanitary treatment.
- (4) Reduce pollutant release in power sector, compared to common practice.
- (5) Create job opportunities for local government during the construction and operation of the project.

The technical parameters have been verified with the nameplates /9 / as below:

Technical parameters of the equipment:

Items	Parameters	Unit
Incinerator		
Quantity	3	set

Type	Reciprocating mechanical grate incinerator	
Treatment capacity	500	ton
Annual operation time	≥8,000	hour
Service life of the Grate	15	year
Boiler		
Quantity	3	set
Type	CG-500-50.5/4.0/400-LJ	
Annual operation time	≥8,000	hour
Pressure of the superheated steam	4	MPa
Temperature of the superheated steam	400	°C
Efficiency	≥80	%
Service life	31	year
Steam-turbine Generator		
Steam-turbine		
Quantity	2	set
Type	N15-3.8/395	
Rated power	15	MW
Service year	≥30	year
Generator		
Quantity	2	set
Type	QF ₂ W-20-2	

Rated power	20	MW
Rated voltage	10.5	kV
Rotational speed	3,000	r/min
Power factor	0.8	
Efficiency	97.4	%
Service life	≥30	years

By comparing the actual ER claimed in this monitoring period with the estimate in the registered PD, the actual emission reductions (960,750 tCO₂e) are lower than what is stated in the registered PD (i.e. 969,873 tCO₂e, based on the estimated value of ER indicated in the registered PD) which surely will not lead to the overestimation of VERs².

The assessment team confirmed that there is no proposed or actual change to the project design during this monitoring period.

All required equipments and procedures are available and implemented in an appropriate manner.

All necessary monitoring instruments are installed. All required instruments including standby and operating procedures for the same have been implemented in an appropriate manner.

The project is completely operational and the same has been confirmed on-site. Neither mistakes nor malfunction on main meters have been observed during this monitoring period.

4.2 Safeguards

4.2.1 No Net Harm

By checking the EIA summary and conclusion provided in the registered PD, it is confirmed that the impact caused by MSW project on the surrounding ecosystem and residents, water, and atmosphere etc. is very little, there would be no net harm caused due to the project activity. Also, the EIA of the project are approved by the government.

Also, no potential environment or social economic matter was found during the site visit. The project is MSW project and thus no net harm observed in air or water quality on-site.

4.2.2 Local Stakeholder Consultation

The local stakeholder's meeting was held in Nanhai on 04/03/2009. 40 participants attended the meeting including local residents, builders and members of the local authorities. The project owner introduced the proposed project, and then a survey was arranged through a one-page questionnaire, which was designed to be easily filled in. The opinions expressed by the stakeholders were recorded and are available on request.

The stakeholder meeting and the survey showed that the proposed project receives strong support from the local community. They all believe the proposed project will promote local economic development and agree with the project development and construction.

Communications with Local stakeholders was being carried out at periodic intervals. There are no negative comments received for the project.

All such conclusion has been verified through site visit and check registered PD.

4.3 AFOLU-Specific Safeguards

Not applicable as non-AFOLU project.

4.4 Accuracy of GHG Emission Reduction and Removal Calculations

The monitoring has been carried out in accordance with the monitoring plan contained in the registered PD /3/.

The PP voluntarily gives up the emission reductions generated during period from 01/06/2011 to 26/02/2012. And ERs generated from 27/02/2012 to 28/02/2015 has been issued under CDM. The value of following parameters does not include both above periods.

All parameters were monitored and determined as per the monitoring plan which is listed in below table:

Data / Parameter:	$F_{cons,y}$										
Data unit:	The mass or volume of the fuel consumed										
Description:	Amount of fuel consumed on-site during year y within the crediting period										
Purpose of the data:	Calculation of project emissions										
Parameter value:	312.754										
Source of data used:	Amount of fuel consumed on-site during year y within the crediting period ($F_{cons,y}$) are all sourced from CDM Monthly Report /10/ issued by the project owner.										
Information flow:	1 gauge height meter was installed at project site to monitor continuously, recorded daily and archived monthly in the system in form of CDM Monthly Report /10/ which is consistent with methodology and registered PD. Also, Fuel purchase invoices /16/ would be used for crosscheck. The data for CDM Monthly Report and Fuel purchase invoices has been sent to the CDM consulting company for reporting of GHG emission reduction.										
Monitoring method, frequency and equipments:	The parameter was monitor continuously, recorded daily and archived monthly by 1 gauge height meter installed at project site. See below for the information of 1 gauge height meter verified by site visit and checking calibration certificates /12/: <table border="1"> <thead> <tr> <th>Meter</th><th>Type</th><th>Serial Number</th><th>Accuracy</th></tr> </thead> <tbody> <tr> <td> </td><td> </td><td> </td><td> </td></tr> </tbody> </table>			Meter	Type	Serial Number	Accuracy				
Meter	Type	Serial Number	Accuracy								

² The comparison only cover the monitoring period from 01/03/2015 to 31/12/2018.

	<table><tr><td>Gauge height meter</td><td>EJA100a</td><td>S4L8C06352</td><td>0.1%</td></tr></table>	Gauge height meter	EJA100a	S4L8C06352	0.1%
Gauge height meter	EJA100a	S4L8C06352	0.1%		
	The type, serial number and accuracy have been confirmed by site visit.				
Calibration:	The calibration information is shown as below /12/:				
	Meter		Calibration date	Valid until	
	Gauge height meter	15/11/2014	14/11/2015		
		15/11/2015	14/11/2016		
		15/11/2016	14/11/2017		
		15/11/2017	14/11/2018		
		15/11/2018	14/11/2019		
The calibration was conducted by accredited third parties which are Foshan Supervision Testing Centre of Quality and Metrology /13/ which was accredited by Guangdong Technical and Quality Supervision Bureau valid from 07/08/2009 to 31/12/2019.					
QA/QC procedure:	Data record will be archived for a period of 2 years after the crediting period to which the records pertain.				
Means of verification:	Data of the parameter was verified by checking CDM Monthly Report and Fuel purchase invoices. All data is in line with CDM Monthly Report and Fuel purchase invoices;				
	Information flow was verified by checking CDM Monthly Report and Fuel purchase invoices, and all information are consistent;				
	Monitoring method was verified by site visit, checking calibration certificates, all monitoring method meets the description in the PD;				
	Calibration was verified by checking calibration certificate, all calibration of monitoring equipment meets the requirement indicated in the PD.				

Data / Parameter:	-
Data unit:	MJ
Description:	Energy generated by auxiliary fossil fuel added in the incinerator
Purpose of the data:	Calculation of project emissions
Parameter value:	13,845,620
Source of data used:	Energy generated by auxiliary fossil fuel added in the incinerator are calculated based on Amount of fuel consumed on-site during year y within the crediting period ($F_{cons,y}$) and Net calorific value of fuel (NCV_{fuel}) as below: $F_{cons,y} * NCV_{fuel} = 312.754 \text{ (ton)} * 44.27 \text{ (MJ/kg)} = 13,845,620 \text{ MJ}$

Information flow:	Energy generated by auxiliary fossil fuel added in the incinerator are calculated based on Amount of fuel consumed on-site during year y within the crediting period ($F_{\text{cons},y}$) and Net calorific value of fuel (NCV_{fuel}) as below: $F_{\text{cons},y} * \text{NCV}_{\text{fuel}} = 312.754 \text{ (ton)} * 44.27 \text{ (MJ/kg)} = 13,845,620 \text{ MJ}$ Moreover, the fraction of energy generated by fossil fuel has been determined by Amount of fuel consumed on-site during year y within the crediting period ($F_{\text{cons},y}$) and Amount of electricity generated utilizing the combustion heat from incineration in the project activity displacing electricity in the baseline during the year y ($\text{EG}_{d,y}$), it is obvious that the fraction of energy generated by fossil fuel is far lower than the requirement which is 50%.
Monitoring method, frequency and equipments:	Not applicable
Calibration:	Not applicable
QA/QC procedure:	Data record will be archived for a period of 2 years after the crediting period to which the records pertain.
Means of verification:	Data of the parameter was verified by checking CDM Monthly Report, Fuel purchase invoices and ETNs. All data is in line with CDM Monthly Report, Fuel purchase invoices and ETNs; Information flow was verified by checking CDM Monthly Report, Fuel purchase invoices and ETNs, and all information are consistent.

Data / Parameter:	EF
Data unit:	Fraction
Description:	Combustion efficiency for waste
Purpose of the data:	Calculation of project emissions
Parameter value:	100%
Source of data used:	Combustion efficiency for waste (EF) is sourced from IPCC. No country or project specific data are available. Therefore, using 2006 IPCC Guidelines for default value.
Information flow:	Combustion efficiency for waste (EF) is sourced from IPCC. No country or project specific data are available. Therefore, using 2006 IPCC Guidelines for default value.

Monitoring method, frequency and equipments:	Not applicable
Calibration:	Not applicable
QA/QC procedure:	Data record will be archived for a period of 2 years after the crediting period to which the records pertain.
Means of verification:	Data of the parameter was verified by checking IPCC. All data is in line with IPCC; Information flow was verified by checking IPCC, and all information are consistent.

Data / Parameter:	NCV _{fuel}
Data unit:	MJ/kg
Description:	Net calorific value of fuel
Purpose of the data:	Calculation of project emissions
Parameter value:	44.27
Source of data used:	Net calorific value of fuel (NCV _{fuel}) is sourced from Device Technical Agreement of Incinerators /17/.
Information flow:	Net calorific value of fuel (NCV _{fuel}) is sourced from Device Technical Agreement of Incinerators /17/. This value is compared with 43.3 MJ/kg in 2006 IPCC Guideline for National Greenhouse Gas Inventories (Volume 2 Energy, Chapter 1, Table 1.2), and 42.652 MJ/kg in the latest version of China Energy Statistical Yearbook /18/, the most conservative value 44.27 MJ/kg is used in the ER calculation.
Monitoring method, frequency and equipments:	Not applicable
Calibration:	Not applicable
QA/QC procedure:	Data record will be archived for a period of 2 years after the crediting period to which the records pertain.
Means of verification:	Data of the parameter was verified by checking Device Technical Agreement of Incinerators. All data is in line with Device Technical Agreement of Incinerators;

	Information flow was verified by checking Device Technical Agreement of Incinerators, IPCC and China Energy Statistical Yearbook, and all information are consistent.
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Data / Parameter:	EF _{fuel}
Data unit:	tCO ₂ /MJ
Description:	Emission factor of the fuel
Purpose of the data:	Calculation of project emissions
Parameter value:	74.8*10 ⁻⁶
Source of data used:	Emission factor of the fuel (EF _{fuel}) is sourced from IPCC.
Information flow:	Emission factor of the fuel (EF _{fuel}) is sourced from IPCC.
Monitoring method, frequency and equipments:	Not applicable
Calibration:	Not applicable
QA/QC procedure:	Data record will be archived for a period of 2 years after the crediting period to which the records pertain.
Means of verification:	Data of the parameter was verified by checking IPCC. All data is in line with IPCC; Information flow was verified by checking IPCC, and all information are consistent.

Data / Parameter:	FCF _i
Data unit:	Fraction
Description:	Fraction of fossil carbon in total carbon of waste type i
Purpose of the data:	Calculation of baseline emissions
Parameter value:	Please refer to ER calculation for details
Source of data used:	Fraction of fossil carbon in total carbon of waste type i (FCF _i) is sourced from Monitoring reports issued by BETA Analytic Inc which is an accredited testing laboratory.

Information flow:	Fraction of fossil carbon in total carbon of waste type i was tested by BETA Analytic Inc which is an accredited testing laboratory four times per year. Once receiving the sample, BETA Analytic Inc would conduct the test following based standard: • ASTM D6866-08: “Standard Test Methods for Determining the Biobased Content of Solid, Liquid, and Gaseous Samples Using Radiocarbon Analysis”; • ASTM D7459-08: “Standard Practice for Collection of Integrated Samples for the Speciation of Biomass (Biogenic) and Fossil Derived Carbon Dioxide Emitted from Stationary Emissions Sources”. Then for each time test, BETA Analytic Inc would issue a monitoring report /19/. The data for Monitoring reports issued by BETA Analytic Inc has been sent to the CDM consulting company for reporting of GHG emission reduction.
Monitoring frequency and equipments:	Fraction of fossil carbon in total carbon of waste type i was tested by BETA Analytic Inc which is an accredited testing laboratory four times per year based on standard as below: • ASTM D6866-08: “Standard Test Methods for Determining the Biobased Content of Solid, Liquid, and Gaseous Samples Using Radiocarbon Analysis”; • ASTM D7459-08: “Standard Practice for Collection of Integrated Samples for the Speciation of Biomass (Biogenic) and Fossil Derived Carbon Dioxide Emitted from Stationary Emissions Sources”. The size and frequency of sampling is statically significant with a maximum uncertainty range of 20% at a 95% confidence level. As a minimum, sample has been undertaken four times per year.
Calibration:	Not applicable
QA/QC procedure:	Data record will be archived for a period of 2 years after the crediting period to which the records pertain.
Means of verification:	Data of the parameter was verified by checking Monitoring reports issued by BETA Analytic Inc. All data is in line with Monitoring reports issued by BETA Analytic Inc; Information flow was verified by checking Monitoring reports issued by BETA Analytic Inc, and all information are consistent; Monitoring method was verified by site visit, checking Monitoring reports issued by BETA Analytic Inc, all monitoring method meets the description in the PD.

Data / Parameter:	A _{msw,y} ³																
Data unit:	tons/yr																
Description:	Amount of MSW combusted in the incinerators each year																
Purpose of the data:	Calculation of baseline emissions Calculation of project emissions																
Parameter value:	1,886,735.15																
Source of data used:	Amount of MSW combusted in the incinerators each year (A _{msw,y}) are all sourced from CDM Monthly Report /10/ issued by the project owner.																
Information flow:	2 weighbridges were installed at project site to monitor continuously, recorded daily and archived monthly in the system in form of CDM Monthly Report /10/ which is consistent with methodology and registered PD. Also, Invoice for MSW treatment /20/ would be used for crosscheck. The data for CDM Monthly Report and Invoice for MSW treatment have been sent to the CDM consulting company for reporting of GHG emission reduction.																
Monitoring method, frequency and equipments:	The parameter was monitor continuously, recorded daily and archived monthly by 2 weighbridges installed at project site. See below for the information of 2 weighbridges verified by site visit and checking calibration certificates /12/: <table><tr><th>Meter</th><th>Type</th><th>Serial Number</th><th>Accuracy</th></tr><tr><td>Weighbridge (W1)</td><td>SCS-80</td><td>201008028</td><td>III</td></tr><tr><td>Weighbridge (W2)</td><td>SCS-80</td><td>201008029</td><td>III</td></tr></table> The type, serial number and accuracy have been confirmed by site visit.			Meter	Type	Serial Number	Accuracy	Weighbridge (W1)	SCS-80	201008028	III	Weighbridge (W2)	SCS-80	201008029	III		
Meter	Type	Serial Number	Accuracy														
Weighbridge (W1)	SCS-80	201008028	III														
Weighbridge (W2)	SCS-80	201008029	III														
Calibration:	The calibration information is shown as below /12/: <table><tr><th>Meter</th><th>Calibration date</th><th>Valid until</th></tr><tr><td rowspan="5">Weighbridges (W1 and W2)</td><td>05/02/2015</td><td>04/02/2016</td></tr><tr><td>17/11/2015</td><td>16/11/2016</td></tr><tr><td>09/11/2016</td><td>08/11/2017</td></tr><tr><td>10/05/2017</td><td>09/05/2018</td></tr><tr><td>17/11/2017</td><td>16/11/2018</td></tr></table>			Meter	Calibration date	Valid until	Weighbridges (W1 and W2)	05/02/2015	04/02/2016	17/11/2015	16/11/2016	09/11/2016	08/11/2017	10/05/2017	09/05/2018	17/11/2017	16/11/2018
Meter	Calibration date	Valid until															
Weighbridges (W1 and W2)	05/02/2015	04/02/2016															
	17/11/2015	16/11/2016															
	09/11/2016	08/11/2017															
	10/05/2017	09/05/2018															
	17/11/2017	16/11/2018															

³ In the registered PD, there are no monitoring for $Q_{biomass,y}$ which is essential for project emission calculation. But $A_{msw,y}$ was monitored which also referred to $Q_{biomass,y}$

	04/06/2018	03/06/2019
	The calibration was conducted by accredited third parties which are Foshan Supervision Testing Centre of Quality and Metrology /13/ which was accredited by Guangdong Technical and Quality Supervision Bureau valid from 07/08/2009 to 31/12/2019.	
QA/QC procedure:	Data record will be archived for a period of 2 years after the crediting period to which the records pertain.	
Means of verification:	Data of the parameter was verified by checking CDM Monthly Report and Invoice for MSW treatment. All data is in line with CDM Monthly Report and Invoice for MSW treatment; Information flow was verified by checking CDM Monthly Report and Invoice for MSW treatment, and all information are consistent; Monitoring method was verified by site visit, checking calibration certificates, all monitoring method meets the description in the PD; Calibration was verified by checking calibration certificate, all calibration of monitoring equipment meets the requirement indicated in the PD.	

Data / Parameter:	CCW _i	
Data unit:	%	
Description:	Total carbon fraction in waste type i	
Purpose of the data:	Calculation of project emissions	
Parameter value:	Waste type	CCW _i
	Food waste	38
	Paper and cardboard	46
	Wood and wood products	40
	Plastic	75
	Textiles	50
	Glass and metal	0
	Rubber and leather	67
	Ash	3
Source of data used:	Total carbon fraction in waste type i (CCW _i) is sourced from IPCC.	
Information flow:	Total carbon fraction in waste type i (CCW _i) is sourced from IPCC.	

Monitoring method, frequency and equipments:	Not applicable
Calibration:	Not applicable
QA/QC procedure:	Data record will be archived for a period of 2 years after the crediting period to which the records pertain.
Means of verification:	Data of the parameter was verified by checking IPCC. All data is in line with IPCC; Information flow was verified by checking IPCC, and all information are consistent.

Data / Parameter:	EG _{PJ,FF,y}
Data unit:	MWh
Description:	Amount of electricity consumed from the grid as a result of the project activity during the year y
Purpose of the data:	Calculation of project emissions
Parameter value:	2,070.200
Source of data used:	Amount of electricity consumed from the grid as a result of the project activity during the year y (EG _{PJ,FF,y}) are all sourced from CDM Monthly Report /10/ issued by the project owner, ETNs /11/ issued by power grid company covering monitoring period.
Information flow:	2 set of bidirectional electricity meters (M3 and M4 as main meter and M3' and M4' as backup meter) installed at project site were measured continuously, recorded monthly and archived electronically. At 24:00 hr of last day of each month, the staff from project owner will record 2 main electricity meters' readings and fill out CDM Monthly Report. The staff from power grid company will record the meter readings of meter then transcribes the data into Electricity Transaction Notes (ETNs), then after the confirmation of the project owner for the ETNs, the power grid company will issue the invoice. The data for CDM Monthly Report and ETNs have been sent to the CDM consulting company for reporting of GHG emission reduction. The conservative one would be used for ER calculation.

Monitoring method, frequency and equipments:	The parameter was measured continuously and recorded monthly by 2 sets of bidirectional electricity meters installed at project site. See below for the information of 2 sets of bidirectional electricity meters verified by site visit and checking calibration certificates /12/:			
	Meter	Type	Serial Number	Accuracy
	M3	ZMD405	EDC00001819	0.5s
	M4	ZMD405	EDC00001755	0.5s
	M3'	ZMD405	EDC00001634	0.5s
	M4'	ZMD405	EDC00001858	0.5s
	The type, serial number and accuracy have been confirmed by site visit.			
Calibration:	The calibration information are shown as below /12/:			
	Meter	Calibration date	Valid until	
	Electricity Meters (M3, M4, M3' and M4')	27/10/2014	26/10/2015	
		27/10/2015	26/10/2016	
		21/10/2016	20/10/2017	
		05/08/2017	04/08/2018	
		01/08/2018	31/07/2019	
The calibration was conducted by accredited third parties which are Measurement Centre of Foshan Power Supply Bureau of Guangdong Power Grid /13/ which was accredited by CNAS valid from 07/08/2013 to 06/08/2016 and from 18/09/2016 to 17/22/2022.				
QA/QC procedure:	Data record will be archived for a period of 2 years after the crediting period to which the records pertain.			
Means of verification:	Data of the parameter was verified by checking CDM Monthly Report and ETNs. All data is in line with CDM Monthly Report and ETNs; Information flow was verified by checking CDM Monthly Report and ETNs, and all information are consistent; Monitoring method was verified by site visit, checking calibration certificates, all monitoring method meets the description in the PD; Calibration was verified by checking calibration certificate, all calibration of monitoring equipment meets the requirement indicated in the PD.			

Data / Parameter:	A _{residual}
Data unit:	tons/yr

Description:	The amount of the residual waste from the incinerator			
Purpose of the data:	Calculation of baseline emissions Calculation of project emissions			
Parameter value:	502,077.49			
Source of data used:	The amount of the residual waste from the incinerator ($A_{residual}$) are all sourced from CDM Monthly Report /10/ issued by the project owner.			
Information flow:	2 weighbridges were installed at project site to monitor continuously, recorded daily and archived monthly in the system in form of CDM Monthly Report /10/ which is consistent with methodology and registered PD. The data for CDM Monthly Report have been sent to the CDM consulting company for reporting of GHG emission reduction.			
Monitoring method, frequency and equipments:	The parameter was monitor continuously, recorded daily and archived monthly by 2 weighbridges installed at project site. See below for the information of 2 weighbridges verified by site visit and checking calibration certificates /12/:			
	Meter	Type	Serial Number	Accuracy
	Weighbridge (W1)	SCS-80	201008028	III
	Weighbridge (W2)	SCS-80	201008029	III
	The type, serial number and accuracy have been confirmed by site visit.			
Calibration:	The calibration information is shown as below /12/:			
	Meter	Calibration date	Valid until	
	Weighbridges (W1 and W2)	05/02/2015	04/02/2016	
		17/11/2015	16/11/2016	
		09/11/2016	08/11/2017	
		10/05/2017	09/05/2018	
		17/11/2017	16/11/2018	
		04/06/2018	03/06/2019	
The calibration was conducted by accredited third parties which are Foshan Supervision Testing Centre of Quality and Metrology /13/ which was accredited by Guangdong Technical and Quality Supervision Bureau valid from 07/08/2009 to 31/12/2019.				
QA/QC procedure:	Data record will be archived for a period of 2 years after the crediting period to which the records pertain.			
Means of verification:	Data of the parameter was verified by checking CDM Monthly Report. All data is in line with CDM Monthly Report;			

	Information flow was verified by checking CDM Monthly Report, and all information are consistent; Monitoring method was verified by site visit, checking calibration certificates, all monitoring method meets the description in the PD; Calibration was verified by checking calibration certificate, all calibration of monitoring equipment meets the requirement indicated in the PD.
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Data / Parameter:	FC _{residual}
Data unit:	%
Description:	Fraction of residual carbon in the residual waste of MSW incinerator
Purpose of the data:	Calculation of leakages
Parameter value:	Please refer to ER calculation for details
Source of data used:	Fraction of residual carbon in the residual waste of MSW incinerator (FC _{residual}) is sourced from Monitoring reports issued by Guangzhou Institute of Energy Conversion Chinese Academy of Science which is a qualified and independent organization.
Information flow:	Fraction of residual carbon in the residual waste of MSW incinerator was tested by Guangzhou Institute of Energy Conversion Chinese Academy of Science which is a qualified and independent organization four times per year. Once receiving the sample, Guangzhou Institute of Energy Conversion Chinese Academy of Science would conduct the test and then issue a monitoring report /21/. The data for Monitoring reports issued by Guangzhou Institute of Energy Conversion Chinese Academy of Science has been sent to the CDM consulting company for reporting of GHG emission reduction.
Monitoring method, frequency and equipments:	Fraction of residual carbon in the residual waste of MSW incinerator was tested by Guangzhou Institute of Energy Conversion Chinese Academy of Science four times per year. The size and frequency of sampling is statically significant with a maximum uncertainty range of 20% at a 95% confidence level. As a minimum, sample has been undertaken four times per year. Guangzhou Institute of Energy Conversion Chinese Academy of Science was accredited by CNCA valid from 16/12/2012 to 15/12/2016 and from

	23/12/2015 to 22/12/2021 /13/ which cover the period of monitoring report.
Calibration:	Not applicable
QA/QC procedure:	Data record will be archived for a period of 2 years after the crediting period to which the records pertain.
Means of verification:	Data of the parameter was verified by checking Monitoring reports issued by Guangzhou Institute of Energy Conversion Chinese Academy of Science. All data is in line with Monitoring reports issued by Guangzhou Institute of Energy Conversion Chinese Academy of Science; Information flow was verified by checking Monitoring reports issued by Guangzhou Institute of Energy Conversion Chinese Academy of Science, and all information are consistent; Monitoring method was verified by site visit, checking Monitoring reports issued by Guangzhou Institute of Energy Conversion Chinese Academy of Science, all monitoring method meets the description in the PD.

Data / Parameter:	MB _y
Data unit:	tCH ₄
Description:	Amount of methane produced in the landfill in the absence of the project activity in year y
Purpose of the data:	Calculation of baseline emissions
Parameter value:	1,088,426
Source of data used:	Amount of methane produced in the landfill in the absence of the project activity in year y (MB _y) is calculated as per the “Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal”.
Information flow:	Amount of methane produced in the landfill in the absence of the project activity in year y (MB _y) is calculated as per the “Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal”.
Monitoring method, frequency and equipments:	Not applicable
Calibration:	Not applicable
QA/QC procedure:	Data record will be archived for a period of 2 years after the crediting period to which the records pertain.

Means of verification:	Not applicable
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Data / Parameter:	AF
Data unit:	Fraction
Description:	Methane destroyed due to regulatory or other requirements
Purpose of the data:	Calculation of baseline emissions
Parameter value:	0
Source of data used:	Methane destroyed due to regulatory or other requirements (AF) is sourced from local and/or national authorities. Based on the professional knowledge of Applus+ Certification, there are no update law or regulation for Methane destroy in China. Therefore, AF was considered as 0. Moreover, this parameter will be renewed at the renewal of crediting period.
Information flow:	Methane destroyed due to regulatory or other requirements (AF) is sourced from local and/or national authorities. This parameter will be renewed at the renewal of crediting period.
Monitoring method, frequency and equipments:	Not applicable
Calibration:	Not applicable
QA/QC procedure:	Data record will be archived for a period of 2 years after the crediting period to which the records pertain.
Means of verification:	Not applicable

Data / Parameter:	EG _{d,y}
Data unit:	MWh
Description:	Amount of electricity generated utilizing the combustion heat from incineration in the project activity displacing electricity in the baseline during the year y
Purpose of the data:	Calculation of baseline emissions
Parameter value:	518,903.000

Source of data used:	Amount of electricity generated utilizing the combustion heat from incineration in the project activity displacing electricity in the baseline during the year y (EG _{d,y}) are all sourced from CDM Monthly Report /10/ issued by the project owner, ETNs /11/ issued by power grid company covering monitoring period.																				
Information flow:	2 set of bidirectional electricity meters (M3 and M4 as main meter and M3' and M4' as backup meter) installed at project site were measured continuously, recorded monthly and archived electronically. At 24:00 hr of last day of each month, the staff from project owner will record 2 main electricity meters' readings and fill out CDM Monthly Report. The staff from power grid company will record the meter readings of meter then transcribes the data into Electricity Transaction Notes (ETNs), then after the confirmation of the project owner for the ETNs, the project owner will issue the invoice. The data for CDM Monthly Report and ETNs have been sent to the CDM consulting company for reporting of GHG emission reduction. The conservative one would be used for ER calculation.																				
Monitoring method, frequency and equipments:	The parameter was measured continuously and recorded monthly by 2 sets of bidirectional electricity meters installed at project site. See below for the information of 2 sets of bidirectional electricity meters verified by site visit and checking calibration certificates /12/: <table><tr><th>Meter</th><th>Type</th><th>Serial Number</th><th>Accuracy</th></tr><tr><td>M3</td><td>ZMD405</td><td>EDC00001819</td><td>0.5s</td></tr><tr><td>M4</td><td>ZMD405</td><td>EDC00001755</td><td>0.5s</td></tr><tr><td>M3'</td><td>ZMD405</td><td>EDC00001634</td><td>0.5s</td></tr><tr><td>M4'</td><td>ZMD405</td><td>EDC00001858</td><td>0.5s</td></tr></table> The type, serial number and accuracy have been confirmed by site visit.	Meter	Type	Serial Number	Accuracy	M3	ZMD405	EDC00001819	0.5s	M4	ZMD405	EDC00001755	0.5s	M3'	ZMD405	EDC00001634	0.5s	M4'	ZMD405	EDC00001858	0.5s
Meter	Type	Serial Number	Accuracy																		
M3	ZMD405	EDC00001819	0.5s																		
M4	ZMD405	EDC00001755	0.5s																		
M3'	ZMD405	EDC00001634	0.5s																		
M4'	ZMD405	EDC00001858	0.5s																		
Calibration:	The calibration information are shown as below /12/: <table><tr><th>Meter</th><th>Calibration date</th><th>Valid until</th></tr><tr><td rowspan="5">Electricity Meters (M3, M4, M3' and M4')</td><td>27/10/2014</td><td>26/10/2015</td></tr><tr><td>27/10/2015</td><td>26/10/2016</td></tr><tr><td>21/10/2016</td><td>20/10/2017</td></tr><tr><td>05/08/2017</td><td>04/08/2018</td></tr><tr><td>01/08/2018</td><td>31/07/2019</td></tr></table> The calibration was conducted by accredited third parties which are Measurement Centre of Foshan Power Supply Bureau of Guangdong Power	Meter	Calibration date	Valid until	Electricity Meters (M3, M4, M3' and M4')	27/10/2014	26/10/2015	27/10/2015	26/10/2016	21/10/2016	20/10/2017	05/08/2017	04/08/2018	01/08/2018	31/07/2019						
Meter	Calibration date	Valid until																			
Electricity Meters (M3, M4, M3' and M4')	27/10/2014	26/10/2015																			
	27/10/2015	26/10/2016																			
	21/10/2016	20/10/2017																			
	05/08/2017	04/08/2018																			
	01/08/2018	31/07/2019																			

	Grid /13/ which was accredited by CNAS valid from 07/08/2013 to 06/08/2016 and from 18/09/2016 to 17/22/2022.
QA/QC procedure:	Data record will be archived for a period of 2 years after the crediting period to which the records pertain.
Means of verification:	Data of the parameter was verified by checking CDM Monthly Report and ETNs. All data is in line with CDM Monthly Report and ETNs; Information flow was verified by checking CDM Monthly Report and ETNs, and all information are consistent; Monitoring method was verified by site visit, checking calibration certificates, all monitoring method meets the description in the PD; Calibration was verified by checking calibration certificate, all calibration of monitoring equipment meets the requirement indicated in the PD.

Data / Parameter:	f
Data unit:	%
Description:	Fraction of methane captured at the SWDS and flared, combusted or used in another manner
Purpose of the data:	Calculation of baseline emissions
Parameter value:	0
Source of data used:	Fraction of methane captured at the SWDS and flared, combusted or used in another manner (f) is sourced from written information from the operator of the solid waste disposal site.
Information flow:	Fraction of methane captured at the SWDS and flared, combusted or used in another manner (f) is sourced from written information from the operator of the solid waste disposal site. In which indicated that there was no fraction of methane captured at the SWDS and flared, combusted or used in another manner. The data for written information from the operator of the solid waste disposal site has been sent to the CDM consulting company for reporting of GHG emission reduction.
Monitoring method, frequency and equipments:	Not applicable
Calibration:	Not applicable

QA/QC procedure:	Data record will be archived for a period of 2 years after the crediting period to which the records pertain.
Means of verification:	Data of the parameter was verified by checking written information from the operator of the solid waste disposal site. All data is in line with written information from the operator of the solid waste disposal site; Information flow was verified by checking written information from the operator of the solid waste disposal site, and all information are consistent.

Data / Parameter:	W_x
Data unit:	tons
Description:	Total amount of organic waste prevented from disposal in year x
Purpose of the data:	Calculation of baseline emissions Calculation of project emissions
Parameter value:	1,734,713.23 (for baseline emissions calculation) 2,038,757.09 (for project emissions calculation)
Source of data used:	The monitoring of Total amount of organic waste prevented from disposal in year x (W_x) should be the same as Amount of MSW combusted in the incinerators each year ($A_{msw,y}$) according to registered PDD. However, during this monitoring period, most conservative approach has been conducted. When calculating baseline emission, this value was calculated based on $A_{msw,y}$ multiplied by $P_{n,j,y}$ (95% confidence level low). When calculating project emissions, this value was calculated based on $A_{msw,y}$ multiplied by $P_{n,j,y}$ (95% confidence level high). Please refer to the monitoring of Amount of MSW combusted in the incinerators each year ($A_{msw,y}$) and Weight fraction of the waste type j in the sample n collected during the year y ($P_{n,j,y}$) for details.
Information flow:	Please refer to the monitoring of Amount of MSW combusted in the incinerators each year ($A_{msw,y}$) and Weight fraction of the waste type j in the sample n collected during the year y ($P_{n,j,y}$) for details.
Monitoring method, frequency and equipments:	Please refer to the monitoring of Amount of MSW combusted in the incinerators each year ($A_{msw,y}$) and Weight fraction of the waste type j in the sample n collected during the year y ($P_{n,j,y}$) for details.

Calibration:	Please refer to the monitoring of Amount of MSW combusted in the incinerators each year ($A_{msw,y}$) and Weight fraction of the waste type j in the sample n collected during the year y ($P_{n,j,y}$) for details.
QA/QC procedure:	Data record will be archived for a period of 2 years after the crediting period to which the records pertain.
Means of verification:	The monitoring of Total amount of organic waste prevented from disposal in year x (W_x) should be the same as Amount of MSW combusted in the incinerators each year ($A_{msw,y}$) according to registered PDD. However, during this monitoring period, most conservative approach has been conducted. When calculating baseline emission, this value was calculated based on $A_{MSW,y}$ multiplied by $P_{n,j,y}$ (95% confidence level low). When calculating project emissions, this value was calculated based on $A_{MSW,y}$ multiplied by $P_{n,j,y}$ (95% confidence level high). Please refer to the monitoring of Amount of MSW combusted in the incinerators each year ($A_{msw,y}$) and Weight fraction of the waste type j in the sample n collected during the year y ($P_{n,j,y}$) for details.

Data / Parameter:	$P_{n,j,y}$
Data unit:	Fraction
Description:	Weight fraction of the waste type j in the sample n collected during the year y
Purpose of the data:	Calculation of baseline emissions
Parameter value:	Please refer to ER calculation for details
Source of data used:	Weight fraction of the waste type j in the sample n collected during the year y ($P_{n,j,y}$) is sourced from Sample reports issued by Guangzhou Institute of Energy Conversion Chinese Academy of Science which is a qualified and independent organization.
Information flow:	Weight fraction of the waste type j in the sample n collected during the year y was tested by Guangzhou Institute of Energy Conversion Chinese Academy of Science which is a qualified and independent organization four times per year. Once receiving the sample, Guangzhou Institute of Energy Conversion Chinese Academy of Science would conduct the test and then issue a sample report /23/.

	The data for Sample reports issued by Guangzhou Institute of Energy Conversion Chinese Academy of Science has been sent to the CDM consulting company for reporting of GHG emission reduction.
Monitoring method, frequency and equipments:	Weight fraction of the waste type j in the sample n collected during the year y was tested by Guangzhou Institute of Energy Conversion Chinese Academy of Science four times per year. The size and frequency of sampling is statically significant with a maximum uncertainty range of 20% at a 95% confidence level. As a minimum, sample has been undertaken four times per year. Guangzhou Institute of Energy Conversion Chinese Academy of Science was accredited by CNCA valid from 16/12/2012 to 15/12/2016 and from 23/12/2015 to 22/12/2021 /13/ which cover the period of monitoring report.
Calibration:	Not applicable
QA/QC procedure:	Data record will be archived for a period of 2 years after the crediting period to which the records pertain.
Means of verification:	Data of the parameter was verified by checking Monitoring reports issued by Guangzhou Institute of Energy Conversion Chinese Academy of Science. All data is in line with Monitoring reports issued by Guangzhou Institute of Energy Conversion Chinese Academy of Science; Information flow was verified by checking Monitoring reports issued by Guangzhou Institute of Energy Conversion Chinese Academy of Science, and all information are consistent; Monitoring method was verified by site visit, checking Monitoring reports issued by Guangzhou Institute of Energy Conversion Chinese Academy of Science, all monitoring method meets the description in the PD.

Data / Parameter:	Z
Data unit:	-
Description:	Number of samples collected during the year x
Purpose of the data:	Calculation of baseline emissions
Parameter value:	$P_{n,j,y}$: 15 $FC_{residual}$: 16 FCF_i: 16

Source of data used:	Number of samples collected during the year x (Z) is project owner's record as well as monitoring reports /19/ /21/ and sample reports /23/.
Information flow:	Number of samples collected during the year x (Z) is project owner's record as well as monitoring reports /19/ /21/ and sample reports /23/. The size and frequency of sampling is statically significant with a maximum uncertainty range of 20% at a 95% confidence level. As a minimum, sample has been undertaken four times per year. The data for monitoring reports and sample reports has been sent to the CDM consulting company for reporting of GHG emission reduction.
Monitoring method, frequency and equipments:	Not applicable
Calibration:	Not applicable
QA/QC procedure:	Data record will be archived for a period of 2 years after the crediting period to which the records pertain.
Means of verification:	Data of the parameter was verified by checking monitoring reports and sample reports. All data is in line with monitoring reports and sample reports; Information flow was verified by checking monitoring reports and sample reports, and all information are consistent;

Data / Parameter:	$Q_{COD,y}$
Data unit:	m^3/y
Description:	Amount of wastewater treated anaerobically or released untreated from the project activity in year y
Purpose of the data:	Calculation of project emissions
Parameter value:	168,944.00
Source of data used:	Amount of wastewater treated anaerobically or released untreated from the project activity in year y ($Q_{COD,y}$) are all sourced from CDM Monthly Report /10/ issued by the project owner.
Information flow:	1 flow meter was installed at project site to monitor continuously, recorded daily and archived monthly in the system in form of CDM Monthly Report /10/ which is consistent with methodology and registered PD.

	The data for CDM Monthly Report has been sent to the CDM consulting company for reporting of GHG emission reduction.			
Monitoring method, frequency and equipments:	The parameter was monitor continuously, recorded daily and archived monthly by 1 flow meter installed at project site. See below for the information of 1 flow meter verified by site visit and checking calibration certificates /12/:			
	Meter	Type	Serial Number	Accuracy
	Flow meter	50P80-EH2A1AA0AAAA	JA08CD18000	0.5%
	The type, serial number and accuracy have been confirmed by site visit.			
Calibration:	The calibration information is shown as below /12/:			
	Meter		Calibration date	Valid until
	Flow meter		08/01/2015	07/01/2017
			08/01/2017	07/01/2019
The calibration was conducted by accredited third parties which are Foshan Supervision Testing Centre of Quality and Metrology /13/ which was accredited by Guangdong Technical and Quality Supervision Bureau valid from 07/08/2009 to 31/12/2019.				
QA/QC procedure:	Data record will be archived for a period of 2 years after the crediting period to which the records pertain.			
Means of verification:	Data of the parameter was verified by checking CDM Monthly Report. All data is in line with CDM Monthly Report;			
	Information flow was verified by checking CDM Monthly Report, and all information are consistent;			
	Monitoring method was verified by site visit, checking calibration certificates, all monitoring method meets the description in the PD;			
	Calibration was verified by checking calibration certificate, all calibration of monitoring equipment meets the requirement indicated in the PD.			

Data / Parameter:	P _{COD,y}
Data unit:	tCOD/m ³
Description:	Chemical Oxygen Demand (COD) of wastewater
Purpose of the data:	Calculation of project emissions

Parameter value:	0.023980 (average)
Source of data used:	Chemical Oxygen Demand (COD) of wastewater ($P_{COD,y}$) are all sourced from CDM Monthly Report /10/ issued by the project owner.
Information flow:	Chemical Oxygen Demand (COD) of wastewater was monitored daily, recorded daily and archived monthly by qualified laboratory engineer of project owner. After the test of COD of wastewater, laboratory engineer would record the result in the CDM Monthly Report. The data for CDM Monthly Report has been sent to the CDM consulting company for reporting of GHG emission reduction.
Monitoring method, frequency and equipments:	Not applicable
Calibration:	Not applicable
QA/QC procedure:	Data record will be archived for a period of 2 years after the crediting period to which the records pertain.
Means of verification:	Data of the parameter was verified by checking CDM Monthly Report. All data is in line with CDM Monthly Report; Information flow was verified by checking CDM Monthly Report, and all information are consistent.

Data / Parameter:	T_{flare}
Data unit:	°C
Description:	Temperature of the exhaust gas of the incinerators
Purpose of the data:	Calculation of project emissions
Parameter value:	910-979
Source of data used:	Temperature of the exhaust gas of the incinerators (T_{flare}) are all sourced from CDM Monthly Report /10/ issued by the project owner covering monitoring period.
Information flow:	6 thermocouples were used to monitor continuously, recorded hourly and archived monthly in the system in form of CDM Monthly Report /10/ which is consistent with methodology and registered PD. The data for CDM Monthly Report has been sent to the CDM consulting company for reporting of GHG emission reduction.

Monitoring method, frequency and equipments:	The parameter was measured continuously and recorded monthly by 6 thermocouples installed at project site. See below for the information of 6 thermocouples verified by site visit and checking calibration certificates /12/:			
	Equipment	Type	Serial Number	Accuracy
	Thermocouple 1#	WRP-331	121114002	II
	Thermocouple 2#	WRP-331	121114004	II
	Thermocouple 3#	WRP-331	121114005	II
	Thermocouple 4#	WRP-331	121114011	II
	Thermocouple 5#	WRP-331	121114012	II
	Thermocouple 6#	WRP-331	121114015	II
The type, serial number and accuracy have been confirmed by site visit.				
By checking thermocouple change record, it is confirmed				
Calibration:	The calibration information are shown as below /12/:			
	Equipment	Calibration date	Valid until	
	Thermocouples (1#~6#)	16/05/2013	15/05/2014	
		16/05/2014	15/05/2015	
		16/05/2015	15/05/2016	
		16/05/2016	15/05/2017	
		16/05/2017	15/05/2018	
		16/05/2018	15/05/2019	
The calibration was conducted by accredited third parties which are Foshan Supervision Testing Centre of Quality and Metrology /13/ which was accredited by Guangdong Technical and Quality Supervision Bureau valid from 07/08/2009 to 31/12/2019.				
QA/QC procedure:	Data record will be archived for a period of 2 years after the crediting period to which the records pertain.			
Means of verification:	Data of the parameter was verified by checking CDM Monthly Report. All data is in line with CDM Monthly Report; Information flow was verified by checking CDM Monthly Report, and all information are consistent; Monitoring method was verified by site visit, checking calibration certificates, all monitoring method meets the description in the PD; Calibration was verified by checking calibration certificate, all calibration of monitoring equipment meets the requirement indicated in the PD.			

Data / Parameter:	RATE ^{Compliance_y}
Data unit:	Number
Description:	Rate of compliance
Purpose of the data:	Calculation of baseline emissions
Parameter value:	0
Source of data used:	Rate of compliance (RATE ^{Compliance_y}) is sourced from National Report on Environmental Statistic annually.
Information flow:	Rate of compliance (RATE ^{Compliance_y}) is sourced from National Report on Environmental Statistic annually. The data for National Report on Environmental Statistic /24/ has been sent to the CDM consulting company for reporting of GHG emission reduction.
Monitoring method, frequency and equipments:	Rate of compliance (RATE ^{Compliance_y}) is sourced from National Report on Environmental Statistic annually.
Calibration:	Not applicable
QA/QC procedure:	Data record will be archived for a period of 2 years after the crediting period to which the records pertain.
Means of verification:	Data of the parameter was verified by checking National Report on Environmental Statistic. All data is in line with National Report on Environmental Statistic; Information flow was verified by checking National Report on Environmental Statistic, and all information are consistent; Monitoring method was verified by site visit, checking National Report on Environmental Statistic, all monitoring method meets the description in the PD.

Parameters available at validation stage:

Below data has been verified against the data sources and the PD.

Parameter title	Description	Data	Source
CEF _d	Emission factor for the displaced electricity by the project activity	0.78795	Notification on 2009 baseline emission factors for regional power grids in

			China, issued by China on 02/09/2009 /15/.
CE_{elec}	Emission factor for the on-site use of electricity in the project activity	0.78795	Notification on 2009 baseline emission factors for regional power grids in China, issued by China on 02/09/2009 /15/.
EF_{CH_4}	Aggregated CH_4 emission factor	0.2	IPCC /16/
EF_{N_2O}	Aggregated N_2O emission factor	47	IPCC /16/
GWP_{CH_4}	Global warming potential of CH_4	25	IPCC /16/
GWP_{N_2O}	Global warming potential of N_2O	298	IPCC /16/
NCV_{fuel}	Net caloric value of the fuel used in the project	44.27	Device Technical Agreement of Incinerators /17/
EF_{fuel}	CO_2 emission factor of the fuel used	74.8×10^{-6}	IPCC /16/
B_0	Maximum methane producing capacity	0.265	IPCC /16/
ϕ	Model correction factor to account for the model uncertainties	0.9	Tool to determine methane emissions avoided from disposal of waste at a solid waste disposal site
OX	Oxidation factor	0.1	IPCC /16/
F	Fraction of Methane in the landfill gas (volume fraction)	0.5	IPCC /16/

DOC _f	Fraction of degradable organic carbon (DOC) that can decompose	0.5		IPCC /16/
MCF	Methane conversion factor	1.0		IPCC /16/
DOC _j	Fraction of degradable organic carbon (by weight) in the waste type j	Waste Type j	DOC _j (% wet waste)	IPCC /16/
		Wood and wood product	43	
		Pulp, paper and cardboard	40	
		Food, food waste, beverage and tobacco	15	
		Textiles	24	
		Gardens, yard and park waste	20	
		Plastic	0	
		Glass, metal and other inert waste	0	
		Rubber and leather	0	

k_j	Decay rate for waste type j	Waste Type j	k_j	IPCC /16/
		Wood and wood product	0.035	
		Pulp, paper and cardboard	0.07	
		Food, food waste, beverage and tobacco	0.4	
		Textiles	0.07	
		Gardens, yard and park waste	0.17	
		Plastic	0	
		Glass, metal and other inert waste	0	
		Rubber and leather	0	
CF	Conservativeness factor	1.37		Approved methodology AM0025 (version 12.0) /7/, table 3.
MCF _p	Methane conversion factor for waste water treatment	0.8		IPCC /16/

* CEF_d and CEF_{elec} are not directly available in the registered PD but calculated based on the ex-ante data fixed in the registered PD.

4.5 Quality of Evidence to Determine GHG Emission Reductions and Removals

The monitoring has been carried out in accordance with the monitoring plan contained in the registered PD /3/ version 3.0 dated 20/05/2020.

As a result of verification of the ER calculation process, the assessment team confirmed that all the parameters required for the determination of the emission reductions have been included in the MR Report and ER Calculation Spreadsheet /2/ and are consistent with the applied methodology AM0025 version 12.0 and the monitoring plan contained in the registered PD. The parameters are complete in this monitoring period.

After verifying the reported figures with the raw data sources, it's confirmed that the values of the parameters from the raw data sources are consistent with those quoted in the ER Calculation Spreadsheet and the MR Report. The verification process for the same has been clearly described above in section 4.4 of the report.

4.6 Non-Permanence Risk Analysis

Not applicable as a renewable project.

5 VERIFICATION CONCLUSION

Applus+ Certification has been commissioned by Climate Bridge Ltd. to perform the verification of greenhouse gas emission reductions of the project activity “Nanhai MSW Incineration II Project” (VCS Ref. No. 2098).

The management of Foshan Nanhai Green Renewable Energy Co., Ltd. is responsible for the preparation of the GHG emissions data and the reported GHG emissions reductions on the basis set out within the project’s Monitoring Plan in the registered PD /3/, version 3.0 dated 20/05/2020.

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

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

In our opinion, the GHG emission reductions for “Nanhai MSW Incineration II Project” during the monitoring period 01/06/2011 to 31/12/2018 as reported in Monitoring Report, prepared on the basis of the project’s Monitoring Plan are fairly stated. Based on the information we have seen and evaluated, we confirm the following statement:

Verification period: From 01/06/2011 to 31/12/2018 (divided into 8 vintage periods). Verified GHG emission reductions or removals in the above reporting period:

Year	Baseline emissions or removals (tCO ₂ e)	Project emissions or removals (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Net GHG emission reductions or removals (tCO ₂ e)
2011	0	0	0	0
2012	0	0	0	0
2013	0	0	0	0
2014	0	0	0	0
2015	270,013	108,153	11,597	150,263
2016	391,052	126,715	14,120	250,217
2017	410,356	122,306	13,960	274,090
2018	425,875	126,130	13,565	286,180
Total	1,497,295	483,304	53,241	960,750

APPENDIX 1: REFERENCE LIST

1. Monitoring report, Version 1.0, dated 20/07/2020; version 3.0, dated 01/09/2020
2. ER calculation spreadsheet
3. Registered CDM PDD, version 11, dated 06/01/2012;
Registered VCS PD, version 3.0, dated 20/05/2020
4. Validation report, No. 008008, version 11, completed by GLC;
Gap Validation report, Version 01.2, completed on 20/05/2020 by Applus+ Certification
5. VCS standard version 4.0, dated on 19/09/2019
6. Statement issued by project owner
7. Approved methodology AM0025, version 12.0, dated 13/08/2010
8. CDM Monitoring procedure
9. Nameplate of the equipment
10. CDM Monthly Record covering the monitoring period
11. ETNs covering the monitoring period
12. Calibration certificates of weighbridge, flow meter and gauge height meter covering the whole monitoring period issued by Foshan Supervision Testing Centre of Quality and Metrology
Calibration certificates of electricity meter covering the whole monitoring period issued by Measurement Centre of Foshan Power Supply Bureau of Guangdong Power Grid
13. Accreditation certificates for Foshan Supervision Testing Centre of Quality and Metrology issued by Guangdong Technical and Quality Supervision Bureau valid from 07/08/2009 to 31/12/2019

Accreditation certificates for Guangzhou Institute of Energy Conversion Chinese Academy of Science issued by CNCA valid from 16/12/2012 to 15/12/2016 and from 23/12/2015 to 22/12/2021

Accreditation certificates for Measurement Centre of Foshan Power Supply Bureau of Guangdong Power Grid issued by CNAS valid from 07/08/2013 to 06/08/2016 and from 18/09/2016 to 17/22/2022

- 14 IPCC
- 15 Notification on 2009 baseline emission factors for regional power grids in China, issued by China on 02/09/2009
- 16 Fuel purchase invoices covering the monitoring period
- 17 Device Technical Agreement of Incinerators
- 18 China Energy Statistical Yearbook
- 19 Monitoring report issued by BETA Analytic Inc covering the monitoring period
- 20 Invoice for MSW treatment covering the monitoring period
- 21 Monitoring report issued by Guangzhou Institute of Energy Conversion Chinese Academy of Science covering the monitoring period
- 22 Written information from the operator of the solid waste disposal site dated 13/08/2014, 13/08/2015, 13/08/2016, 13/08/2017 and 13/08/2018
- 23 Sample report issued by Guangzhou Institute of Energy Conversion Chinese Academy of Science covering the monitoring period

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