




# Verification and certification report form for CDM project activities

(Version 01.0)

Complete this form in accordance with the "Attachment: Instructions for filling out the verification and certification report form for CDM project activities" at the end of this form.

## VERIFICATION AND CERTIFICATION REPORT

<b>Title of the project activity</b>	Quezon City Controlled Disposal Facility Biogas Emission Reduction Project
<b>Reference number of the project activity</b>	1258
<b>Version number of the verification and certification report</b>	2.0 Aa
<b>Completion date of the verification and certification report</b>	18/10/2017
<b>Monitoring period number and duration of this monitoring period</b>	12 <sup>th</sup> Monitoring Period 01/01/2015 to 30/06/2016
<b>Version number of monitoring report to which this report applies</b>	02
<b>Crediting period of the project activity corresponding to this monitoring period</b>	01/02/2008 to 31/01/2018
<b>Project participant(s)</b>	Quezon City Government Pangea Green Energy Philippines, Inc. Bunge Emissions Fund Limited
<b>Host Party</b>	Philippines
<b>Sectoral scope(s), selected methodology(ies), and where applicable, selected standardized baseline(s)</b>	Sectoral Scope 1 - Energy industries, Type I: Renewable energy projects, Category D: Renewable electricity generation for a grid  Sectoral Scope 13 - Waste handling and disposal (Landfill Gas Project Activity)  Baseline methodologies: ACM0001 Version 5 - Consolidated methodology for landfill gas project activities AMS-I.D. Version 10 - Grid connected renewable electricity generation
<b>Estimated GHG emission reductions or net anthropogenic GHG removals for this monitoring period in the registered PDD</b>	131, 084.5 annual average in tCO <sub>2</sub> e
<b>Certified GHG emission reductions or net anthropogenic GHG removals for this monitoring period</b>	87, 144 tCO <sub>2</sub> e

<b>Name of DOE</b>	RINA Services S.p.A. (RINA)
<b>Name, position and signature of the approver of the verification and certification report</b>	Laura SEVERINO Unit Manager Sustainability & Climate Change 

## SECTION A. Executive summary

### Purpose and general description of the project activity.

RINA Services S.p.A. (RINA), commissioned by Pangea Green Energy Philippines, Inc., has verified the greenhouse gas emission reductions reported for the project activity “Quezon City Controlled Disposal Facility Biogas Emission Reduction Project” in Philippines, CDM Registration Reference N° 1258, for the period 01/01/2015 to 30/06/2016, with regard to the relevant requirements for CDM activities. The verification shall ensure that reported emission reductions are complete and accurate in accordance with applicable CDM requirements in order to be certified.

The Project activity involves extraction, collection, processing and flaring, including the conversion into electricity of the biogas at the Quezon City Controlled Disposal Facility (“Facility”) located in Area 2, Barangay Payatas, Quezon City, the Philippines. Further the gas is used to generate power and the generated power is used for internal consumption of the plant and the rest supplied to the local users and also exported to Manila Electric Company (Local distributor).

### Scope of verification

This report summarizes the findings of the verification of the project, performed on the basis of UNFCCC criteria for CDM, as well as criteria given to provide for consistent project operations, monitoring and reporting.

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

The verification scope is:

- to verify that actual monitoring systems and procedures are in compliance with the monitoring systems and procedures described in the monitoring plan;
- to evaluate the GHG emission reduction data and express a conclusion with a reasonable level of assurance about whether the reported GHG emission reduction data is free from material misstatement;
- to verify that reported GHG emission data is sufficiently supported by evidence.

Verification shall ensure that reported emission reductions are complete and accurate in accordance with applicable UNFCCC criteria for CDM in order to be certified.

UNFCCC criteria for CDM refer to Article 12 of the Kyoto Protocol, the CDM modalities and procedures, and the subsequent decisions by the CDM Executive Board.

Verification is not meant to provide any consultancy towards the project participants. However, stated requests for clarifications and/or corrective actions may have provided input for improvement of the monitoring.

### Conclusion.

In conclusion, it is RINA’s opinion that the project activity “Quezon City Controlled Disposal Facility Biogas Emission Reduction Project” in Philippines”, as described in the Monitoring Report version 01 of 23/05/2017, meets all relevant requirements for CDM activities and all relevant host Party criteria and correctly applies the approved baseline and monitoring methodology ACM0001 “Consolidated methodology for landfill gas project activities”, version 05 of 15/12/2006 and AMS-I.D of “Grid connected renewable electricity generation”, of version 10 of 23/12/2006. Hence, RINA is able to certify that the emission reductions from the project during the monitoring period 01/01/2015 to 30/06/2016 amount to 87,144 tCO<sub>2</sub>e.

**SECTION B. Verification team, technical reviewer and approver****B.1. Verification team member**

No.	Role	Type of resource	Last name	First name	Affiliation (e.g. name of central or other office of DOE or outsourced entity)	Involvement in			
						Desk review	On-site inspection	Interview(s)	Verification findings
1.	Team Leader	IR	Menon	Rekha	RINA India	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
2.	Verifier, Technical Expert TA 1.1 - 13.1	IR	Augustus	Cyril	RINA India	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

**B.2. Technical reviewer and approver of the verification and certification report**

No.	Role	Type of resource	Last name	First name	Affiliation (e.g. name of central or other office of DOE or outsourced entity)
1.	Technical Reviewer	IR	Liu	Huifeng	RINA China
2	Approver	IR	Severino	Laura	RINA Central Office

**SECTION C. Application of materiality****C.1. Consideration of materiality in planning the verification**

No.	Risk that could lead to material errors, omissions or misstatements	Assessment of the risk		Response to the risk in the verification plan and/or sampling plan
		Risk level	Justification	
1.	Human errors	Low	Human error is likely to occur if the monitoring personnel are not trained well or inexperienced in data recording procedures and monitoring processes.	Wherever there is a greater likelihood of errors and chances of incorrect transfer of data, effective data verification should be done on those days/months data. Noted that data is automatically archived by the SCADA. The readings are continuously recorded and read in the PLC system for every 5 minutes. The data is aggregated hourly into daily reports and every day to monthly reports.
2	Design of data management	Medium	Use of spreadsheets without adequate data control, changes/updates, version tracking, traceability and security	Depending on how data is generated, processed, and reported, place greater emphasis on verifying data captured and processed manually and/or in spreadsheets versus those that are generated from an automated system
3	Manual data	Low	Typographic errors in the	Require the PPs to assess all

			spreadsheets and log books while recording.	the data again and confirm that no further errors are made.
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## C.2. Consideration of materiality in conducting the verification

The errors identified in the project are below the threshold limit of materiality and hence not material. The GHG emission reductions are calculated without material misstatements.

## SECTION D. Means of verification

### D.1. Desk review

The monitoring report, version 02 of 08/10/2016, , the emission reduction calculations provided in the form of a spreadsheet (01ER calculation sheet\_2015 JAN\_REV1.xls, 02ER calculation sheet\_2015 FEB\_REV1.xls, 03ER calculation sheet\_2015 MAR\_REV1.xls, 04ER calculation sheet\_2015 APR\_REV1.xls, 05ER calculation sheet\_2015 MAY\_REV1.xls, 06ER calculation sheet\_2015 JUN\_REV1.xls, 07ER calculation sheet\_2015 JUL\_REV1.xls, 08ER calculation sheet\_2015 AUG\_REV1.xls, 09ER calculation sheet\_2015 SEP\_REV1.xls, 10ER calculation sheet\_2015 OCT\_REV1.xls, 11ER calculation sheet\_2015 NOV.xls\_REV1, 12ER calculation sheet\_2015 DEC\_REV1.xls), 01ER calculation sheet\_2016 JAN\_REV1.xls, 02ER calculation sheet\_2016 FEB\_REV1.xls, 03ER calculation sheet\_2016 MAR\_REV1.xls, 04ER calculation sheet\_2016 APR\_REV1.xls, 05ER calculation sheet\_2016 MAY\_REV1.xls, 06ER calculation sheet\_2016 JUN\_REV1.xls version 02 submitted on 08/10/2017 /08/, were assessed as part of the verification. In addition the Project Design Document (PDD)/01/ in particular the baseline estimations and the monitoring plan and the validation report, version 02 of 02/08/2007 /32/ for the project were reviewed. The list of all documents reviewed are referenced during the verification is available in Appendix 3 below.

The monitoring report version 00 of 05/09/2016 was made publicly available on the CDM UNFCCC website on 13/09/2016

### D.2. On-site inspection

Duration of on-site inspection: 23/03/2017				
No.	Activity performed on-site	Site location	Date	Team member
1.	Project implementation status of 2nd phase of the project activity	Plant office	23/03/2017	Rekha Menon and Cyril Augustus
2	Monitoring Report and Emission Reduction Spread sheets	Plant office	23/03/2017	Rekha Menon and Cyril Augustus
3	Operating staff competence and the risks for inappropriate operation and data collection procedures of the project (training needs).  Metering equipment accuracy / calibration performance-frequency (project boundaries-processes and equipment's involved-possible leakages). Monitoring practices (against the requirements of the PDD and the selected methodology)  Cross-check between information provided in the monitoring report and data from other sources such as plant log books, inventories, purchase records or similar data sources	Plant office	23/03/2017	Rekha Menon and Cyril Augustus

**D.3. Interviews**

No.	Interviewee			Date	Subject	Team member
	Last name	First name	Affiliation			
1.	Campos	Jennifer Fernan	President	23/03/2017	Project implementation status of 2nd phase of the project activity	Rekha Menon and Cyril Augustus
2	Radriha	Joseph	Jr. Research Engineer	23/03/2017	Monitoring Report and Emission Reduction Spread sheets	Rekha Menon and Cyril Augustus
3	Sumalo	Anecito P.	Plant Manager	23/03/2017	Operating staff competence and the risks for inappropriate operation and data collection procedures of the project (training needs).	Rekha Menon and Cyril Augustus
4	Cruz	Arthur	Asst. Plant Engineer	23/03/2017	<p>Metering equipment accuracy / calibration performance-frequency (project boundaries-processes and equipments involved-possible leakages). Monitoring practices (against the requirements of the PDD and the selected methodology)</p> <p>Cross-check between information provided in the monitoring report and data from other sources such as plant log books, inventories, purchase records or similar data sources</p>	

**D.4. Sampling approach**

N/A

**D.5. Clarification requests, corrective action requests and forward action requests raised**

Areas of verification findings	No. of CL	No. of CAR	No. of FAR
Compliance of the monitoring report with the monitoring report form			
Compliance of the project implementation with the registered PDD	1		
Post-registration changes			
Compliance of the monitoring plan with the monitoring methodology including applicable tool and standardized baseline			
Compliance of monitoring activities with the registered monitoring plan	1		
Compliance with the calibration frequency requirements for measuring instruments	1		
Assessment of data and calculation of emission reductions			

or net removals			
Others (please specify)			
<b>Total</b>	<b>3</b>		

## SECTION E. Verification findings

### E.1. Compliance of the monitoring report with the monitoring report form

<b>Means of verification</b>	To check the compliance of the monitoring report with the latest monitoring report form available at UNFCCC. The latest version of MR form available at UNFCCC is 05.1 and the same has used by the project proponent in the monitoring report.
<b>Findings</b>	N/A
<b>Conclusion</b>	RINA confirms that the monitoring report has been prepared with the latest version of the MR available at UNFCCC.

### E.2. Remaining forward action requests from validation and/or previous verification

No FAR have been presented, neither in the validation report nor in the previous verification report /48/.

### E.3. Compliance of the project implementation with the registered project design document

<b>Means of verification</b>	<p>The verification team, carrying out an on-site inspection, assessed all physical features of the registered project activity and has verified the implementation of the project activity as per clause 351, 373 (b)(i) and 375 of VVS version 09.0. During the site visit it was noted that the project is implemented according to the description presented in the registered PDD /01/. It was noticed that the no. of wells in this and the previous monitoring period remains the same. However, it was observed that there had been a gradual increase in the no. of wells throughout the crediting period and the PP has confirmed that the no. of wells were increased to partially recover the lost production of biogas caused due to partial disconnection of some existing wells located in the dumpsite due to the dumping activity. Further, it was also noted that the partial disconnection of some wells are due to periodic requests from the Disposal Facility Management (POG) to dump the waste /38/. Thus, the gas collection continues to be lesser than the values projected in the Registered PDD.</p> <p>Biogas from the wells is conveyed to 5 substations through 90 mm dia. HDPE pipes. The substation conveys the biogas to the main line constituting of 160 mm dia. HDPE pipes. Condensate traps are located on the main line within the biogas plant and provided with the float required for the condensate gravity draining whereby condensate is captured and returned to the well. Where, 80% of the biogas is conveyed to the high temperature enclosed gas flare with capacity 500 - 2500 Nm<sup>3</sup>/h, and the remaining to the electricity generator of capacity 200kW. The electricity produced from the engine is used for internal consumption of the plant and rest supplied the local users in free. The same was cross checked with the request letter from Payatas Operation Group (POG) to City Administrator, Quezon City Government for supply of free electricity to POG (landfill operator) /34/ and this was further checked with letter from Pangea Green Energy to POG, dated 26/01/2009 /35/, wherein it is clearly stated that the power will be supplied free of charge in support of Quezon City Governments effort not only to achieve energy savings, but also to provide Payatas residents a safer and cleaner environment /35/. The project or phase-1 of the project started its operation from 18/03/2008, the same was cross checked with the commissioning certificate issued by Biotechnogas Srl /36/. Further the 2nd phase of the project i.e 2 gas engines with 320 kW each were commissioned on 08/03/2013 and started exporting power to the grid (MERALCO), which was cross checked from the commissioning certificates /43/. The project is fully implemented according to the description presented in the PDD, which is discussed above. The verifier confirms, through physical inspection at site that all features of the CDM project activity including the equipment, data collecting systems and storage have been implemented and is in accordance with the registered PDD. The project activity is completely operational</p>
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	and the same has been confirmed during the site visit.
<b>Findings</b>	<p>CL 1</p> <p>PP is requested to update the dates of the 12<sup>th</sup> MP in table 3 of section B.1 of the MR.</p> <p>PP is requested to correct the emission reductions value provided in page 2 of the MR. The same is not consistent with ER spread sheets and other pages of the MR.</p> <p>Please refer to Appendix 04. CL1 is closed.</p>
<b>Conclusion</b>	The project is fully implemented according to the description presented in the PDD, which is discussed above. RINA confirms, through physical inspection at site that all features of the CDM project activity including the equipment's, data collecting systems and storage have been implemented in accordance with the registered PDD. The project activity is completely operational and the same has been confirmed on-site.

**E.4. Post-registration changes**

N/A

**E.4.1. Temporary deviations from the registered monitoring plan, monitoring methodology or standardized baseline**

N/A

**E.4.2. Corrections**

N/A

**E.4.3. Changes to the start date of the crediting period**

N/A

**E.4.4. Inclusion of a monitoring plan to a registered project activity**

N/A

**E.4.5. Permanent changes from registered monitoring plan, monitoring methodology or standardized baseline**

N/A

**E.4.6. Changes to the project design of a registered project activity**

N/A

**E.4.7. Types of changes specific to afforestation and reforestation project activities**

N/A



### E.5. Compliance of monitoring plan with the monitoring methodology including applicable tool and standardized baseline

<b>Means of verification</b>	As per the applied methodology, the parameters (also discussed in detail in section E.6.2) are monitored continuously. The data is automatically archived by the SCADA. The parameters are continuously recorded and read in the PLC system. The data is aggregated hourly into daily reports and every day to monthly reports. The measuring and reporting frequency is in accordance with the monitoring plan and monitoring methodology. There is no deviation observed between monitoring plan of the project activity with the monitoring plan of the applied methodology of the project activity.
<b>Findings</b>	N/A
<b>Conclusion</b>	The registered monitoring plan and the monitoring system implemented are in accordance with the approved monitoring methodology, ACM0001, version 05 of 15/12/2009 /06/ and AMS-I.D, version 10 of 23/12/2006 /07/ applied by the CDM project activity. Based on the above mentioned information, the verification team confirms that the registered monitoring plan complies with the approved methodology applied by the registered

### E.6. Compliance of monitoring activities with the registered monitoring plan

#### E.6.1. Data and parameters fixed ex ante or at renewal of crediting period

<b>Means of verification</b>	Data and parameters fixed ex-ante as listed in the monitoring report have been crosschecked and reviewed as applicable against the registered PDD, monitoring plan as well as against the applied methodology and other relevant CDM documentation.			
<b>Findings</b>	DATA/PARAMETER Unit	Source of data	Reported value for the project period	Assessment/Observation
	Wt. of MSW	Payatas Operation Group	2,971,500 (2001- 2006) /33/	The quantity of waste disposed for the period 2001-2006 is used in the determination of baseline emissions. The same was available with the PP at the time validation, which was cross checked with the registered PDD /01/ and found to be correct.
	GWP <sub>CH4</sub>	IPCC 1996	25 tCO <sub>2eq</sub> /39/	Is the default value as per the registered PDD.
	D <sub>CH4</sub>	IPCC 1996	0.0007168 t/m <sup>3</sup> /39/	Is the default value as per the registered PDD.
	CEF <sub>electricity, y</sub>	Data published by Philippine Department of Energy	0.46 tCO <sub>2</sub> /MWh /01/	The value is fixed ex-ante through out the crediting period. Hence not required to recalculate in every monitoring period. The same is also as per the registered PDD /01/.
<b>Conclusion</b>	RINA confirms that the parameters listed above are fixed ex-ante and used for baseline, project emissions and leakage emissions calculation in accordance with the applied methodology and methodological tools and they are the same used at the validation stage.			

## E.6.2. Data and parameters monitored

<b>Means of verification</b>	Referring to clause 389-393 and 394 of VVS, version 09.0, the below table provide a summary on the verification of each parameter listed in the registered monitoring plan.	
	Data/Parameter	LFG <sub>total,v</sub>
	Data Unit	m <sup>3</sup>
	Description	Total amount of land fill gas captured
	Source of data to be used	Reading from the Annubar flow meters (FT03_a) acquired by SCADA
	Value of monitored parameter for the monitoring period	12,825,010
	Monitoring equipment	Model/SE.No:485–0075923/3051S1CD1A2E12A1AB 4D2E1L4Q4 -8696153. Manufacturer: Emerson-Rosemount
	Accuracy of the monitoring equipment	Uncertainty: 0.142%/Error:0.04% Uncertainty: 0.36%/Error:0.080%  Verifier cross checked the accuracy with the the calibration test certificates and the instrument error calculation sheet /26/ /20/ and found to be in order.
	Measuring/Reading/Recording frequency	Measured continuously by Annubar flow meter. The data is automatically archived by the SCADA. The readings are continuously recorded and read in the PLC system for every 5 minutes. The data is aggregated hourly into daily reports and every day to monthly reports. The measuring and reporting frequency is in accordance with the monitoring plan and monitoring methodology.
	Calcualtion method (if applicable)	Not Applicable
	Data/Parameter	LFG <sub>flare,v</sub>
	Data Unit	m <sup>3</sup>
	Description	Amount of landfill gas flared
	Source of data to be used	Reading from the Annubar flow meters (FT04_a) acquired by SCADA
	Value of monitored parameter for the monitoring period	6,429,414
	Monitoring equipment	Model/SE.No:485–0075924 /3051S1CD1A2E12A1AB 4D2E1L4Q4 -8696152. Manufacturer: Emerson-Rosemount
	Accuracy of the monitoring equipment	Uncertainty: 0.0108%/Error 0.089% Uncertainty: 0.032%/Error:5%  Verifier cross checked the accuracy with the PDD. However the same is not

		available in the PDD. Hence the verifier cross checked the same with the calibration test certificates and the instrument error calculation sheet /26/ /20/ and found to be in order.
Measuring/Reading/Recording frequency		Continuously by Annubar flow meter, the data is automatically archived by the SCADA. The flow rates are continuously recorded and read in the PLC system. The data is aggregated hourly into daily reports and every day to monthly reports. The measuring and reporting frequency is in accordance with the monitoring plan and monitoring methodology.
Calcualtion method (if applicable)		Not Applicable
Data/Parameter		LFG <sub>electricity.v</sub>
Data Unit		m <sup>3</sup>
Description		Amount of landfill gas combusted in power plant
Source of data to be used		Reading from the Annubar flow meters (FT05_a) and (FT06_a) acquired by SCADA
Value of monitored parameter for the monitoring period		6,044,763
Monitoring equipment		<p>1.Model/SE.No:485-0075925 /3051S1CD1A2E12A1AB 4D2E1L4Q4 -8696154 Manufacturer: Emerson-Rosemount</p> <p>2. SE.No: 3K646612025470 Manufacturer: ABB</p>
Accuracy of the monitoring equipment		<p>FT05_a : Uncertainty: 0.435%/Error:.0.5% Uncertainty: 0.320%/Error:.0.000%</p> <p>Verifier cross checked the accuracy with the PDD. However the same is not available in the PDD. Hence the verifier cross checked the same with the calibration test certificates and the instrument error calculation sheet /26/ /20/ and found to be in order.</p> <p>FT06_a : Uncertainty: 0.089%/Error:.0.000% Uncertainty: 0.207%/Error:.0.000% Verifier cross checked the accuracy with the PDD. However the same is not available in the PDD. Hence the verifier cross checked the same with the calibration test certificates /26/ and found to be in order</p>
Measuring/Reading/Recording		Continuously by Annubar flow meter,

	frequency	the data is automatically archived by the SCADA. The flow rates are continuously recorded and read in the PLC system. The data is aggregated hourly into daily reports and every day to monthly reports. The measuring and reporting frequency is in accordance with the monitoring plan and monitoring methodology.
	Calculation method (if applicable)	Not Applicable
	Data/Parameter	$FV_{RG,h}$
	Data Unit	$Nm^3/h$
	Description	Volumetric flow rate of the residual gas in dry basis at normal conditions in the hour h
	Source of data to be used	Measured parameters Landfill gas, temperature, and pressure of the gas.
	Value of monitored parameter for the monitoring period	486.94
	Monitoring equipment	<p>FT04_a (readings from FT03_a and FT05_a would be used in case of failure of FT04_a (Annubar flow meters)).</p> <p>TT02 (Temperature Meter)</p> <p>PT04 (Pressure Meter)</p> <p>For more information please refer to the following parameters:</p> <ol style="list-style-type: none"> <li>1. <math>LFG_{flare,y}</math></li> <li>2. T</li> <li>4. P</li> </ol>
	Accuracy of the monitoring equipment	Please refer the above
	Measuring/Reading/Recording frequency	Continuously by Annubar flow meter, the data is automatically archived by the SCADA. The flow rates read continuously and recorded in the PLC system. The data is aggregated hourly into daily reports and every day to monthly reports. The measuring and reporting frequency is in accordance with the monitoring plan and monitoring methodology.
Calculation method (if applicable)	<p>The parameter (<math>FV_{RG,h}</math>) is calculated based on the different measured values of flow rate of biogas flared, temperature and pressure. Normalization constant is calculated based on the measured values of landfill gas T and P.</p> <p>Volume normalization constant = <math>\frac{((\text{Biogas pressure (mBar)} + \text{Atmospheric pressure (mBar)}) * \text{Normal temperature (273.15 K)})}{(\text{Normal pressure (1,013.25 mBar)} * (\text{Biogas temperature (degrees Celsius)} + \text{Normal temperature (273.15 K)}))}</math>.</p> <p>The Atmospheric pressure is based on</p>	

	the values provided by Department of Science and Technology Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA) for the period 1971-2000 /25/. RINA accepted the same since it doesn't impact the emission reduction calculation. Further it was also noted that the monitoring parameters temperature and pressure of the landfill gas were mentioned as monitoring parameters in the registered PDD.
Data/Parameter	f <sub>VCH4,h</sub>
Data Unit	%
Description	Volumetric fraction of methane in the residual gas in the hour h
Source of data to be used	Reading from the Methane content analyzer (GA01) acquired by SCADA
Value of monitored parameter for the monitoring period	47.73%% (Average)
Monitoring equipment	Model/SE.No: ULTRAMAT 23 – N1-V7- 0538 Manufacturer: Siemens  SE.No: 0236_14 AB Energy BTG_1000
Accuracy of the monitoring equipment	Uncertainty: 0.00 O <sub>2</sub> and 2.400% CH <sub>4</sub> Uncertainty: 0.000O <sub>2</sub> and 1.940% CH <sub>4</sub>  Verifier cross checked the accuracy with the PDD. However the same is not available in the PDD. Hence the verifier cross checked the same with the calibration test certificates and the instrument error calculation sheet /26/ /20/ and found to be in order.
Measuring/Reading/Recording frequency	Continuously by gas analyzer, the data is automatically archived by the SCADA. The methane content is continuously recorded and read in the PLC system. The data is aggregated hourly into daily reports and every day to monthly reports. The measuring and reporting frequency is in accordance with the monitoring plan and monitoring methodology.
Calculation method (if applicable)	Not Applicable.
Data/Parameter	t <sub>O2,h</sub> and f <sub>VCH4,FG,h</sub>
Data Unit	% and mg/m <sup>3</sup>
Description	Volumetric fraction of O <sub>2</sub> in the exhaust component i in the residual gas in the hour h and Concentration of methane in the exhaust gas of the flare in dry basis at normal conditions in the hour h. It is noted that the description of the

	parameter $f_{V_{CH_4,FG,h}}$ in the registered PDD is not correct. However the parameter is measured as described in the “tool to determine project emissions from flaring gases containing methane”, as well as the registered PDD.
Source of data to be used	Reading from the exhaust gas analyzer (GA02) acquired by SCADA
Value of monitored parameter for the monitoring period	12.083% (Average) 0.2816mg/m <sup>3</sup> (Average)
Monitoring equipment	Model/SE.No: ULTRAMAT 23 – N1-V0- 0038 Manufacturer: Siemens
Accuracy of the monitoring equipment	Uncertainty: 0.5% O <sub>2</sub> and 1.96% CH <sub>4</sub> Uncertainty: 0.5% O <sub>2</sub> and 2.56% CH <sub>4</sub> Uncertainty: 0.5% O <sub>2</sub> and 2.800% CH <sub>4</sub>  Verifier cross checked the accuracy with the PDD. However the same is not available in the PDD. Hence the verifier cross checked the same with the calibration test certificates and the instrument error calculation sheet /26/ /20/ and found to be in order.
Measuring/Reading/Recording frequency	Continuously by gas analyzer, the data is automatically archived by the SCADA. The data is continuously recorded and read in the PLC system. The data is aggregated hourly into daily reports and every day to monthly reports. The measuring and reporting frequency is in accordance with the monitoring plan and monitoring methodology.
Calculation method (if applicable)	Not Applicable

Data/Parameter	Tflare
Data Unit	°C
Description	Temperature in the exhaust gas of flare.
Source of data to be used	Continuous reading from the temperature meter (TT05) acquired by SCADA
Value of monitored parameter for the monitoring period	684.19°C (Average)
Monitoring equipment	Model/SE.No: Probe Model: M1.U07-S00-M00400.1-S20, Transmitter Model: Y1-SEM210/S - Serial number 11-10/63288 Manufacturer: ELSI
Accuracy of the monitoring equipment	Uncertainty: 0.043%, Error; 0.300% Uncertainty:0.043%, Error; 0.000% Uncertainty:0.043%, Error; 1.107% Verifier cross checked the accuracy with the PDD. However the same is not available in the PDD.

	Hence the verifier cross checked the same with the calibration test certificates and the instrument error calculation sheet /26/ /20/ and found to be in order.
Measuring/Reading/Recording frequency	Continuously by temperature meter, the data is automatically archived by the SCADA. The data is continuously recorded and read in the PLC system. The data is aggregated hourly into daily reports and every day to monthly reports. The measuring and reporting frequency is in accordance with the monitoring plan and monitoring methodology.
Calculation method (if applicable)	Not Applicable

Data/Parameter	T
Data Unit	°C
Description	Temperature of the landfill gas
Source of data to be used	Continuous reading from the temperature meter (TT02) acquired by SCADA
Value of monitored parameter for the monitoring period	68.29°C (Average)
Monitoring equipment	Model/SE.No: Probe Model: G1.U10-P20-B0150-S00 Transmitter Model: Y1-SEM203P - Serial number 08-07/305 Manufacturer: ELSI
Accuracy of the monitoring equipment	Uncertainty: 0.131% , Error; 0.018% Uncertainty: 0.421% , Error; 0.000%  Verifier cross checked the accuracy with the PDD. However the same is not available in the PDD. Hence the verifier cross checked the same with the calibration test certificates and the instrument error calculation sheet /26/ /20/ and found to be in order
Measuring/Reading/Recording frequency	Continuously by temperature meter, the data is automatically archived by the SCADA. The data is continuously recorded and read in the PLC system. The data is aggregated hourly into daily reports and every day to monthly reports. The measuring and reporting frequency is in accordance with the monitoring plan and monitoring methodology
Calculation method (if applicable)	Not Applicable

Data/Parameter	P
Data Unit	Pa (the units used in the calculation is Mbar, the same is accepted by the verification team since 1mbar = 100 Pa)
Description	Pressure of the landfill gas
Source of data to be used	Continuous reading from the temperature meter (PT04) acquired by SCADA
Value of monitored parameter for the monitoring period	50.78Pa (Average)
Monitoring equipment	Model/SE.No: 264HS-6407024078

	Manufacturer: ABB		
	Accuracy of the monitoring equipment	Error; 0.577% Error; 1.977% Verifier cross checked the accuracy with the PDD. However the same is not available in the PDD. Hence the verifier cross checked the same with the calibration test certificates /26/ and found to be in order	
	Measuring/Reading/Recording frequency	Continuously by pressure meter, the data is automatically archived by the SCADA. The data is continuously recorded and read in the PLC system. The data is aggregated hourly into daily reports and every day to monthly reports. The measuring and reporting frequency is in accordance with the monitoring plan and monitoring methodology.	
	Calculation method (if applicable)	Not Applicable	
	Data/Parameter	EL <sub>EX,LFG</sub> and EL <sub>IMP</sub>	
	Data Unit	MWh	
	Description	Total amount of electricity exported out of the project boundary and total amount of electricity imported to meet project requirements.	
	Source of data to be used	Continuous reading from the Polyphase meter (EM01) acquired by SCADA	
	Value of monitored parameter for the monitoring period	7,217.405 (Export) 1.082 ( Import)	
	Monitoring equipment	Model/SE.No: EDM1 N680 - 209074056 Manufacturer: GENIUS	
	Accuracy of the monitoring equipment	Uncertainty 0.0824% Uncertainty: 0.054% Verifier cross checked the accuracy with the PDD. However the same is not available in the PDD. Hence the verifier cross checked the same with the calibration test certificates /26/ and found to be in order.	
	Measuring/Reading/Recording frequency	Hourly by electricity meter, the data is automatically archived by the SCADA. The data is continuously recorded and read in the PLC system. The data is aggregated hourly into daily reports and every day to monthly reports. The measuring and reporting frequency is in accordance with the monitoring plan and monitoring methodology	
	Calculation method (if applicable)	Not Applicable	
	<b>Findings</b>	<p>CL 2</p> <p>It is noted that the values for monitoring parameters mentioned in the section D.2 of the MR is not consistent with ER sheets. PP is requested to correct the same.</p> <p>Please refer to Appendix-4 of this report. CL 2 is closed.</p>	
	<b>Conclusion</b>	The monitoring has been carried out in accordance with the monitoring plan contained in the registered PD. All the parameters were monitored and determined as per the registered monitoring plan. Referring to clause 389-391 of the VVS	



	<p>version 09.0, DOE confirms through site visit verification, from the document review, the actual monitoring system complies with the registered monitoring plan. During the verification, all the relevant monitoring parameters of the registered monitoring plan have been verified with regard to the appropriateness of the verification method; the correctness of the values applied for ER calculation, the accuracy and applied QA/QC measures. It is confirmed that all the monitoring parameters have been measured/determined without material misstatements and are in line with all applicable standards and relevant requirements.</p> <p>RINA confirms:</p> <ul style="list-style-type: none"> <li>- That all the parameters stated in the registered PDD have been monitored;</li> <li>- The responsibilities and authorities for monitoring and reporting are in accordance with those stated in the registered PDD;</li> <li>- The monitoring results are consistently recorded as per the approved frequency;</li> </ul> <p>Quality assurance and quality control procedure have been applied in accordance with the registered PDD.</p>
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### E.6.3. Implementation of sampling plan

<b>Means of verification</b>	N/A
<b>Findings</b>	N/A
<b>Conclusion</b>	N/A

**E.7. Compliance with the calibration frequency requirements for measuring instruments**

<b>Means of verification</b>	RINA team checked the calibration certificates and records of the monitoring equipment as given below:			
	Se.No	Calibration date	Validity till	Calibration agency
	485 - 0075923	21/02/2013	15/02/2017	Premier Physic Metrologie
	3051S1CD1A2E12A1AB4D2E1L4Q 4 -8696153	16/02/2015		Premier Physic Metrologie
	485 - 0075924	21/02/2013	15/02/2017	Premier Physic Metrologie
	3051S1CD1A2E12A1AB4D2E1L4Q 4 -8696152	16/02/2015		Premier Physic Metrologie
	485 - 0075925	21/02/2013	08/02/2017	Premier Physic Metrologie
	3051S1CD1A2E12A1AB4D2E1L4Q 4 -8696154	09/02/2015		Premier Physic Metrologie
	3K646612025470	27/02/2013 16/02/2015	15/02/2017	Premier Physic Metrologie
	ULTRAMAT 23 – N1-V7-0538 was replaced with AB Energy BTG_1000 s/n 0236_14	07/07/2014 07/07/2015	06/07/2015 06/07/2016	Pangea Air Liquide
	Probe Model: G1.U10-P20-B0150-S00, Transmitter Model: Y1-SEM203P - Serial number 08-07/305	21/02/2013 16/02/2015	15/02/2017	Premier Physic Metrologie
	264HS-6407024078	21/02/2013 09/02/2015	08/02/2017	Premier Physic Metrologie
	Probe Model: M1.U07-S00-M00400.1-S20, Transmitter Model: Y1-SEM210/S, Serial Number 11-11/63626	21/02/2013 16/02/2015	15/02/2017	Premier Physic Metrologie
	Probe Model: M1.U07-S00-M00400.1-S20, Transmitter Model: Y1-SEM210/S, Serial Number 11-10/63288	20/01/2014 19/01/2015 19/01/2016	18/01/2017	Premier Physic Metrologie
	ULTRAMAT23 - N1-V0-0038	13/01/2014 15/01/2015 13/01/2016	12/01/2017	Pangea/ Air Liquide
	EDMI N680 - 209074056	31/03/2014 29/03/2016	28/03/2018	ERC Philippines
The calibration frequency of all monitoring parameters has been maintained according to the frequency specified in the registered monitoring plan. The calibration of all the equipment's discussed above is valid for the whole verification monitoring period.				
<b>Findings</b>	<p>CL 3 PP is requested to correct the calibration date of FT06_a. The same is not as per the calibration certificate.</p> <p>PP is requested to correct the manufacturer of GA01 provided in the table 4 of section C.1.1 Please refer to Appendix-4 of this report. CL 3 is closed.</p>			
<b>Conclusion</b>	The verifier confirms that the calibration confirms the proper functioning of the monitoring equipment and is valid for the whole verification monitoring period. According to clause 373 (b), and 402 of VVS version 09.0, verification team has checked calibration records to confirm that the frequency of calibration is carried out as specified in the registered monitoring plan (clause 387, 390, and 394 of VVS, version 09.0)			

**E.8. Assessment of data and calculation of emission reductions or net removals****E.8.1. Calculation of baseline GHG emissions or baseline net GHG removals by sinks**

<b>Means of verification</b>	<p>According to the applied methodology “ACM0001”, “Consolidated baseline methodology for landfill gas project activities”, version 05 of 15/12/2006 /06/ and “AMS-I.D”, “Grid connected renewable electricity generation”, version 10 of 23/12/2006 /07/, the emission reductions have been calculated based on the following formula:</p> $ER_y = (MD_{project,y} - MD_{reg,y}) * GWP_{CH4} + EL_y * CEF_{electricity,y} - ET_y * CEF_{thermal,y}$ $EL_y = EL_{EX, LFG} - EL_{IMP}$ $MD_{project,y} = MD_{flared,y} + MD_{electricity,y} + MD_{thermal,y}$ $MD_{flared,y} = (LFG_{flare,y} * w_{CH4} * D_{CH4}) - (PE_{flare,y} / GWP_{CH4})$ $MD_{electricity,y} = LFG_{electricity,y} * w_{CH4} * D_{CH4}$ <p>Since the project doesn't aim to produce any thermal energy <math>ET_y</math> and <math>CEF_{thermal,y}</math> is considered as zero.</p> <p>The audit team cross checked the same with ER spread sheets 01ER calculation sheet_2015 JAN_REV1.xls, 02ER calculation sheet_2015 FEB_REV1.xls, 03ER calculation sheet_2015 MAR_REV1.xls, 04ER calculation sheet_2015 APR_REV1.xls, 05ER calculation sheet_2015 MAY_REV1.xls, 06ER calculation sheet_2015 JUN_REV1.xls, 07ER calculation sheet_2015 JUL_REV1.xls, 08ER calculation sheet_2015 AUG_REV1.xls, 09ER calculation sheet_2015 SEP_REV1.xls, 10ER calculation sheet_2015 OCT_REV1.xls, 11ER calculation sheet_2015 NOV_REV1.xls, 12ER calculation sheet_2015 DEC_REV1.xls and 01ER calculation sheet_2016 JAN_REV1.xls, 02ER calculation sheet_2016 FEB_REV1.xls, 03ER calculation sheet_2016 MAR_REV1.xls, 04ER calculation sheet_2016 APR_REV1.xls, 05ER calculation sheet_2016 MAY_REV1.xls, 06ER calculation sheet_2016 JUN_REV1.xls and found to be correct. RINA also checked the real time data. The entire monitoring system is connected with OMRON Programmable Logic Controller (PLC), which extracts the data from the sensor. The data is then automatically archived by the SCADA system every hour into daily reports and every day into monthly reports and the same is used in emission reduction calculations, which was checked during the site visit and found to be consistent. Further , it is also checked that the monthly sum of <math>LFG_{flare,y}</math> adopted in the ER calculations is much lesser than the difference between monthly main line (<math>LFG_{total,y}</math>) and monthly engine line (<math>LFG_{elect,y}</math>). Hence RINA confirms that the values of <math>LFG_{flare,y}</math> used in ER calculations are conservative. No deviations or corrections noted in the formula, method and values used in ER calculations.</p>
<b>Findings</b>	N/A
<b>Conclusion</b>	Calculations, applied formulae and method for calculation of baseline emissions are in accordance with the registered monitoring plan and are in line with the requirements of the applied methodology “ACM0001”, “Consolidated baseline methodology for landfill gas project activities”, version 05 of 15/12/2006 and “AMS-I.D” “Grid connected renewable electricity generation”, version 10 of 23/12/2006

**E.8.2. Calculation of project GHG emissions or actual net GHG removals by sinks**

<b>Means of verification</b>	Not applicable as this is already covered in the formula used in the ER calculations.
<b>Findings</b>	NA
<b>Conclusion</b>	NA

**E.8.3. Calculation of leakage GHG emissions**

<b>Means of verification</b>	No leakage needs to be accounted under methodology ACM0001 /06/, also as per the registered PDD /01/.
<b>Findings</b>	Leakage emissions =0
<b>Conclusion</b>	The leakage of the project activity has been considered in accordance with the registered monitoring plan and in line with the requirements of the methodology.

#### E.8.4. Summary of calculation of GHG emission reductions or net anthropogenic GHG removals by sinks

<b>Means of verification</b>	<p>Please refer to section E.8.1</p> <p>Further the PP has also deducted the <math>\epsilon</math> equivalent error for the respective measuring devices from the emission reductions: The following is the formula used:</p> $\epsilon_{PE_{\text{flared}}} = \text{Sq.} (\text{err}_{PT04})^2 + (\text{err}_{TT02})^2 + (\text{err}_{FT04\_a})^2 + (\text{err}_{GA02ch4})^2 + (\text{err}_{GA02CO2})^2$ $\epsilon_{MD_{\text{flared before PE}}} = \text{Sq.} (\text{err}_{PT04})^2 + (\text{err}_{TT02})^2 + (\text{err}_{FT04\_a})^2 + (\text{err}_{GA01})^2$ $\epsilon_{MD_{\text{electricity}}} = \text{Sq.} (\text{err}_{PT04})^2 + (\text{err}_{TT02})^2 + (\text{err}_{FT05\_a})^2 + (\text{err}_{GA01})^2$ $\epsilon_{EL} = \text{Sq.} (\text{err}_{EM01})^2$ <p>RINA confirms that deduction of instrumental error from ER calculations results in most conservative value and hence accepted. In addition it is also noted that for the temperature meter and pressure meter the error is calculated based on the results obtained from the calibration test certificates /26/ and the linear regression model. The formulas used in the linear regression model were further cross check with the website easycalculation.com /46/ and found that it is a universally accepted formula and hence accepted by RINA.</p>
<b>Findings</b>	N/A
<b>Conclusion</b>	<p>RINA confirms:</p> <ul style="list-style-type: none"> <li>- All the data and parameters were monitored in accordance with the registered PDD;</li> <li>- The data presented in the monitoring report /02/ were assessed by reviewing in detail project documentation, collection of monitored data, observation of established monitoring and reporting practices and assessment of the reliability of monitoring equipment.</li> <li>- The calculation of emission reductions have been carried out in accordance with the formulae and methods described in the registered PDD, the applied methodology and methodological tools;</li> </ul> <p>Emission factor and default values have been applied in the calculation in accordance to the registered PDD.</p>

#### E.8.5. Comparison of actual GHG emission reductions or net anthropogenic GHG removals by sinks with estimates in registered PDD

<b>Means of verification</b>	<p>The emission reduction calculations provided in the spreadsheet/08/ have been verified to be correct and in line with the registered PDD /01/.</p> <p>The emission reductions from the project for the monitoring period as reported in the monitoring report revision 02 of 08/10/2017 /02/ is equivalent to 87, 144 tCO<sub>2e</sub>. The reported emission reductions are 33.52% lower than the estimated emission reduction of 131,084 tCO<sub>2e</sub> for the period of eighteen months for the period from 2015 to 2016 , as per the registered PDD/01/. The observations are discussed in the below section E.8.6</p>
<b>Findings</b>	N/A
<b>Conclusion</b>	<p>Calculations, applied formulae and method for calculation of Emission Reductions are in accordance with the registered monitoring plan and are in line with the requirements of the applied methodology "ACM0001", "Consolidated baseline methodology for landfill gas project activities", version 05 of 15/12/2006 and "AMS-I.D" "Grid connected renewable electricity generation", version 10 of 23/12/2006</p>

#### E.8.6. Remarks on difference from estimated value in registered PDD

<b>Means of verification</b>	N/A
<b>Findings</b>	N/A
<b>Conclusion</b>	N/A

### E.8.7. Actual GHG emission reductions or net anthropogenic GHG removals by sinks during the first commitment period and the period from 1 January 2013 onwards

<b>Means of verification</b>	GHG emission reductions or net GHG removals by sinks reported up to 31 December 2012	GHG emission reductions or net GHG removals by sinks reported from 1 January 2013 onwards
	NA	87, 144 tCO <sub>2</sub> e
<b>Findings</b>	N/A	
<b>Conclusion</b>	The actual monitoring period does not fall into the first commitment period.	

### SECTION F. Internal quality control

The draft final verification report before being submitted to the client were subjected to an independent internal technical review to confirm that all verification activities had been completed according to the pertinent RINA instructions.

The technical review was performed by a technical reviewer(s) qualified in accordance with RINA's qualification scheme for CDM validation and verification.

### SECTION G. Verification opinion

>> RINA Service Spa (RINA) has performed verification of the emission reductions reported for the project activity "Quezon City Controlled Disposal Facility Biogas Emission Reduction Project" in Philippines, CDM Registration Reference N° 1258, for the period 01/01/2015 to 30/06/2016, with regard to the relevant requirements for CDM activities.

The project participants of the "Quezon City Controlled Disposal Facility Biogas Emission Reduction Project" project are responsible for:

- the preparation of greenhouses gas emissions data and the reported greenhouse gas emission reductions from the project on the basis set out in the monitoring plan contained in the registered project design document version 11 of 30/11/2007.
- the development and maintenance of records and reporting procedures in accordance with that plan, including the calculation and determination of greenhouse gas emission reductions of the project

It is the responsibility of RINA to express an independent verification opinion about the project's conformity with the requirements of paragraph 62 of the CDM modalities and procedures and on the reported greenhouse gas emission reductions from the project.

Based on documented evidence and corroborated by an on-site assessment RINA can confirm that:

- the project has been implemented and operated as per the registered PDD;
- the monitoring report and other supporting documents provided are complete and verifiable and in accordance with the applicable CDM requirements;
- the monitoring is in place as per the applied baseline and monitoring methodology;
- the monitoring complies with the monitoring plan in the registered PDD;
- the monitoring plan in the registered PDD is as per the applied baseline and monitoring methodology.

### SECTION H. Certification statement

- It is RINA's opinion that the GHG emission reduction stated in the monitoring report version 02 of 08/10/2017 for the "Quezon City Controlled Disposal Facility Biogas Emission Reduction Project" for the period 01/01/2015 to 30/06/2016 are fairly stated. The GHG emission reductions were calculated correctly on the basis of the approved baseline and monitoring methodology "ACM0001", "Consolidated baseline methodology for landfill gas project activities", version 05 of 15/12/2006 and "AMS-I.D", "Grid connected renewable electricity generation", version 10 of 23/12/2006 and the monitoring plan contained in the registered PDD.
- Hence RINA is able to certify that the emission reductions from the project during the monitoring period 01/01/2015 to 30/06/2016 amount to 87,144 tCO<sub>2</sub>e.

## Appendix 1. Abbreviations

Abbreviations	Full texts
BE	Baseline Emissions
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CDM M&P	Modalities and Procedures CDM
CER(s)	Certified Emission Reduction(s)
CH <sub>4</sub>	Methane
CL	Clarification Request
CO <sub>2</sub>	Carbon dioxide
CO <sub>2</sub> e	Carbon dioxide equivalent
CRT	Coordination and Technical Control Staff
DCI	Certification Division of RINA Services Spa
DNA	Designated National Authority
DOE	Designated Operational Entity
EB	Executive Board
ER	Emission Reductions
FAR	Forward Action Request
GHG(s)	Greenhouse gas(es)
GWP	Global Warming Potential
HDPE	High Density Polyethylene
IPCC	Intergovernmental Panel on Climate Change
LoA	Letter of Approval
MoV	Means of Verification
MR	Monitoring Report
NGO	Non-governmental Organization
ODA	Official Development Assistance
PDD	Project Design Document
PE	Project Emission
PO	Purchase Order
POG	Payatas Operating Group
PP(s)	Project Participant(s)
PPA	Power Purchase Agreement
Ref.	Document Reference
RINA	RINA Services S.p.A.
SS(s)	Sectoral Scope(s)
TA(s)	Technical Area(s)
UNFCCC	United Nations Framework Convention on Climate Change
VVS	Validation and Verification Standard

## Appendix 2. Competence of team members and technical reviewers



RINA

### CERTIFICATO DI QUALIFICA QUALIFICATION CERTIFICATE

Si attesta che il sig./sig.ra:  
We declare that Mr/Mrs/Ms:

Rekha Menon

è qualificato come<sup>1</sup>:  
is qualified as:

CDM-TEC, -VAL, -VER, -TL  
ITRP

per le seguenti aree tecniche:  
for the following technical areas:

1.2, 2.1, 13.1, 13.2, 14.1

AREE TECNICHE TECHNICAL AREAS	DESCRIZIONE DELL'AREA TECNICA TECHNICAL AREA DESCRIPTION	SCOPO SETTORIALE SECTORAL SCOPE
1.2	Renewables	1
2.1	Energy Demand	2
13.1	Solid Waste and wastewater	13
13.2	Manure	13
14.1	Afforestation and reforestation	14

in accordo alle istruzioni dell'unità Sostenibilità & Cambiamenti Climatici.  
in accordance with the instructions of the Sustainability & Climate Change Unit.

REVISIONE REVISION	DATA DATE	MOTIVAZIONI PER LA REVISIONE REASON FOR THE REVISION
0	06-03-2008	-
11	31/03/2017	Update qualification as ITRP

Il Resp. QPT  
Head of QPT

<sup>1</sup> Legend:

VAL: Validator  
VER: Verifier  
TEC: Technical Expert  
TL: Team Leader  
FIN-EXP: Financial Expert  
DET: Determiner

CDM: Clean Development Mechanism  
VCS: Verified Carbon Standard  
GS: Gold Standard  
SCS: SocialCarbon Standard  
JI: Joint Implementation

RINA Services S.p.A. è accreditato da UNFCCC, quale Entità Operativa Designata (DOE), per condurre la Validazione e la Verifica di Progetti CDM, da VCSA per condurre la Validazione e la Verifica di Progetti VCS, da GS Foundation, per condurre la Validazione e la Verifica di Progetti GS, da Ecologia Institute per condurre la Validazione e la Verifica di rapporti SCS.

RINA Services S.p.A. is accredited by the UNFCCC, as Designated Operational Entity (DOE), to carry out Validation and Verification of CDM Projects, by the VCSA, to carry out Validation and Verification of VCS Projects, by the GS Foundation, to carry out Validation and Verification of GS Projects and by the Ecologia Institute, to carry out Validation and Verification of SCS Reports.

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RINA

**CERTIFICATO DI QUALIFICA**  
**QUALIFICATION CERTIFICATE**

 Si attesta che il sig./sig.ra: **Amalorpavanathan Cyril Augustus Arokiasamy**

We declare that Mr/Mrs/Ms: \_\_\_\_\_

 è qualificato come<sup>1</sup>:  
 is qualified as:

 CDM-TEC, CDM-VAL, CDM-VER, CDM-TL,  
 ITRP

 per le seguenti aree tecniche:  
 for the following technical areas:

1.1, 1.2, 3.1, 5.1, 13.1

AREE TECNICHE TECHNICAL AREAS	DESCRIZIONE DELL'AREA TECNICA TECHNICAL AREA DESCRIPTION	SCOPO SETTORIALE SECTORAL SCOPE
1.1	Thermal energy generation	1
1.2	Renewables	1
3.1	Energy Demand	3
5.1	Chemical Industry	5
13.1	Solid Waste and wastewater	13

 in accordo alle istruzioni della Divisione Certificazione.  
 in accordance with the instructions of the Certification Division.

REVISIONE REVISION	DATA DATE	MOTIVAZIONI PER LA REVISIONE REASON FOR THE REVISION
0	30/06/2010	-
13	31/03/2017	Updated qualification as ITRP

 Il Resp. QPT  
 Head of QPT


<sup>1</sup> Legend:
 VAL: Validator  
 VER: Verifier  
 TEC: Technical Expert  
 TL: Team Leader  
 FIN-EXP: Financial Expert  
 DET: Determiner

 CDM: Clean Development Mechanism  
 VCS: Verified Carbon Standard  
 GS: Gold Standard  
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RINA Services S.p.A. è accreditato da UNFCCC, quale Entità Operativa Designata (DOE), per condurre la Validazione e la Verifica di Progetti CDM, da VCSA per condurre la Validazione e la Verifica di Progetti VCS, da GS Foundation, per condurre la Validazione e la Verifica di Progetti GS, da Ecologia Institute per condurre la Validazione e la Verifica di rapporti SCS

RINA Services S.p.A. is accredited by the UNFCCC, as Designated Operational Entity (DOE), to carry out Validation and Verification of CDM Projects, by the VCSA, to carry out Validation and Verification of VCS Projects, by the GS Foundation, to carry out Validation and Verification of GS Projects and by the Ecologia Institute, to carry out Validation and Verification of SCS Reports

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RINA

**CERTIFICATO DI QUALIFICA**  
**QUALIFICATION CERTIFICATE**

Si attesta che il sig./sig.ra:

Hui Feng Liu

We declare that Mr/Mrs/Ms:

è qualificato come<sup>1</sup>:  
is qualified as:CDM -TEC, -VAL,- VER, -TL  
ITRPper le seguenti aree tecniche:  
for the following technical areas:

1.1, 1.2, 8.1, 9.2, 13.1

AREE TECNICHE TECHNICAL AREAS	DESCRIZIONE DELL'AREA TECNICA TECHNICAL AREA DESCRIPTION	SCOPO SETTORIALE SECTORAL SCOPE
1.1	Thermal energy generation	1
1.2	Renewables	1
8.1	Mining and mineral processes	8
9.2	Iron, steel and ferro-alloy production	9
13.1	Solid waste and wastewater	13

in accordo alle istruzioni dell'unità Sostenibilità & Cambiamenti Climatici.  
in accordance with the instructions of the Sustainability & Climate Change Unit.

REVISIONE REVISION	DATA DATE	MOTIVAZIONI PER LA REVISIONE REASON FOR THE REVISION
0	10/09/2010	-
11	31/03/2017	Updating qualification as ITRP

 Il Resp. QPT  
 Head of QPT


<sup>1</sup> Legend:
 VAL: Validator  
 VER: Verifier  
 TEC: Technical Expert  
 TL: Team Leader  
 FN-EXP: Financial Expert  
 DET: Determiner

 CDM: Clean Development Mechanism  
 VCS: Verified Carbon Standard  
 GS: Gold Standard  
 SCS: SocialCarbon Standard  
 JI: Joint Implementation

RINA Services S.p.A. è accreditato da UNFCCC, quale Entità Operativa Designata (DOE), per condurre la Validazione e la Verifica di Progetti CDM, da VCSA per condurre la Validazione e la Verifica di Progetti VCS, da GS Foundation, per condurre la Validazione e la Verifica di Progetti GS, da Ecologic Institute per condurre la Validazione e la Verifica di rapporti SCS

RINA Services S.p.A. is accredited by the UNFCCC, as Designated Operational Entity (DOE), to carry out Validation and Verification of CDM Projects, by the VCSA, to carry out Validation and Verification of VCS Projects, by the GS Foundation, to carry out Validation and Verification of GS Projects and by the Ecologic Institute, to carry out Validation and Verification of SCS Reports

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### Appendix 3. Documents reviewed or referenced

No.	Author	Title	References to the document	Provider
1	Pangea Green Energy S.r.l.	CDM-PDD for project activity “Quezon City Controlled Disposal Facility Biogas Emission Reduction Project” in Philippines	version 11 of 30/11/2007	Project Participant
2	Pangea Green Energy Philippines, Inc:	Monitoring report for project activity “Quezon City Controlled Disposal Facility Biogas Emission Reduction Project” in Philippines”	version 0.0 of 05/09/2016  version 01 of 23/05/2017  version 02 of 08/10/2017	Project Participant
3	CDM Executive Board	Clean Development Mechanism Project Cycle Procedure	Version 09.0 of 20/02/2015	Others
4	CDM Executive Board	Clean Development Mechanism Project Standard	Version 09.0 of 20/02/2015	Others
5	CDM Executive Board	Clean Development Mechanism Validation and Verification Standard	Version 09.0 of 20/02/2015	Others
6	CDM Executive Board	Baseline and monitoring methodology “ACM0001”, “Consolidated baseline methodology for landfill gas project activities” .	version 05 of 15/12/2006	Others
7	CDM Executive Board	Baseline and monitoring methodology “AMS-I.D”, “ Grid connected renewable electricity generation “ .	version 10 of 23/12/2006	Others
8	Pangea Green Energy Philippines, Inc	Emission reduction calculation spread sheets: 01ER calculation sheet_2015_JAN.xls, 02ER calculation sheet_2015_FEB.xls, 03ER calculation sheet_2015_MAR.xls, 04ER calculation sheet_2015_APR.xls, 05ER calculation sheet_2015_MAY.xls, 06ER calculation sheet_2015_JUN.xls, 07ER calculation sheet_2015_JUL.xls, 08ER calculation sheet_2015_AUG.xls, 09ER calculation sheet_2015_SEP.xls, 10ER calculation sheet_2015_OCT.xls, 11ER calculation sheet_2015_NOV.xls, 12ER calculation sheet_2015_DEC.xls)  Emission reduction calculation spread sheets: 01ER calculation sheet_2016_JAN.xls, 02ER calculation sheet_2016_FEB.xls, 03ER calculation sheet_2016_MAR.xls, 04ER calculation sheet_2016_APR.xls, 05ER calculation sheet_2016_MAY.xls, 06ER calculation sheet_2016_JUN.xls,  Total mr 12.xlsx	submitted on 23/03/2017	Project Participants

		<p>Instrument Errors-Revision 00.xls</p> <p>Emission reduction calculations provided in the form of a spreadsheet (01ER calculation sheet_2015 JAN_REV1.xls, 02ER calculation sheet_2015 FEB_REV1.xls, 03ER calculation sheet_2015 MAR_REV1.xls, 04ER calculation sheet_2015 APR_REV1.xls, 05ER calculation sheet_2015 MAY_REV1.xls, 06ER calculation sheet_2015 JUN_REV1.xls, 07ER calculation sheet_2015 JUL_REV1.xls, 08ER calculation sheet_2015 AUG_REV1.xls, 09ER calculation sheet_2015 SEP_REV1.xls, 10ER calculation sheet_2015 OCT_REV1.xls, 11ER calculation sheet_2015 NOV.xls_REV1, 12ER calculation sheet_2015 DEC_REV1.xls), 01ER calculation sheet_2016 JAN_REV1.xls, 02ER calculation sheet_2016 FEB_REV1.xls, 03ER calculation sheet_2016 MAR_REV1.xls, 04ER calculation sheet_2016 APR_REV1.xls, 05ER calculation sheet_2016 MAY_REV1.xls, 06ER calculation sheet_2016 JUN_REV1.xls</p> <p>Instrument Errors-Revision02_DF.xls</p> <p>Total mr_12_REV1.xls</p>	<p>Version 02 submitted on 08/10/2017</p>	
9	Environmental Protection and Waste Management Department of Quezon City	Environmental clearance	<p>Issued on 08/01/2015 valid until 31/12/2015</p> <p>Also issued on 13/01/2016 valid until 31/12/2016</p>	Project Participants
10	Department of the Building official, Annual and Safe Building Inspection Division	Certificate of operation: internal combustion engine	<p>issued 09/09/2014, valid until 09/09/2015</p> <p>issued 14/10/2015, valid until 30/09/2016</p> <p>Also issued 14/10/2016, valid until 27/09/2017</p>	Project Participants
11	Department of Environment and Natural Resources, Environmental Management Bureau	Permit to operate	<p>dated 11/07/2013, valid until 08/02/2018</p>	Project Participants
12	CDM Executive Board	Monitoring report form (CDM-MR-FORM)	<p>version 04.0 of 25/06/2014</p>	Others

13	CDM Executive Board	Monitoring report form (CDM-MR-FORM)	version 05.1 of 04/05/2015	Others
14	Department of the Interior and Local Government Bureau of Fire Protection National Capital Region Quezon City Fire District Diliman	Fire safety inspection certificate	issued on 13/01/2014 – valid till 08/01/2016  also issued on 18/01/2016 – valid till 17/01/2017	Project Participants
15	Office of the Mayor Business Permits & Licence Office	Business Permit	dated 30/01/2014, valid until 31/12/2014  Also dated 23/01/2015, valid until 31/12/2015	Project Participants
16	Pangea Green Energy Philippines, Inc	SCADA (Supervisory Control and Data Acquisition) reports that registered the raw data for the months 01/01/2015 to 30/06/2016.	-----	Project Participants
17	Pangea Green Energy S.r.l	Machine Book which gives the maintenance requirement for each component of the biogas plant i.e. flare, engine, blower and chiller heat exchanger including frequency and the records of maintenance performed.	-----	Project Participants
18	Pangea Green Energy Philippines	Plant organizational chart	dated 03/03/2014	Project Participants
19	Pangea Green Energy S.r.l	Emergency Management Procedures (PGSYS020), Rev.00.	-----	Project Participants
20	Pangea Green Energy Philippines	Inc I-Error calculation spread sheet – Instrument Errors – Revision. XIs for the period 01/01/2015 to 30/06/2015.	-----	Project Participants
21	Pangea Green Energy	Internal audit reports	dated 05/04/2016	Project Participants
22	Pangea Green Energy	Training records for plant health and security procedures	dated 16/06/2016	Project Participants
23	Pangea Green Energy	Pangea Green Energy : Work out instructions for ER calculation procedure, WIBIO001	rev:00, dated 29/04/2009	Project Participants
24	Pangea Green Energy	Pangea Green Energy – Roles and Job description	rev.00 submitted on 07/03/2013	Project Participants
25	Pangea Green Energy	Values on atmospheric pressure, issued by the Department of Science and Technology Philippine Atmospheric Geophysical and Astronomical Services Administration (PAGASA) for the period 1971-2000	-----	Project Participants
26	Premier Phisic metrologie	Premier Phisic metrologie – Calibration certificates for parameters FT03_a, FT04_a dated 16/02/2015 and FT05_a dated 09/02/2015	-----	Project Participants

		<p>Premier Phisic metrologie – Calibration certificates for parameters FT06_a, dated 16/02/2015</p> <p>Pangea/ Air liquid – Calibration certificates for parameters GA01 dated 07/07/2015</p> <p>Pangea/ Air liquid – Calibration certificates for parameters GA02 dated 13/01/2014, 15/01/2015 and 13/01/2016</p> <p>Premier Phisic metrologie –Calibration certificates for parameters TT02, dated 21/02/2013 and 16/02/2015</p> <p>Premier Phisic metrologie –Calibration certificates for parameters TT03 dated 21/02/2013 and 16/02/2015</p> <p>Premier Phisic metrologie –Calibration certificates for parameters TT05 dated 20/01/2014, 19/01/2015 and 19/01/2016</p> <p>Premier Phisic metrologie –Calibration certificate for parameter PT04 dated 21/02/2013 and 09/02/2015</p> <p>ERC Philippines –Calibration certificate for parameter EM01 dated 31/03/2014 and 29/03/2016</p>		
27	ABB	Letter from ABB on the calibration frequency of flowmeters,model no.264, dated 16/12/2009	-----	Project Participants
28	EDMI	Letter from EDM I Ltd on the calibration frequency of Energy meter, model no.N680, dated 3/12/2010	-----	Project Participants
29	Emerson Process Management	Product data sheet from Emerson Process Management on the calibration frequency , dated 2008-2009	-----	Project Participants
30	ELSI s.r.l	Letter from ELSI s.r.l on the calibration frequency of thermocouple model no: G1.U10-P20-B0150-S00, M1.U07- S00-M00400.1-S20 dated 23/02/2010	-----	Project Participants
31	Siemens	Siemens manual on calibration frequency of model no. ULTRAMAT23 gas analyser submitted on 07/03/2013.	-----	Project Participants
32	DNV	Validtion report for project activity “Quezon City Controlled Disposal Facility Biogas Emission Reduction Project” in Philippines	version 02 of 02/08/2007	Project Participants
33	Payatas Operations Group (POG)	Waste disposal rates for the period 2001 to 2006	-----	Project Participants
34	POG	Request letter to City Administartor on supply of free electricity from Quezon city disposal facility, dated 15/12/2008	-----	Project Participants
35	Pangea Green Energy	Letter to POG on acceptance of free supply of electricity to POG, dated 26/01/2009	-----	Project Participants
36	Biotechnogas Srl	Comissioning certificate, dated 18/03/2008	-----	Project Participants
37	Pangea Green Energy	<p>Quality procedures :</p> <p>PGBIO001, rev.00, dated 01/04/2006: Biogas plant operation, maintenance activities, and control.</p> <p>PGSYS001, rev.01: Document standard (document control procedure).</p>	-----	Project Participants

		PGSYS003, rev.00, dated 01/04/2008 Non conformity preventive and corrective action management . PGSYS002, rev.00, dated 01/04/2006: Internal Audit . POTR001, rev.00 of 09/01/2007: Human resource Management (provides the procedures on identification of the needs of training, qualification and planning).		
38	POG	Request letter to Pangea Green Energy Philippines INC. on dumping of garbage on the landfill site, dated 15/12/2009.	-----	Project Participants
39	IPCC	2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 5 , Waste, Chapter 2	-----	Project Participants
40	CDM Executive Board	Methodological tool "Tool to determine project emissions from flaring gases containing Methane", EB 28, Annex 13	-----	Others
41	City Planning and Development Office, Republic of the Philippines, Quezon City	Locational Clearance	dated 29/01/2014 valid until 29/04/2016	Project Participants
42	Pangea Green Energy Philippines, Inc	Purchase Order placed for gensets, dated 25/05/2012	-----	Project Participants
43	ATME S.p.A	Test and commissioning report of 2*320 kW IVECO engines	dated 08/03/2013	Project Participants
44	Easy Calculation	Statistic formulas used were cross checked with the website easy calculation .com available at weblink <a href="http://easycalculation.com/statistics/learn-regression.php">http://easycalculation.com/statistics/learn-regression.php</a> , in English,	retrieved on 12/03/2017	RINA
45	CDM Executive board	<a href="http://cdm.unfccc.int/Issuance/MonitoringReports">http://cdm.unfccc.int/Issuance/MonitoringReports</a> , Web page of monitoring report uploaded	dated 19/02/2015	Others
46	Pangea Green Energy Philippines, Inc	Power Purchase Agreement between MERALCO and Pangea Green Energy Philippines, Inc	, dated 31/05/2012	Project Participants
47	AB Energy	Letter from AB Energy on the calibration frequency of methane analyzer	dated 04/05/2015	Project Participants
48	RINA	Previous verification report ,Revision no. 1.1Aa	dated 04/08/2016	RINA

## Appendix 4. Clarification requests, corrective action requests and forward action requests

Table 1. Remaining FAR from validation and/or previous verification

FAR ID	XX	Section no.	XX	Date: DD/MM/YYYY
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<b>Description of FAR</b>	
<b>Project participant response</b>	<b>Date:</b> DD/MM/YYYY
<b>Documentation provided by project participant</b>	
<b>DOE assessment</b>	<b>Date:</b> DD/MM/YYYY

Table 2. CL from this verification

<b>CL ID</b>	01	<b>Section no.</b>	E.3	<b>Date:</b> 04/04/2017
<b>Description of CL</b>				
PP is requested to update the dates of the 12 <sup>th</sup> MP in table 3 of section B.1 of the MR.				
PP is requested to correct the emission reductions value provided in page 2 of the MR. The same is not consistent with ER spread sheets and other pages of the MR.				
<b>Project participant response</b>				<b>Date:</b> 23/05/2017
<i>Dates of the 12th MP in table 3 of section B.1 of the MR corrected</i>				
<i>Emission reductions value is made consistent in MR and ER spread sheets.</i>				
<b>Documentation provided by project participant</b>				
MR12 rev1				
<b>DOE assessment</b>				<b>Date:</b> DD/MM/YYYY
The dated are updated in table 3 of the revised MR. Emission reductions in ER sheets and MR made consistent.				
CL 01 is closed.				

<b>CL ID</b>	02	<b>Section no.</b>	E.6.2	<b>Date:</b> 04/04/2017
<b>Description of CL</b>				
It is noted that the values for monitoring parameters mentioned in the section D.2 of the MR is not consistent with ER sheets. PP is requested to correct the same.				
<b>Project participant response</b>				<b>Date:</b> 23/05/2017
<i>Section D.2 of the MR is corrected and consistent with ER sheet</i>				
<b>Documentation provided by project participant</b>				
MR12 rev1				
<b>DOE assessment</b>				<b>Date:</b> DD/MM/YYYY
The values of the section D.2 of the MR made consistent with the ER spread sheets.				
CL 02 is closed.				

<b>CL ID</b>	03	<b>Section no.</b>	E.7	<b>Date:</b> 04/04/2017
<b>Description of CL</b>				
PP is requested to correct the calibration date of FT06_a. The same is not as per the calibration certificate.				
PP is requested to correct the manufacturer of GA01 provided in the table 4 of section C.1.1				
<b>Project participant response</b>				<b>Date:</b> 23/05/2017
<i>Table 4 of section C1 in the MR is corrected related GA01 and FT06_a</i>				
<b>Documentation provided by project participant</b>				
MR12 rev1				
<b>DOE assessment</b>				<b>Date:</b> DD/MM/YYYY

The calibration date of FT06\_a and manufacturer of GA01 is corrected in the revised MR.  
CL 03 is closed.

**Table 3. CAR from this verification**

<b>CAR ID</b>	XX	<b>Section no.</b>		<b>Date:</b> DD/MM/YYYY
<b>Description of CAR</b>				
<b>Project participant response</b>				<b>Date:</b> DD/MM/YYYY
<b>Documentation provided by project participant</b>				
<b>DOE assessment</b>				<b>Date:</b> DD/MM/YYYY

**Table 4. FAR from this verification**

<b>FAR ID</b>	XX	<b>Section No.</b>	XX	<b>Date:</b> DD/MM/YYYY
<b>Description of FAR</b>				
<b>Project participant response</b>				<b>Date:</b> DD/MM/YYYY
<b>Documentation provided by project participant</b>				
<b>DOE assessment</b>				<b>Date:</b> DD/MM/YYYY

<i>Version</i>	<i>Date</i>	<i>Description</i>
01.0	23 March 2015	Initial publication.
Decision Class: Regulatory Document Type: Form Business Function: Issuance Keywords: project activities, verifying and certifying		