

BID BULLETIN NO. 2
For LBP-HOBAC-ITB-GS-20180227-02

PROJECT : **One (1) Lot Monitoring Equipment and Data Monitoring System for the Clean Development Mechanism (CDM) Program of Activities – Piggery Project**

IMPLEMENTOR : **Procurement Department**

DATE : **April 5, 2018**

This Bid Bulletin is issued to modify, amend or clarify items in the Bid Documents. This shall form an integral part of the Bid Documents.

The modifications, amendments or clarifications are as follows:

- 1) The Terms of Reference (Annex A), Section VI (Schedule of Requirements), Section VII (Specifications) and Checklist of the Bidding Documents (Items 5 & 6 of the Technical Component and Item 3 of the Financial Component) have been revised. Please see attached revised Annexes A-1 to A-7 and the specific sections of the Bidding Documents.
- 2) The calculation of emission reduction and the template for the monthly monitoring report have been added. Please see attached Annexes C-1 & C-2 and D.
- 3) Clarification on bidder's query:

BIDDER'S QUERY	LANDBANK'S RESPONSE
1) Are all the biogas systems listed fully operational?	<ul style="list-style-type: none"> • To date, not all farms have an operational biogas digester. This is the reason that the project will be implemented in phases. <p>For Phase 1, the initial thirty (30) units of monitoring equipment shall be installed in the farms listed. (see attached Revised Annex A-7)</p>
2) Are the existing metering facility already installed in the farms, such that the suppliers scope is to replace only the kWh meter with remote monitoring capability?	<ul style="list-style-type: none"> • The supplier will be expected to install a new set of metering system in all the farms, whether there is an existing metering system in the farm or none. <p>Futhermore, the supplier will have back-up units available should the newly installed system have any defects. The</p>

<p>3) Who will supply the other components/materials that will/might be needed other than the kWh meters, cabinets and brackets such as current transformers, additional cables and connectors? Will the farm owners provide or pay for this?</p> <p>4) What is the installed plant capacity?</p> <p>5) Is this the formula to be used for the calculation of Emission Reductions (ER)?</p> <p>Formula:</p> $ER_y = BE_y - PE_y - LE_y$ <p>Where:</p> <p>ER_y = Emission reductions in year y</p> <p>BE_y = Baseline emissions in year y</p> <p>PE_y = Project emissions in year y</p> <p>LE_y = Leakage emissions in year y</p> <p>The following are follow-up questions for Item No. 5:</p> <ul style="list-style-type: none"> • Are there data for the Baseline and Leakage ERs? As we understand, this includes daily monitoring of the amount of biomass coming in the system. Are monitoring systems/protocols available for this? • Are there installed flares onsite? If yes, what is the type of flare being/to be 	<p>back-up unit will be installed within the prescribed time to minimize loss of data and to ensure smooth CDM monitoring. Please see Revised Terms of Reference, Section III. A, Item No. 6 for reference.</p> <ul style="list-style-type: none"> • The supplier shall provide these as part of their bid. • Please refer to the updated list of farms per Revised Annex A-7. • Yes. This is the general equation. <p>Please refer to the attached excerpt from the CDM-CPA-DD regarding ER calculations per attached Annexes C-1 & C-2. Please take note that the Post-Registration Change (PRC) provision in the CDM methodology.</p> <ul style="list-style-type: none"> • ERs shall be monitored through electricity generation per PRC in CDM methodology. Please see attached Annexes C-1 & C-2 for reference. • Flares may be installed but it is not included in the ER monitoring. Please see attached
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<p>used? Is there a temperature gauge to monitor the exhaust gas for the flare?</p> <ul style="list-style-type: none"> • Will LANDBANK provide the format for the reports? 	<p>Annexes C-1 & C-2 for reference.</p> <ul style="list-style-type: none"> • Monitoring reports require data for hourly kW generation based on electricity readings. Please see attached Annex D for the template of sample format for the monthly monitoring report. • The green electricity generated should be reported on a per-farm basis, with capability to generate totals on a regional (North-Central Luzon, Southern Luzon, Visayas and Mindanao) and national scales. • Format of monthly kWh generation and visual analysis of data (via graphs and charts) will be discussed by LANDBANK and the successful bidder for the contract.
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ALWIN I. REYES
Assistant Vice President
Procurement Department and
HOBAC Secretariat

Section VI. Schedule of Requirements

The delivery schedule expressed as weeks/months stipulates hereafter a delivery date which is the date of delivery to the project site.

Item Description	Delivery Period & Destination
One (1) Lot Monitoring Equipment and Data Monitoring System for the Clean Development Mechanism (CDM) Program of Activities (PoA) – Piggery Project	<p>Per attached Revised Terms of Reference (Section C of Revised Annex A).</p> <p><u>Contact Person:</u> AVP Prudencio E. Calado III Environmental Program and Management Department (EPMD)</p> <p><u>Contact Numbers:</u> 405-7339; 405-7238</p>

Conforme:

Name of Bidder

Signature over Printed Name of
Authorized Representative

Position

Specifications

Specifications	Statement of Compliance
	<p style="text-align: center;">Bidders must state below either “Comply” or “Not Comply” against each of the individual parameters of each specification.</p> <p>Statements of “Comply” or “Not Comply” must be supported by evidence in a Bidders Bid. Evidence shall be in the form of manufacturer’s un-amended sales literature, unconditional statements of specification and compliance issued by the manufacturer, samples, independent test data etc., as appropriate. A statement that is not supported by evidence or is subsequently found to be contradicted by the evidence presented will render the Bid under evaluation liable for rejection. A statement either in the Bidders statement of compliance or the supporting evidence that is found to be false either during Bid evaluation, post-qualification or the execution of the Contract may be regarded as fraudulent and render the Bidder or supplier liable for prosecution subject to the provisions of ITB Clause 3.1(a)(ii) and/or GCC Clause 2.1(a)(ii)</p>
<p>One (1) Lot Monitoring Equipment and Data Monitoring System for the Clean Development Mechanism (CDM) Program of Activities (PoA) – Piggery Project</p> <p>Compliance to the Terms of Reference – Annexes A-1 to A-7.</p> <p>Service Provider/Contractor shall:</p> <p>a) Supply, deliver, install, commission and maintain the monitoring system composed of the following:</p> <ul style="list-style-type: none"> ▪ 40 units Digital Electric Meters ▪ Data transmission and monitoring system for all piggery farms <p>b) Provide access to an infrastructure facility capable of receiving, storing and processing the data from the piggery farm locations nationwide until June 30, 2021, with option to extend.</p> <p>c) Develop and customize a CDM data monitoring system capable of electronic data collection, transmission and report generation.</p> <p>d) Ensure that the units will be fully functional for the duration of the project until June 30, 2021.</p>	<p>Please state here either “Comply” or “Not Comply”</p>

Conforme:

Name of Bidder

Signature over Printed Name of
Authorized Representative

Position

Checklist of Bidding Documents for Procurement of Goods and Services

Documents should be arranged as per this Checklist. Kindly provide folders or guides, dividers and ear tags with appropriate labels.

The Technical Component (First Envelope) shall contain the following:

1. Duly notarized Secretary's Certificate attesting that the signatory is the duly authorized representative of the prospective bidder and granted full power and authority to do, execute and perform any and all acts necessary and/or to represent the prospective bidder in the bidding, if the prospective bidder is a corporation, partnership, cooperative, or joint venture (sample form – Form No. 7).
2. Duly notarized Omnibus Sworn Statement (sample form – Form No.6).
3. Eligibility requirements.
 - **Legal Document**
 - 3.a. PhilGEPS Certificate of Registration (Platinum Membership). All documents enumerated in its Annex A must be updated; or
 - 3.b. Class "A" eligibility documents as follows:
 - Registration Certificate from SEC, Department of Trade and Industry (DTI) for Sole Proprietorship, or CDA for Cooperatives, or any proof of such registration as stated in the Bidding Documents;
 - Valid and current mayor's permit issued by the city or municipality where the principal place of business of the prospective bidder is located; and
 - Tax Clearance per Executive Order 398, Series of 2005, as finally reviewed and approved by the BIR.
 - **Technical / Financial Documents**
 - 3.c. Statement of the prospective bidder of all its ongoing government and private contracts, including contracts awarded but not yet started, if any, whether similar or not similar in nature and complexity to the contract to be bid, within the relevant period as provided in the Bidding Documents. The statement shall include all information required in the PBDs prescribed by the GPPB. (sample form - Form No. 3). The duly signed form shall still be submitted even if the bidder has no on-going contract.
 - 3.d. Statement of the prospective bidder identifying its single largest completed contract similar to the contract to be bid, equivalent to at least fifty percent (50%) of the ABC supported with contract/purchase order, end-user's acceptance or official receipt(s) issued for the contract, within the relevant period as provided in the Bidding Documents. The statement shall include all information required in the PBDs prescribed by the GPPB. (sample form - Form No. 4).

- 3.e. The prospective bidder's audited financial statements, showing, among others, the prospective bidder's total and current assets and liabilities, stamped "received" by the BIR or its duly accredited and authorized institutions, for the preceding calendar year which should not be earlier than two (2) years from the date of bid submission.
 - 3.f. The prospective bidder's computation for its Net Financial Contracting Capacity (sample form - Form No. 5).
 - 3.g. Valid joint venture agreement (JVA), in case the joint venture is already in existence. In the absence of a JVA, duly notarized statements from all the potential joint venture partners stating that they will enter into and abide by the provisions of the JVA in the instance that the bid is successful shall be included in the bid. Failure to enter into a joint venture in the event of a contract award shall be ground for the forfeiture of the bid security. Each partner of the joint venture shall submit the legal eligibility documents. The submission of technical and financial eligibility documents by any of the joint venture partners constitutes compliance.
4. Bid security in the prescribed form, amount and validity period (ITB Clause 18.1 of the Bid Data Sheet);
 - 5. Revised Schedule VI - Schedule of Requirements with signature of bidder's authorized representative.**
 - 6. Revised Section VII - Specifications with response on compliance and signature of bidder's authorized representative.**
 7. Post-Qualification Documents – (Non-submission of these documents during the bid opening shall not be a ground for the disqualification of the bidder).
 - 7.a. Business Tax Returns per Revenue Regulations 3-2005 (BIR No. 2550Q) VAT or Percentage Tax Returns for the last two (2) quarters filed manually or through the BIR EFPS; and
 - 7.b. Income Tax Return for 2016 filed manually or through the BIR EFPS.

The Financial Component (Second Envelope) shall contain the following:

1. Duly filled out Bid Form signed by the bidder's authorized representative (sample form - Form No.1)
2. Duly filled out Schedule of Prices signed by the bidder's authorized representative (sample form - Form No.2).
- 3. Breakdown of cost using Annex B.**

**LAND BANK OF THE PHILIPPINES
ENVIRONMENTAL PROGRAM AND MANAGEMENT DEPARTMENT
CARBON ASSET DEVELOPMENT FUND**

TERMS OF REFERENCE

I. DESCRIPTION OF THE PROJECT

The project involves the Supply, Delivery, Installation, Commissioning, Operation and Maintenance of Monitoring Equipment, and Data Collection, Transmission, Report Generation of the Monitoring System of the Clean Development Mechanism for the Programme of Activity in Animal Waste-to-Energy.

Piggery Farms that are included into the Clean Development Mechanism (CDM) program shall be eligible/ entitled to receive a grant/ subsidy from LANDBANK to set up and maintain its CDM monitoring system. This amount shall be used to finance the supply, delivery, installation, commissioning and maintenance of monitoring system, according to the specifications outlined in this framework in order to generate quality data and reports for the issuance of Certified Emission Reductions (CERs). This shall be implemented through the signing of a Subsidiary Grant Agreement (SGA) between LANDBANK and the Piggery Farm. The SGA shall be issued upon signing of the Sub-project Purchase Agreement (SPA).

For Phase 1, LANDBANK shall purchase thirty (30) units for the first 30 farms ***listed in Annex A***. The remaining units shall be purchased ***in the next project phase, upon the completion of each farm's requirements for inclusion to the PoA***. Please refer to Annex A for further details.

II. PROJECT BACKGROUND

The Land Bank of the Philippines (LANDBANK) is a dominant financial institution in countryside development, committed to protect the environment and promote sustainable development. Heeding the global call to reduce the greenhouse gas (GHG) emissions, LANDBANK established the Carbon Finance Support Facility (CFSF) to provide financing and other services within the context of Clean Development Mechanism (CDM).

With the assistance of the World Bank (WB), LANDBANK has developed two (2) Clean Development Mechanism (CDM) Programme of Activities (PoAs), namely: Methane Recovery and Combustion with Renewable Energy Generation from Anaerobic Animal Manure Management Systems (Animal Waste-to-Energy); and Landfill Gas Recovery and Combustion with Renewable Energy Generation from Sanitary Landfill Sites (Landfill Gas-to-Energy). LANDBANK acts as the Coordinating and Managing Entity (C/ME) for these two PoAs.

Each PoA is implemented through an unlimited number of CDM Program Activities (CPAs). A CPA is a specific project activity under the PoA, which is implemented in a piggery farm or landfill project level. It is harmonized with the baseline methodology discussed in the PoA. Further, the CPA is also expected to contribute to the sustainable development of the immediate locality.

LANDBANK serves as the PoA's financial and technical intermediary. As such, LANDBANK arranges the pre-assessment/ due diligence activities; prepares the CDM documents such as CPA-Design Documents (CDM-CPA-DD), CDM Sustainable Development Benefit Description (SDBD) Form, Environmental Management Plan (EMP), etc., as required by the World Bank and United Nations Framework Convention on Climate Change (UNFCCC); assists in the conduct of stakeholder consultation; assists in the validation and verification activities with a Designated Operational Entity (DOE) or the Third Party Auditor; provides support and assistance on CDM documentation and monitoring; and, provides financing for the installation of the biogas digester/ methane recovery system.

The WB, under the Carbon Partnership Facility, is the buyer of the Certified Emission Reductions (CERs) or carbon credits that will be generated from the LANDBANK's PoAs. This was formalized thru the signing of an Emission Reduction Purchase Agreement (ERPA).

Furthermore, the WB provided the Carbon Asset Development Fund (CADF) to support LANDBANK in the development of carbon assets. LANDBANK intends to use a portion of the CADF grant to assist the CPAs (Pig Farms) in setting-up their CDM monitoring system in the form of a grant to eligible Piggery farms.

III. TERMS OF REFERENCE OF THE MONITORING SYSTEM

A. Scope of Work

The Contractor shall provide the following services:

1. Supply, deliver, install, commission and maintain the monitoring system which will be used to measure and monitor the green electricity produced by the biodigester system of each piggery farm located nationwide;

On the monitoring equipment (electric meter)

2. Provide all necessary components or accessories, e.g., brackets, clamps, fasteners, etc., to ensure safe, normal and efficient operation of installed electric meter;
3. Provide the applicable calibration documents/certificate by the manufacturer or local distributor;

4. Conduct familiarization seminar/ training to orient the end-user on the basic concept, functions, operation and maintenance of the equipment installed;
5. Ensure that the units will be fully functional for the duration of the project until 30 June, 2021;
6. Replace the defective units within 48 hours with a fully functional unit in the event of equipment breakdown and/or malfunction;

On the data monitoring system (data collection, transmission and report generation)

7. Develop and customize a CDM data monitoring system capable of electronic data collection, transmission and report generation;
8. Provide access to an infrastructure facility capable of receiving, storing and processing the data from piggery farms until 30 June, 2021, with option to extend;
9. Shall investigate, prepare and submit report to LANDBANK-EPMD within 72 hours from the detection of tampering on the monitoring system;
10. Shall prepare and submit to LANDBANK-EPMD the following:
 - Certificate of Completion for the installation of monitoring equipment duly conformed by the piggery farm owner or its authorized representative;
 - Attendance Sheet of piggery farm personnel who attended the orientation/ briefing on the basic concept, functions and operations of the installed monitoring equipment;
 - Monitoring system's Operations Manual
11. In the performance/ delivery of services, the Contractor:
 - Shall be liable for any harm, damage or injury that may be sustained or suffered by its own crew/workers while in the performance of their duties/ job under the project;
 - Shall be held responsible for any injury to person and/or damage to the piggery farm's property arising from the act, whether partial, contributory, or due entirely to the fault, negligence and/or dishonesty of the contractor's personnel in the course of their duties.

B. Specifications

The Contractor shall provide the farm with monitoring equipment according to the following specifications:

1. Supply, delivery, installation and commissioning of equipment to measure green electricity produced

Electric	Three phase, four wire, whole current meter, direct reading type
	Voltage : 220 volts (-40% to +20% of V_{ref})
	Power factor range : 0.80 - 1.00
	Operating frequency: 60 Hz ± 5%
	Operating conditions: 0 – 80 °C or higher up to ≥95% humidity
	Display : Digital
	Calibrated at factory Certified by manufacturer or local distributor
Security feature	Rust-resistant coated steel box with tamper-proof security tape With SD card memory inside for back-up storage
Memory	64 MB (for text file storage only)

2. Customized CDM data monitoring system for electronic data collection, transmission and report generation

Data connection	Capable of sending data thru either radio, internet or cellular network (best signal from farm location)
Transmission	Automatic network data sending to the Contractor’s Server at least on a daily basis
	The electricity generated by the biogas generator shall be received by the Control Unit (CU) of the electric meter. The current and voltage is then shown on an LCD display, and stored in an SD card. For data transmission, the CU sends the data to an online server such as cloud storage via RF network. The transmitted data may then be viewed on an online dashboard, and used to generate periodic reports.
	With feature to alert in case of intrusion or tampering with the device
Display / User interface	The Contractor shall create a visual display/ user interface and provide 24/7 access to data for the contract duration. The display/ user interface shall indicate the following parameters: <ul style="list-style-type: none"> • green electricity produced • equivalent ERs data Both parameters shall be displayed as per-farm data, as well as regional (North-Central Luzon, Southern Luzon, Visayas and Mindanao), and national totals.

Report Generation	Generate reports showing daily/ weekly/ monthly data on a per-farm basis, and on a regional and national scale: <ul style="list-style-type: none"> • green electricity produced • equivalent ERs (based on the CPA-DD formula)
	Prepare and submit the monthly monitoring reports containing data on green electricity generation and corresponding equivalent ERs (based on the CPA-DD formula) on a per farm basis

C. Contract Duration

The contract duration for the supply and installation of the initial 30 units of monitoring equipment shall be ninety (90) calendar days from the issuance of the Notice to Proceed (NTP) for the first 30 farms while the entire monitoring system must be functional until 30 June, 2021.

D. Maintenance and Guarantee Clause

The Contractor shall guarantee that the monitoring system is operational until 30 June, 2021. Correspondingly, it shall post performance guarantee equivalent to 10% of the contract cost valid until the said date.

In case of equipment breakdown and/or malfunction under normal working conditions, the Contractor shall replace defective units within 48 hours with a fully functional unit.

E. Schedule of Payment

1. For the installation of monitoring equipment (electric meter) at piggery farms located nationwide:
 - **First Release/ payment** shall be 15% of the total contract amount for the installation of monitoring equipment at piggery farms located nationwide **upon submission of a project operational plan**,
 - Succeeding Releases shall be via progress billing **based on the installed monitoring equipment**.
2. For the development and customization of a CDM data monitoring system:
 - **First Release/ payment** shall be 30% of the total contract amount for the development and customization of a CDM data monitoring system capable of electronic data collection, transmission and report generation **upon submission of a project operational plan**;

- Second Release shall be 50% of the total contract amount for the development and customization of a CDM data monitoring system when at least five (5) piggery farms are already connected to the monitoring system and are able to transmit data to the Contractor's server and are able to record and retain/save data on green electricity produced by the farm;
- Third Release shall be 20% of the total contract amount for the development and customization of a CDM data monitoring system when the Contractor has submitted the Operations Manual.

Note: For the purpose of paying the contractor's billing, the contractor is required to submit the breakdown on his proposal (for the installation of monitoring equipment on a piggery farm basis and for the development and customization of a CDM data monitoring system). Please use the list of piggery farms in Annex A as your reference.

F. Services to be provided by Piggery Farm

The Piggery Farm shall perform the following tasks:

1. Provide access to the piggery farm, as well as space in the power/generator room where the monitoring system will be installed;
2. Provide board and lodging for the technicians installing the monitoring system covering the downtime period for biosecurity and the conduct of installation;
3. Send information in advance to LANDBANK regarding biosecurity measures observed in the piggery farm.

G. Services to be provided by LANDBANK

LANDBANK shall perform the following tasks:

1. Provide the list of piggery farms eligible to receive the monitoring system grant;
2. Coordinate with the piggery farm owners for the installation of monitoring system;
3. Inform the Contractor regarding the lead time necessary for the biosecurity measures of the farms;
4. Provide office space and a computer unit for the server to receive the transmitted data from the piggery farms.

LANDBANK OF THE PHILIPPINES
ENVIRONMENTAL PROGRAM AND MANAGEMENT DEPARTMENT

CARBON FINANCE SUPPORT FACILITY (CFSF) MONITORING EQUIPMENT AND SYSTEM

PHASE ONE: FIRST 30 UNITS

	Municipality	Province	Genset Capacity (kW)	No. of Units
Farm 1	Cortes	Bohol	265	2
Farm 2	Banga	South Cotabato	800	4
Farm 3	San Nicolas	Ilocos Norte	625	2
Farm 4	Galimuyod	Ilocos Sur	16	2
Farm 5	San Carlos City	Pangasinan	240	2
Farm 6	Malasiqui	Pangasinan	250	2
Farm 7	Victoria	Tarlac	120	2
Farm 8	San Jose	Tarlac	120	2
Farm 9	Florida	Pampanga	320	1
Farm 10	Cararayan	Camarines Sur	60	2
Farm 11	Iguig	Cagayan	120	1
Farm 12	Pinamungahan	Cebu	177	1
Farm 13	Bontoc	Southern Leyte	120	1
Farm 14	Valencia City	Bukidnon	160	1
Farm 15	Malaybalay	Bukidnon	100	1
Farm 16	Davao City	Davao del Sur	200	1
Farm 17	Gen. Santos City	South Cotabato	200	1
Farm 18	Cauayan	Isabela	200	1
Farm 19	San Ildefonso	Bulacan	100	1
Farm 20	Pandi	Bulacan	120	1
Farm 21	Rosario	Batangas	105.6	1
Farm 22	Oroquieta City	Misamis Occidental	120	1
Farm 23	Malaybalay	Bukidnon	60	1
Farm 24	Tupi	South Cotabato	200	2
Farm 25	Tupi	South Cotabato	200	2
Farm 26	Tupi	South Cotabato	200	2
Farm 27	San Fernando	Pampanga	100	1
Farm 28	Magalang	Pampanga	80	1
Farm 29	Manolo Fortich	Bukidnon	60	1
Farm 30	Rosario	Agusan del Sur	200	1

PHASE TWO: ADDITIONAL 10 UNITS

	Municipality	Province	Genset Capacity (kW)	No. of Units
Farm 31	Malaybalay	Bukidnon	60	1
Farm 32	Tiaong	Quezon	160	1
Farm 33	Gen. E. Aguinaldo	Cavite	80	1
Farm 34	Sta. Barbara	Pangasinan	100	1
Farm 35	Cuyapo	Nueva Ecija	100	1
Farm 36	Cuyapo	Nueva Ecija	No info	No info
Farm 37	Palayan	Nueva Ecija	400	2
Farm 38	Tarlac City	Tarlac	500	1
Farm 39	Tarlac City	Tarlac	150	1
Farm 40	Tarlac City	Tarlac	150	1

Calculation of emissions reductions: Based on the monitoring data the emission reductions will be calculated ex-post using the following approach:

$$PER_y = MER_{y, \text{ex-post}} + GER_{y, \text{ex-post}}$$

Where:

$MER_{y, \text{ex-post}}$ Emission reduction in year "y" (tCO₂e) from methane recovery (as per AMS-III.D)
 $GER_{y, \text{ex-post}}$ Emission reduction in year "y" (tCO₂e) from renewable electricity generation (as per AMS-I.F)

The emission reductions achieved in any year from methane recovery are the lowest value of the following:

$$MER_{y, \text{ex-post}} = \min [(MBE_{y, \text{ex-post}} - MPE_{y, \text{ex-post}}), (MD_y)]$$

Where:

$ER_{y, \text{ex-post}}$ Emission reductions achieved by the project activity based on monitored values for year "y" (tCO₂e)
 $BE_{y, \text{ex-post}}$ Baseline emissions calculated using the formula found in Section B.4.3 using *ex post* monitored values of $N_{LT,y}$ and if applicable $VS_{LT,y}$
 $PE_{y, \text{ex-post}}$ Project emissions calculated using the formula found in Section B.4.3 using *ex post* monitored values of $N_{LT,y}$, $MS\%_{i,y}$ and if applicable $VS_{LT,y}$
 MD_y Methane captured and destroyed or used gainfully by the project activity in year "y" (tCO₂e)

$$MD_y = BG_{\text{burnt},y} * W_{CH_4,y} * D_{CH_4} * \eta_{\text{flare},h} * GWP_{CH_4}$$

Where:

$BG_{\text{burnt},y}$ Biogas flared or combusted in year "y" (m³).
 $W_{CH_4,y}$ Methane content in biogas in the year "y" (mass fraction)
 $\eta_{\text{flare},h}$ Flare efficiency in the year "y" (fraction) when biogas is flared

Methane content in biogas, W_{CH_4} : As per AMS-III.D version 17 there are three options to monitor/determine the fraction of methane in the biogas: a) should be measured with a continuous analyzer or alternatively, b) with periodical measurements at a 90/10 confidence/precision level or, alternatively c) a default value of 60% methane content can be used. For all CPAs under this PoA **option c) will be adopted**: a default value of 60% methane content.

Flare efficiency ($\eta_{\text{flare},h}$) will be determined using default values. $PE_{\text{flare},y}$ will be calculated using this default flare efficiency value.

Alternatively, if the recovered methane is used for power generation, MD_y may be calculated as follows, based on the amount of monitored electricity generation, without monitoring methane flow and concentration

$$MD_y = EG_y \times 3600 / (NCV_{CH_4} \times EE_y) \times D_{CH_4} \times GWP_{CH_4}$$

Where:

EG_y Total electricity generated from the recovered biogas in year y (MWh)
 3600 Conversion factor (1 MWh = 3600 MJ)
 NCV_{CH_4} NCV of methane (MJ/Nm³) use default value: 35.9 MJ/Nm³
 EE_y Energy conversion efficiency of the project equipment, which is determined by adopting one of the following criteria:
 - Specification provided by the equipment manufacture. The equipment shall be designed to utilize biogas as fuel, and efficiency specification is for this fuel. If

the specification provides a range of efficiency values, the highest value of the range shall be used for the calculation;

- Default efficiency of 40% (more likely option to be used by this CPA)

Project emissions are estimated using the equations given in section B.4.3.

The Physical leakage ($PE_{PL,y}$) calculation will be based on monitored parameters of $MS\%_{i,y}$, $N_{LT,y}$, $VS_{LT,y}$

For $PE_{power,y}$ as per the methodology methane used to power auxiliary equipment of the project (EC_{AE}) will be taken into account accordingly, using zero as its emission factor.

The emission reductions achieved from renewable electricity generation are the following:

$$GBE_{y,ex-post} = (EG_{y,ex-post} - EG_{baseline}) * EF_{y,ex-ante}$$

Where:

$GBE_{y,ex-post}$	Baseline emissions based on monitored values for year "y" (tCO ₂) from renewable electricity generation
$EG_{y,ex-post}$	Electricity generated based on monitored values and calculated using the formula found in Section B.4.3 for year "y" (MWh/yr)
$EG_{baseline}$	Baseline electricity supplied to the grid in case of modified or retrofit units based on monitored values and calculated using the formula found in Section B.4.3
$EF_{y,ex-ante}$	Grid emissions factor (tCO ₂ e/MWh) <i>ex-ante</i> values applied throughout the crediting period

LANDBANK OF THE PHILIPPINES
ENVIRONMENTAL PROGRAM AND MANAGEMENT DEPARTMENT
CARBON FINANCE SUPPORT FACILITY
 CDM Program of Activity
 Methane Recovery and Combustion on Anaerobic Animal Waste Management Systems

CPA Name: _____ CPA No.: _____
 Location: _____ Region: (NCL, SL, Vis, Min)
 For the Month of: _____ Elec. Meter Serial No: _____

Date	Time	Cumulative Electricity Reading (kWh)	Remarks
<i>first day of the month</i>			
<i>end of the month</i>			

Electricity generated for the month (kWh): _____

Verified by:

 XXXX

Approved by:

 XXXX