Verification report form of GS project	
BASIC INFORMATION	
Title and GS reference number of the project activity	Indonesia Domestic Biogas Programme of Activities (IDBP VPA-1) GS reference number: program: 1172 VPA-1: 1174
Version number of the verification and certification report	4
Completion date of the verification and certification report	13/12/2023
Monitoring period number and duration of this monitoring period	5th Monitoring; 01/01/2022-31/12/2022
Version number of the monitoring report to which this report applies	0.3
Crediting period of the project activity corresponding to this monitoring period	31/05/2018 – 30/05/2025
Project participants	Yayasan Rumah Energy (YRE)
Host Party	Indonesia
Applied methodologies and standardized baselines	Technologies and Practices to Displace Decentralized Thermal Energy Consumption version 3.1
Activity Requirements applied	☒ Community Services Activities ☐ Renewable Energy Activities ☐ Land Use and Forestry Activities/Risks & Capacities ☐ N/A
Product Requirements applied	☒ GHG Emissions Reduction & Sequestration ☐ Renewable Energy Label ☐ N/A
Estimated amount of ex-ante GHG emission reductions or GHG removals for this monitoring period in the included VPAs covered in this report	55,056 tCO_2e
Certified amount of GHG emission reductions or GHG removals for this monitoring period for the included VPAs covered in this report	50,568 tCO_2e
Name and GS reference number of the VVB	AENOR International, S.A.U (GS S.No.: 3)
Name, position and signature of the approver of the verification and certification report	José Luis Fuentes  Climate Change Manager

SECTION A. Executive summary

AENOR INTERNACIONAL S.A.U (AENOR) has been contracted by Yayasan Rumah Energy (YRE) to undertake this verification of the registered GS programme titled Indonesia Domestic Biogas Programme of Activities" (VPA-1 GS reference number: 1174). The verification has been performed through a process of document review based on the MR, initially submitted for verification and the subsequent revisions, registered VPA-DD, follow-up interviews, resolution of outstanding issues and issuance of the verification report.

The programme's aim is to disseminate domestic biodigesters as a local, sustainable energy source. These biodigesters are fed with a mixture of water and animal manure that is anaerobically digested, and the generated biogas is intended for use as fuel for cooking. The biodigester type implemented is the fixed-dome type, constructed with bricks and stone masonry.

The project is located in Indonesia, in the following provinces:

Province	Latitude	Longitude	Number of biodigesters
Lampung	5° 27' 0.0000" S	105° 16' 0.0120" E	418
West Java*	6° 54' 53.0784" S	107° 36' 35.3160" E	1,448
Central Java	7° 47' 49.4448" S	110° 22' 13.9044" E	1,368
East Java	7° 15' 1.6020" S	112° 46' 7.8420" E	7,638
Bali	8° 24' 34.2648" S	115° 11' 20.1084" E	1,066
Nusa Tenggara Barat	8° 39' 10.5602" S	117° 21' 41.9314" E	4,328
Nusa Tenggara Timur	8° 39' 26.575" S	121° 4' 45.732" E	649
Yogyakarta	7° 47' 49.4448" S	110° 22' 13.9044" E	1,407
South Sulawesi	5° 8' 51.5940" S	119° 25' 57.8352" E	1,930

*Provinces Banten and Sumatera Selatan are included under West Java

The VPA aims to reduce GHG emissions by using biogas systems to replace traditional thermal energy generation methods by making biogas systems affordable and available to households. It meets the small-scale thresholds set forth by the CDM i.e., 15 MW or 45 MW_{th} for the renewable energy component and an emissions cap of 60,000 tCO_2e for the methane avoidance component as shown in the table below:

$\mathbf{Th_{cap}} = \frac{\mathbf{E}}{\mathbf{t}}$ $\quad where \quad \mathbf{E} = \eta * \mathrm{H_b} * \mathrm{V_b}$		
Where:	Value:	Comments:
t = hours/day usage	2.74	See "Crosstab BUS by Province_18May2016.xls", sheet "raw_data" cell J2683. Fixed for future verifications
η = efficiency of stove	50%	Indonesian Government standard on stove efficiency
H_b = heat of combustion per unit volume of biogas	21.0 MJ/m^3	Derived from IPCC defaults
V_b = volume of biogas	1.80 m^3/day	Data provided by Hivos /17/
E = Energy available from the biogas system	18.87 MJ/day	Calculated
E_{th} =	5.24 kWh/day	1 MJ = 0.2778 kWh
Th_{cap} =	1.91 kW_{th}	Given a 2.74 hour/day usage
Total capacity	38.738 MW_{th}	Given 20,252 units installed

Scope of the verification

The scope of the verification is to assess all aspects described in the Gold Standard for the global Goals, Principles and Requirements, v1.2. related to all aspects of GHG reduction involved in the programme. The verification is based on the validated project design document Version 10.1, (hereinafter validated or registered VPA-DD) and previous verification report. These documents were also reviewed against the requirements of Gold Standard for the Global Goals, Community Services Activities Requirements, v1.2 /18//19/.

The objectives of this verification are to verify and certify emission reductions reported for the programme for the monitoring period from 01/01/2022 to 31/12/2022 (first and last day included); and to verify that the data reported are complete and transparent.

This report summarizes the findings of the verification of the programme, performed on the basis of GS criteria as well as criteria given to provide for consistent programme operations, monitoring and reporting. UNFCCC criteria refer to the Kyoto Protocol, the CDM rules and modalities as agreed in the Bonn Agreement, the Marrakech Accords and the CDM Executive Board's decisions.

The information in these documents is reviewed against Gold Standard for the Global Goals, Principles and Requirements, v1.2., the recommendations in the CDM Validation and Verification Standard for programmes of activities version 3.0 Kyoto Protocol requirements and associated interpretations. AENOR has used a risk-based approach in the verification, focusing on the identification of significant risks and reliability of project monitoring and generations of GS-VERs /20/.

The verification is not meant to provide any consulting towards the client. However, stated request for clarifications and/or corrective actions may provide input for improvement of the monitoring.

Verification process

The verification team determines the conformity of the actual programme and its operation with the validated project design document. The audit team has, by means of a desk review and remote interviews, assessed that all physical features of the proposed programme proposed in the VPA-DD are in place, and that the project participants have operated the programme as per the VPA-DD. Thus, the verification team has concluded that the programme was implemented and operated as per VPA-DD, and that all physical features of the project are in place.

The verification team, based on the remote interviews and document review, was able to conclude that the programme has been commissioned and implemented as per the VPA-DD. The start date of this monitoring period is 01/01/2022 and considering the end date of the previous monitoring period, the verification team concludes that it is correct.

The verification team has planned and performed the work to obtain the information and explanations that is considered necessary to provide sufficient evidence for it to give reasonable assurance that the amount of calculated GHG emission reductions for this monitoring period were fairly stated.

The monitoring report for this monitoring period is in compliance with the monitoring plan of the registered VPA-DD. The programme was registered by applying the GS methodology Technologies and Practices to Displace Decentralized Thermal Energy Consumption version 3.1 and the verification was carried out in accordance with the applied methodology /24/. It was confirmed that the programme during the current verification is in accordance with the applicability criteria of the methodology.

The project participants were requested to address all verification findings and finally provided the verification team with sufficient evidence to determine that the applicable GS requirements have been met. The project participant modified the initial MR to resolve the verification team concerns

and resubmitted a final version of the MR. AENOR has prepared this report based on the final MR.

All Corrective Action Requests (CAR) and Clarification Actions (CL) have been checked by the verification team and have been adequately resolved.

All the verification findings are documented in Appendix 4.

As a final step of the verification, the verification report has to undergo internal quality control by means of a technical review following the procedures of AENOR. The technical reviewer is a competent person from AENOR, independent of the team that carried out the verification of the project activity.

In AENOR's opinion, the GHG emissions reductions of the monitoring period from 01 January 2022 – 31 December 2022, were calculated correctly and amount 50,568 tonnes of CO_2 equivalent.

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 VVB or outsourced entity)	Involvement in			
						Desk/document review	On-site inspection	Interviews	Verification findings
1.	Team Leader	IR	Arribas Alonso	Luis Javier	AENOR	Yes	No	No	Yes
2.	Team Leader Under Supervision	IR	Arranz Arbex	Asís	AENOR	Yes	Yes	Yes	Yes

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 VVB or outsourced entity)
1.	Technical reviewer	IR	Fuentes Pérez	José Luis	AENOR
2.	Approver	IR	Fuentes Pérez	José Luis	AENOR

SECTION C. Means of verification

C.1. Desk/document review

The verification was performed primarily based on the review of the monitoring report and the supporting documentation. This process included review of data and information presented to verify their completeness and review of the monitoring plan and monitoring methodology, paying particular attention to the frequency of measurements, the quality of metering equipment including calibration requirements, and the QA/QC procedures, and an evaluation of data management and the QA/QC system in the context of their influence on the generation and reporting of emission reduction.

The following documents were reviewed as part of the verification:

- MR, including excel calculations /4//5/.
- Gold Standard for the Global Goals Safeguarding Principles & Requirements Version 1.2 /28/
- Technologies and Practices to Displace Decentralized Thermal Energy Consumption (TPDDTEC), version 3.1 /24/.
- Decision 3/CMP.1 and relevant decisions and guidelines from the EB
- CDM Validation and Verification Standard for programmes of activities, v03.0 /20/
- Gold Standard for the Global Goals, Principles and Requirements, v1.2. /18/
- Gold Standard for the Global Goals, Community Services Activities Requirements, v1.2. /19/

The initial version of the monitoring report version 0.1 /3/ submitted by the project participant and additional background documents related to the emission reductions are reviewed as an initial step of the verification process. The subsequent step involved the identification of corrective action requests and clarification requests (CAR and CL) which are presented in Appendix 4 of this report. In response, Project Participant (PP) has submitted MR version 0.3 /4/. A complete list of all documents and records reviewed is as attached in Appendix 3 of this report.

C.2. On-site inspection

Duration of on-site inspection: 05/06/2023 to 09/06/2023				
No.	**Activity performed on-site**	**Site location**	**Date**	**Team member**
1.	• On site verification of project implementation through interviews in 5 households selected from the sampling plan • Training records • QA/QC procedures • Controls established to detect and correct any error or omission in monitoring parameters • Testing of monitoring equipment and observation of monitoring practices • Calibration of official meters • Maintenance procedures • Grievance Mechanism	PROJECT ACTIVITY SITE	05/06/2023	Asís Arranz Arbex
2.	• On site verification of project implementation through interviews in 14 households selected from the sampling plan • Training records • QA/QC procedures • Controls established to detect and correct any error or omission in monitoring parameters • Testing of monitoring equipment and observation of monitoring practices • Calibration of official meters • Maintenance procedures • Grievance Mechanism	PROJECT ACTIVITY SITE	06/06/2023	Asís Arranz Arbex
3.	• On site verification of project implementation through interviews in 21 households selected from the sampling plan • Training records • QA/QC procedures • Controls established to detect and correct any error or omission in monitoring parameters • Testing of monitoring equipment and observation of monitoring practices • Calibration of official meters • Maintenance procedures • Grievance Mechanism	PROJECT ACTIVITY SITE	07/06/2023	Asís Arranz Arbex
4.	• On site verification of project implementation through interviews in 10 households selected from the sampling plan • Training records • QA/QC procedures • Controls established to detect and correct any error or omission in monitoring parameters • Testing of monitoring equipment and observation of monitoring practices • Calibration of official meters • Maintenance procedures • Grievance Mechanism	PROJECT ACTIVITY SITE	08/06/2023	Asís Arranz Arbex

5.	• Summary of findings detected during the desk review • Summary of findings detected during the onsite visit • Review of some doubts of the PP and VVB as for drop-off and other biodigester fuel uses accounted in the spreadsheets and the ERs • Review documents if required after findings commented: PDD, MR, spreadsheet and evidence provided	FINAL MEETING	09/06/2023	Asís Arranz Arbex

Duration of on-site inspection: 05/06/2023 to 09/06/2023				
No.	**Activity performed on-site**	**Site location**	**Date**	**Team member**
1.	Interviews of 5 households	Semarang	05/06/2023	Asis Arranz Arbex
2.	Interviews of 14 households	Semarang Salatiga	06/06/2023	Asis Arranz Arbex
3.	Interviews of 21 households	Semarang	07/06/2023	Asis Arranz Arbex
4.	Interviews of 10 households	Boyolali	08/06/2023	Asis Arranz Arbex
5.	Final Meeting	Solo	09/06/2023	Asis Arranz Arbex

C.3. Interviews

No.	**Interviewee**			**Date**	**Subject**	**Team member**
	Last name	**First name**	**Affiliation**			
1.	Batur Romzini	Chabi (Bibah)	YRE	02/06/2023	Verify the correct implementation of the project and the monitoring plan	Asís Arranz Arbex
2.	Bakhtary	Haseeb	ClimateFocus (Consultant)			
3.	Widoningtyas	Danastri	YRE	05/06/2023 - 09/06/2023	Verify the correct implementation of the project in the field and in the documentation provided	
4.	Supriyanto		YRE			
5.	Pujo Sasongko	Witono	Yyasan Sion Representative	05/06/2023 - 07/06/2023	Verify the correct implementation of the project in the field and the monitoring plan	
6.	Kristy	Eko	Yayasan Trukajaya Representative	06/06/2023		
7.	Tribowo		Rogomulyo Local Community Coordinator	06/06/2023	Verify the correct implementation of the project in the field	
8.	Priyono		Cepogo Local Farmers Group Representative	08/06/2023		

Additionally, the audit team interviewed a sample of the biodigesters' owners regarding the following matters:

- Information received about the program prior to participating in it
- Signature of contract and voluntary participation
- Opinion on the project

- Participation in survey and trainings
- Use of biogas and any problems that might have been encountered
- SDG benefits
- Grievance mechanism

The results of the interviews provided insight on the programme and allowed to verify the information stated on the MR. The local communities are generally satisfied with the project, participate voluntarily, and have a signed contract with the PP. They are aware of the SDG benefits and are able to contact the designated members of the team in case there is an issue.

C.4. Sampling approach

The sampling plan is developed using guidance of the applied GS methodology and the registered VPA-DD which prescribes a 90% confidence interval with a 10% error margin. With the parameters described, based on the time acquired for the on-site visit of the two VPAs (VPA1 and VPA2), the number of verifications previously carried out on the program and the overcoming of the pandemic situation, a sample size of 23 units is considered sufficient for this VPA. This selection has been accorded between the PP and VVB as the half of the 46-sample size chosen for both VPA-1 and VPA-2, which have same conditions.

The units were randomly selected using the “random” function in excel for conservativeness. Moreover, an additional 25% of the selected sample was randomly picked by the verification team in order to ensure a significant sample in case any issue might arise making interviews difficult. The verification team has checked on the sampling plan and considered appropriate.

According to the Standard for sampling and surveys for CDM project activities and programme of activities /26//27/, the verification team determined the following sample size:
• AQL of 0.5%
• UQL of 10%
• Producer Risk of 5%
• Consumer Risk of 5%

Therefore, according to the sampling guidelines, 23 surveyed householders are required to be checked by the VVB and the acceptance number is 1, which means that number of discrepancies between VVB check and PP result must not exceed this number.

The selected households were interviewed by YRE officers who recorded the interview to the householder and sent it to the verification team, including the interview reports with the answers of the householder.

Additionally, an alternate list for sampling was provided by the PP, in case more were necessary due to exceptional situations of difficulties to access certain regions of Indonesia or absence of household members. Finally, due to the time and access that could be obtained during the visit, 2 more interviews were carried out to obtain greater confidence in the sample, with 25 total interviews carried out for the VPA-1, belonging 14 households (HH) to Semarang, 5 to Salatiga and 6 to Boyolali, as represented below:

IDBP PLANT CODE	PLANT SIZE (m3)	NAME OF OWNER	VILLAGE	SUBDISTRICT	DISTRICT	PROVINCE
QTP0092	6	Royani	Ketapang	Susukan	Semarang	Jawa Tengah
SAP090	12	Cornelius P	Karang Duwet	Tingkir	Salatiga	Jawa Tengah
QTP0218	6	Czafarin	Randuacir	Argomulyo	Salatiga	Jawa Tengah
ONP0104	12	Hevy	Randuacir	Argomulyo	Salatiga	Jawa Tengah
QTP0318	6	Zumri	Noborejo	Argomulyo	Salatiga	Jawa Tengah
QTP0314	6	Nyai. Sut Ipah	Dukuh	Sidomukti	Salatiga	Jawa Tengah
TKP0122	6	Tribowo	Rogomulyo	Kaliwungu	Semarang	Jawa Tengah
TKP0139	6	Budi Santoso	Rogomulyo	Kaliwungu	Semarang	Jawa Tengah

IDBP PLANT CODE	PLANT SIZE (m3)	NAME OF OWNER	VILLAGE	SUBDISTRICT	DISTRICT	PROVINCE
TKP0141	6	Suhardi	Rogomulyo	Kaliwungu	Semarang	Jawa Tengah
TKP0142	6	Sukino	Rogomulyo	Kaliwungu	Semarang	Jawa Tengah
LUP0017	8	Bejo	Jetak	Getasan	Semarang	Jawa Tengah
LUP0002	6	Joko Sambudi	Jetak	Getasan	Semarang	Jawa Tengah
ONP0132	6	Wagiyo	Samirono	Getasan	Semarang	Jawa Tengah
ONP0001	6	Kartiyoso	Samirono	Getasan	Semarang	Jawa Tengah
QTP0134	6	Darti	Sumogawe	Getasan	Semarang	Jawa Tengah
ONP0079	8	Kabul Wildodo	Sumogawe	Getasan	Semarang	Jawa Tengah
ONP0083	8	Suyatno	Sumogawe	Getasan	Semarang	Jawa Tengah
ONP0089	12	Salimin	Sumogawe	Getasan	Semarang	Jawa Tengah
ONP0003	8	Masimin	Samirono	Getasan	Semarang	Jawa Tengah
HPP0004	6	Cipto Utomo	Mliwis	Cepogo	Boyolali	Jawa Tengah
HPP0005	8	Misran	Mliwis	Cepogo	Boyolali	Jawa Tengah
HPP0010	6	Warno Jumadi	Mliwis	Cepogo	Boyolali	Jawa Tengah
HPP0011	6	Harsono Salam	Mliwis	Cepogo	Boyolali	Jawa Tengah
HPP0007	6	Saris	Mliwis	Cepogo	Boyolali	Jawa Tengah
HPP0008	6	Mumuk	Mliwis	Cepogo	Boyolali	Jawa Tengah

C.5. Resolution of Clarification requests (CLs), corrective action requests (CARs) and forward action requests (FARs) raised

All documentation provided by the PP was assessed against the applicable version of the relevant GS guidance document. Several clarification requests (CL) and corrective action requests (CAR) were raised and submitted to the PP, which addressed them either by providing to the audit team with the requested information or by making the appropriate corrections. Updated versions of the documentation were submitted by the PP and the audit team reassessed them against the guidance documentation. This process was repeated iteratively until all CL and CAR were fully closed. Specifically, 2 CLs and 2 CARs were raised.

Areas of verification findings	No. of CL	No. of CAR	No. of FAR
Compliance of the monitoring report with the monitoring report form	-	CAR 1	-
Compliance of the project implementation and operation with the registered PDD	-	-	-
Post-registration changes	-	-	-
Compliance of the registered monitoring plan with the methodologies including applicable tools and standardized baselines	-	-	-
Compliance of monitoring activities with the registered monitoring plan	-	-	-
Compliance with the calibration frequency requirements for measuring instruments	-	-	-
Assessment of data and calculation of emission reductions or net removals	CL 2	CAR 2	-
Assessment of reported sustainable development co-benefits	-	-	-
Local stakeholder consultation	-	-	-
Others	CL 1	-	-
Total	2	2	0

All findings issued by the AENOR audit team during the validation process have been closed and can be found in the Appendix 4 of this report.

SECTION D. Verification findings

D.1. Compliance of the monitoring report with the monitoring report form

Means of verification	The verification team has determined whether the monitoring report was completed using the valid version of the applicable monitoring report form. The verification team has checked whether all the sections of the monitoring report follow the guidelines provided in the template itself.
Findings	CAR 01 - The following sections of the MR have not been completed in accordance with GS template: 1. In Section D.4: "Clearly reference the spreadsheets used (including sheet names as necessary), the aim is to direct your assurance providers to the information as quickly as possible, which will result in a quicker review process". Some evidence as "20230308 BUS_2022_Tabulation", "20230308 GS-13 calculation 2022" or "20230215_IDBP_Database_VPA2" could be mentioned. 2. In Section E.3: "Clearly reference the spreadsheets used (including sheet names as necessary)… The aim is to direct your assurance providers to the information as quickly as possible, which will result in quicker review process". PP may clearly reflect the corresponding reference as in the other sections. 3. In Section G.1: "Include all disputes, inputs and comments received via the approved CIGM and show how these were responded to and/or mitigated. Please clarify any items that have not been fully addressed and that require follow up action." Under the criteria of the VVB, PP can describe with more detail the procedures to fully address the grievances. Appendix 4 summarizes the findings from the desk review of the Monitoring Report /4/, the calculation spreadsheets /5/ and other supporting documents as well as findings from the interviews.
Conclusion	PP has used the valid version of the MR template prescribed by GS which is current and active. The monitoring report has been prepared as per the instructions provided in the GS requirements. The verification team has concluded that the monitoring report was completed using the valid version of the applicable monitoring report form and is followed the guidelines given in the template.

D.2. Remaining forward action requests from validation and/or previous verifications

The audit team has reviewed the previous verification report and validation report observed that there were no FARs pending to close from the previous verification and the validation report of the renewal of the crediting period.

D.3. Compliance of the project implementation and operation with the registered project design document

Means of verification	The compliance of the VPA implementation with the registered project design document was verified through the interviews and desk-review of documents provided by the project participants. All revised documents are listed in Appendix 3. As explained in Section C.4 above, the audit team interviewed 25 HHs and checked the main parts of the program activity on each benefited house: type and heads of cattle, method of manure warehouse, the biodigester and the kitchen; how the family uses the stoves and if they use different methods than those reported in the surveys. The main questions of the surveys done by the VVB were the following: Serie number of the biodigester, name and surname of the family member interviewed, community, date of installation, size of the technology (m^3), type and heads of cattle, satisfaction of the family with the biodigester and the activity program, additional comments of the interviewers and observations by the auditor. The audit team reviewed that the main technical features of the programme and other equipment are operational as per specifications mentioned in the VPA-DD. The audit team verified the correct operation of the VPA by reviewing different technical documentation, surveys, procedures and registries. Project participant has provided all necessary information and documentation to demonstrate

	compliance of the implemented registered VPA and monitored GHG emission with all applicable requirements to the methodology and applicable GS4GG rules.
Findings	No finding was raised regarding this issue.
Conclusion	AENOR confirms that: • The implementation status and equipment installation of the programme are consistent with the registered VPA-DD. • The actual operation of the Programme is as per the registered VPA-DD. • Information (data and variables) provided in the monitoring report is in accordance with that stated in the registered VPA-DD. • The actual GHG emission reductions achieved by the programme in the current monitoring period that have been reported in the monitoring report are lower that the estimated for the same monitoring period in the VPA-DD.

D.4. Post-registration changes

D.4.1. Temporary deviations from the registered monitoring plan, applied methodologies, standardized baselines or other methodological regulatory documents

Not applicable.

D.4.2. Corrections

Not applicable.

D.4.3. Changes to the start date of the crediting period

Not applicable.

D.4.4. Permanent changes from registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines or other methodological regulatory documents

Not applicable.

D.4.5. Changes to the project design

Not applicable.

D.5. Compliance of the registered monitoring plan with applied methodologies, applied standardized baselines, and other applied methodological regulatory documents

Means of verification	The compliance of monitoring plan with the monitoring methodology was verified by reviewing whether the VPA was in accordance with the applied methodology and if any other monitoring aspect of the VPA that is not specified in the methodology was established. During the desk review, the audit team was able to review different records and assess whether the monitoring methodology has been adequately considered and documented. The audit team verified the monitoring of reductions in GHG emissions to result from the proposed VPA and whether it was implemented in accordance with the registered VPA-DD and the project participant is recording the data and parameters following the monitoring methodology applied. Regarding this issue, the verification team reviewed: • The monitoring of reductions in GHG emissions to result from the proposed VPA was implemented in accordance with the Monitoring Plan.

	• The monitoring plan and the applied methodology had been properly implemented and followed by the project participant. • Trainings were performed in order to ensure the correct monitoring of parameters. • All parameters stated in the monitoring plan, the applied methodology and other requirements have been sufficiently monitored and updated. • The responsibilities and authorities for monitoring and reporting were in accordance with the responsibilities and authorities stated in the monitoring plan. The audit team has verified that the monitoring of reductions in GHG emissions to result from the proposed GS programme is implemented in accordance with the monitoring plan.
Findings	No finding was raised regarding this issue.
Conclusion	The verification team reviewed whether the monitoring plan was in accordance with the applied methodology and any other monitoring aspect of the programme that is not specified in the methodology was established. The verification team confirms that the monitoring plan is in accordance with the applied methodology Technologies and Practices to Displace Decentralized Thermal Energy Consumption version 3.1 based on the following reasons /24/: • During the desk review monitoring parameters included in the applied methodology were compared with the ones included in the Monitoring plan of the registered VPA-DD, and they were found consistent. • The monitoring plan perfectly fulfils the criteria stated in the monitoring methodology. • No other relevant aspects for monitoring not included in the methodology were identified. Therefore, AENOR confirms that the monitoring plan is in compliance with the approved methodology applied by the GS programme and applicable tool.

D.6. Compliance of monitoring activities with the registered monitoring plan

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

Means of verification

Data and parameters fixed ex ante were verified through desk-review of final version of monitoring report, registered VPA-DD and methodology applied. The fixed parameters used for calculating the emission reduction have been indicated and verified as follows:

Data/parameter	**$f_{NRB,y}$**
Unit	%
Description	Fraction of biomass used in the absence of the project activity in year y that can be established as non-renewable biomass using nationally approved methods
Source of data	Reports, surveys, and government data
Value(s) applied	58.36
Choice of data or Measurement methods and procedures	Calculated as per guidance of the applied methodology: $f_{NRB,y} = \frac{NRB}{NRB+DRB}$
Purpose of data	Calculation of baseline emissions
Additional comment	Since the MR of VPA1 covers the second crediting period of VPA-1, the PP refers to the fNRB of 58.36% as per that approved PDD.

Data/parameter	**NRB**
Unit	m3
Description	Non-renewable woody biomass

Source of data	FAO (2010) Global Forest Resources Assessment 2010 Country Report Indonesia; FAO (2015) Global Forest Assessment 2015; calculation /32/
Value(s) applied	50,421,516
Choice of data or Measurement methods and procedures	NRB can be calculated by subtracting the DRB of 35,974,483 m3 from 86,396,000 m^3. By is the amount of firewood removed from forests which amounts to 86,396,000 m^3 (FAO, 2010).
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data/parameter	**DRB**
Unit	m^3
Description	Demonstrably renewable woody biomass
Source of data	FAO (2010) Global Forest Resources Assessment 2010 Country Report Indonesia; FAO (2015) Global Forest Assessment 2015; calculation
Value(s) applied	35,974,483
Choice of data or Measurement methods and procedures	The annual sustainable yield from the plantations is determined to be 42,041,000 m^3, which is more conservative than the 35,378,000 m^3 estimated by ITTO (2009). The more conservative number 42,041,000 m^3 is multiplied by the fraction of wood fuel removals from total wood removals (85.57%) reported by FAO, yielding yields the demonstrably renewable biomass (DRB) of 35,974,483 m^3 /31/.
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data / Parameter	**$BB_{b1,bio}$**
Unit	Tonnes/year
Description	Amount of woody biomass used in the baseline scenario 1: households
Source of data	Baseline Survey, December 2017; Baseline December KPT 2017 /13/
Value(s) applied	1.435
Choice of data or Measurement methods and procedures	Baseline KPT was executed in December 2017 targeting 55 households. These households reported an average daily use of 3.93 kg of biomass, equivalent to 1.435 tonnes of biomass per year.
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data / Parameter	**$BB_{b1,fuel}$**
Unit	Tonnes/year
Description	Amount of fossil fuels used in the baseline scenario 1: households
Source of data	Baseline Survey, December 2017; Baseline December KPT 2017 /13/
Value(s) applied	LPG: 0.088
Choice of data or Measurement methods and procedures	Baseline KPT was executed in the period from in of December 2017 targeting 55 households. These households reported an average daily use of 0.24 kg of LPG, equivalent to 0.088 tonnes of LPG per year.
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data/parameter	$EF_{b1, bio}$
Unit	tCO_2/TJ
Description	Emission factor of the woody biomass used in the baseline scenario
Source of data	2006 IPCC Guidelines for National Greenhouse Gas Inventories /25/
Value(s) applied	112
Choice of data or Measurement methods and procedures	As per requirement of the methodology and Table 2.3, Chapter 2, Volume 2 of the 2006 IPCC Guidelines. The IPCC is a standard, credible source of emissions factors.
Purpose of data	Calculation of baseline emissions
Additional comment	IPCC (2006); May be updated according to any future changes by the IPCC. CO_2 and non-CO_2 emissions factors for charcoal may be estimated from project specific monitoring or alternatively by researching a conservative wood to charcoal production ratio (from IPCC, credible published literature, project-relevant measurement reports, or project-specific monitoring) and multiplying this value by the pertinent EF for wood.

Data/parameter	$EF_{p1, bio}$
Unit	tCO_2/TJ
Description	Emission factor of the woody biomass used in the project scenario
Source of data	2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value(s) applied	112
Choice of data or Measurement methods and procedures	As per requirement of the methodology and Table 2.3, Chapter 2, Volume 2 of the 2006 IPCC Guidelines. The IPCC is a standard, credible source of emissions factors.
Purpose of data	Calculation of project emissions
Additional comment	IPCC (2006); May be updated according to any future changes by the IPCC.

Data/parameter	NCV_{bio}
Unit	TJ/tonne
Description	Net calorific value of the non-renewable biomass used in the baseline scenario
Source of data	2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value(s) applied	0.015
Choice of data or Measurement methods and procedures	As per requirement of the methodology and Table 2.3, Chapter 2, Volume 2 of the 2006 IPCC Guidelines. The IPCC is a standard, credible source of emissions factors.
Purpose of data	Calculation of baseline emissions
Additional comment	IPCC (2006); May be updated according to any future changes by the IPCC

Data/parameter	$EF_{b1, fuel}$

Unit	tCO_2/TJ
Description	Emission factor of fossil fuels used in the baseline scenario
Source of data	2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value(s) applied	Kerosene = 71.9 LPG = 63.1
Choice of data or Measurement methods and procedures	As per requirement of the methodology and Table 2.3, Chapter 2, Volume 2 of the 2006 IPCC Guidelines. The IPCC is a standard, credible source of emissions factors.
Purpose of data	Calculation of baseline emissions
Additional comment	IPCC (2006); May be updated according to any future changes by the IPCC

Data/parameter	**$EF_{p1, fuel}$**
Unit	tCO_2/TJ
Description	Emission factor of fossil fuels used in the project scenario
Source of data	2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value(s) applied	Kerosene = 71.9 LPG = 63.1
Choice of data or Measurement methods and procedures	As per requirement of the methodology and Table 2.3, Chapter 2, Volume 2 of the 2006 IPCC Guidelines. The IPCC is a standard, credible source of emissions factors.
Purpose of data	Calculation of baseline emissions
Additional comment	IPCC (2006); May be updated according to any future changes by the IPCC

Data/parameter	**NCV_{fuel}**
Unit	TJ/tonne
Description	Net calorific value of fossil fuels used in the baseline scenario
Source of data	2006 IPCC Guidelines for National Greenhouse Gas Inventories
Value(s) applied	Kerosene = 0.0438 LPG = 0.0473
Choice of data or Measurement methods and procedures	As per requirement of the methodology and Table 2.3, Chapter 2, Volume 2 of the 2006 IPCC Guidelines. The IPCC is a standard, credible source of emissions factors.
Purpose of data	Calculation of baseline emissions
Additional comment	IPCC (2006); May be updated according to any future changes by the IPCC

Data/parameter	**$\eta_{biogas\ stove}$**
Unit	%
Description	Combustion efficiency of the biogas stove introduced by the VPA
Source of data	LIPI Stove Report, 2010; Indonesian Government standard on stove efficiency /29//30/
Value(s) applied	50

Choice of data or Measurement methods and procedures	A comprehensive combustion efficiency test of the biogas stove introduced by the VPA was conducted in 2010 by LIPI, a governmental testing institute. The resulting efficiency of the biogas stoves was 52%. The Indonesian Government standard on stove efficiency indicates an efficiency of 50% is prevalent. The latter has been used to be conservative.
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data/parameter	**$EF_{awms,T}$**
Unit	kg CH_4
Description	Emission factor for the defined livestock population category T by average temperature (27.1°C)
Source of data	2006 IPCC Guidelines for National Greenhouse Gas Inventories; Indonesian Meteorological Climatological and Geophysical Agency
Value(s) applied	Dairy cows = 31 Other cattle = 1 Buffalo = 2 Market swine = 7 Goats = 0.22 Sheep = 0.20 Poultry = 0.02
Choice of data or Measurement methods and procedures	As per requirement of the methodology and sourced from Tables 10.A-4 through A-9., Chapter 10, Volume 4 of the 2006 IPCC Guidelines The IPCC is a standard, credible source of emissions factors.
Purpose of data	Calculation of baseline emissions
Additional comment	IPCC (2006); May be updated according to any future changes by the IPCC

Verification of data generation, aggregation and recording in this case is not applicable since they are fixed parameters from the registered VPA-DD. The values for the fixed parameters in the registered VPA-DD have been correctly used in calculation and reporting of emissions reductions for the monitoring period verified.

Findings	No finding was raised regarding this issue.
Conclusion	Data parameters fixed at validation, used for calculating the emission reduction, are in accordance with registered VPA-DD, methodology and other requirements. All data sources and assumptions are appropriate, and calculations are correct as applicable to the proposed programme.

D.6.2. Data and parameters monitored

Means of verification	The audit team carried out a review of information flows for generating, aggregating and reporting the monitoring parameters to assess a completeness of monitoring in line with the monitoring plan and the applied methodology, including among others: • The measurement/determination method used. • Relevant monitoring equipment, their features and the control and calibration procedures. • Significant inaccuracies occurred in case of measured or estimated values of some parameters. • Measuring, reading and/or recording frequency. • QA/QC procedures applied to prevent or identify and correct any errors or omissions in the reported monitoring parameters.

Data and monitored parameters were verified through the field visit, interviews and desk-review. The monitoring system and all applied procedures are in compliance with the monitoring plan and the applied methodology based on the information included in the final monitoring report. The list of all monitored parameters and the means of verification used are detailed as follows:

Data/parameter:	**$U_{p1,y}$**
Unit	Fraction
Description	Cumulative usage rate for technologies in project scenario p1 in year y, based on cumulative adoption rate and drop off rate (fraction)
Measured/calculated/default	Measured
Source of data	Collected through the annual Biogas User Survey; Biogas User Survey 2022 results have been used for the purpose of the ex-post calculation – 20230308 BUS_2022_Tabulation.xlsx | Sheet Drop-off_2022 | Cell E15 - E21 /6/.
Value(s) of monitored parameter	0.97936 With the following usage rate for each age group: **Age group** / **Usage rate** Age group 13 / 0.9783 Age group 12 / 1 Age group 11 / 1 Age group 10 / 0.9762 Age group 9 / 1 Age group 8 / 0.9231 Age group 7 / 0.9808
Monitoring equipment	NA
Measuring/reading/recording frequency:	Annual
Calculation method (if applicable):	A single usage parameter is weighted to be representative of the quantity of project technologies of each age being credited in a given project scenario
QA/QC procedures:	The usage rate of thermal applications will be monitored annually using survey methods to satisfy a 90/10 precision/confidence, following the 'Standard for Sampling and Surveys for CDM Project Activities and Programme of Activities' (EB 69, Annex 4) /26//27/.
Purpose of data:	Emission reduction calculation
Additional comments:	

Through the source of data represented for $U_{p1,y}$, the cumulative usage rate for technologies by age group in the project scenario are observable for the corresponding crediting periods, based on cumulative adoption rate and drop off rate (fraction). The VVB team has verified the data through the traceability of the column "% in operation", cells E15-E21, where the "Non-technical drop-off rate" of the total samples by year of the crediting period have been taken into account. By applying the % in operation to the units built for each period, considering the total 20,252 biodigesters installed in the VPA, it is obtainable the proportion of drop-off

rate over the units installed. The sum of the latter, gives the weighted average rate of operation VPA-1 for $U_{p1,y}$ by 0.97936.

Data/parameter:	**$N_{p1,y}$**
Unit	Number
Description	Cumulative number of project technology-days included in the project database for project scenario p1 against baseline scenario b1 in year y
Measured/calculated/default	Measured
Source of data	IDBP database and Biogas User Survey; Biogas User Survey 2022 results have been used for the purpose of the ex-post calculation /9/.
Value(s) of monitored parameter	Reported as a result of (Nop1,y * Up1,y *(Op1,y / 365), which equals (20,252 * 0,9793598*364.9400/365) = 19,831 when rounded up
Monitoring equipment	NA
Measuring/reading/recording frequency:	Continuous
Calculation method (if applicable):	$N_{p1,y}$ is calculated from (a) the number of installed system (parameter $No_{p1,y}$); and (b) the average operational days of the system ($O_{p1,y}$). The equation is therefore ($N_{p,y} = No_{p,y} * U_{p1,y} *(O_{p,y} / 365)$)The average operational days will be confirmed upon verification. Households are required to notify provincial office staff in a situation when a biodigester stops working. This information is recorded in the IDBP database, allowing the identification per included biodigester the amount of operational days per year. In a scenario where the biodigester stops operating, the number of non-operational days is recorded in the database.
QA/QC procedures:	As per procedures of the IDBP database
Purpose of data:	Emission reduction calculation
Additional comments:	-

Value of the equation parameters of $N_{p1,y}$ shown in the source of data of their corresponding following tables below.

Data/parameter:	**$No_{p1,y}$**
Unit	Number
Description	Cumulative number of project technologies included in the project database for project scenario p in year y
Measured/calculated/default	Measured
Source of data	20230215_IDBP_Database_VPA1.xls /9/
Value(s) of monitored parameter	20,252
Monitoring equipment	NA
Measuring/reading/recording frequency:	Continuous
Calculation method (if applicable):	The actual number of biodigesters.
QA/QC procedures:	As per procedures of the IDBP database
Purpose of data:	Emission reduction calculation
Additional comments:	-

Data/parameter:	**$O_{p1,y}$**
Unit	Number

Description	The average technology-days during which the biodigesters are operational for project scenario p1 against baseline scenario b1 in year y
Measured/calculated/default	Measured
Source of data	"20230215_IDBP_Database_VPA1" | sheet PLANT MAINTENANCE | cell I42915 /9/ "20230320 ER Calculation VPA1 MP5 CP2.xls" | sheet GS VER 2022 | Cell E85 /5/
Value(s) of monitored parameter	364.9400
Monitoring equipment	NA
Measuring/reading/recording frequency:	Continuous
Calculation method (if applicable):	The actual cumulative number of biodigester non-operational days will be confirmed upon verification. The equation to calculate this is ($O_{p,y}$ = 365 – non-operational days). Non-operational days are based on the number of observations of technical drop-offs, which need to be repaired within a 15 day period. For number of incidences reported during this MP, see: 20230215_IDBP_Database_VPA1" sheet "PLANT MAINTENANCE" cell I42915
QA/QC procedures:	As per procedures of the IDBP database
Purpose of data:	Emission reduction calculation
Additional comments:	-

For parameter $N_{p1,y}$, the average technology-days ($O_{p1,y}$) during which the biodigesters are operational for project scenario of the corresponding monitoring period against the baseline scenario, has been assessed by the VVB through the following evidence provided by the PD:
- "20230320 ER Calculation VPA1 MP5 CP2", tab "GS VER 2022", cell E85: subtraction of the non-operational days (multiplication of 81 number of observations of technical drop-offs and 15 days period where units need to be repaired) to the total days of a year (365), in based on total VPA1 units installed to date (20,252).
- "20230215_IDBP_Database_VPA1", tab "PLANT MAINTENANCE", cell I42915: where the number of incidences reported during the corresponding monitoring period is represented by 81. The PP has considered from all the data of the benefited HHs, the period 2010-2016 the biodigester installations and the year 2022 for the maintained units.

Data/parameter:	**$LE_{p1,y}$**
Unit	tCO_2e/year
Description	Leakage in project scenario p during year y
Measured/calculated/default	Measured
Source of data	Collected through the annual Biogas User Survey. See "20230320 ER Calculation VPA1 MP5 CP2.xls" | sheet GS VER2022 | cell E77 /5/
Value(s) of monitored parameter	0.016
Monitoring equipment	NA
Measuring/reading/recording frequency:	Every two years
Calculation method (if applicable):	

QA/QC procedures:	The leakage is monitored once every two years using survey methods to satisfy the requirements put forth by the methodology Technologies and Practices to Displace Decentralized Thermal Energy Consumption, Version 3.1.
Purpose of data:	Calculation of leakage emissions
Additional comments:	

While there is no leakage emissions from methane avoidance under the VPA per household, the value applied of the total CO_2 leakage emissions from fuel substitution under the VPA per household ($LE_{p1,CO2,y}$) comes from a leakage assessment done by the PD in 2021, related to the fuel usage for VPA-1.

While considering the following project emissions parameters: f_{NRB}, $BB_{p1,bio}$, NCV_{bio}, $EF_{p1,bio}$ and $PE_{CO2,y}$ for biomass as fuel substitution on one hand, and $BB_{p1,fuel}$, NCV_{fuel}, $EF_{p1,fuel}$ and $PE_{CO2,y}$ for LPG as fuel substitution on the second hand (from estimates on 20230320 ER Calculation VPA1 MP5 CP2 spreadsheet, tab GS VER 2022), the PD has provided the corresponding assessment as evidence "20220420 Leakage 2021" Excel file, where tab "fuel_use" estimates the next parameters for the CO_2 leakages:

- "N" and "Mean" for the volume of LPG used, by 8 and 1.56 respectively.
- "N" and "Mean" for firewood used, by 8 and 2.58 respectively.

Additionally, the PD clarified the calculations through a call meeting with the audit team, to show the estimates and the manual figures of the formula developed in the main ER spreadsheet for $LE_{p1,CO2,y}$ /5//34/.

Data/parameter:	**$N_{T,h}$**
Unit	Number
Description	Number of animals of livestock category T in premise h
Measured/calculated/default	Measured
Source of data	BUS 2022 – "20230308 BUS_2022_Tabulation.xlsx" | sheet "Tabulation"| cell AE4618 /6/
Value(s) of monitored parameter	Cows = 3.98[1]
Monitoring equipment	NA
Measuring/reading/recording frequency:	Annual
Calculation method (if applicable):	Analysis of animal ownership from the BUS 2022 shows that cows and buffaloes are the dominant type of animal owned by majority of biodigesters users (70%). Given the marginal emission impact of the latter two categories and for conservativeness, only methane emissions from dairy cows will be considered in this emissions reduction calculation. Methane emissions from secondary and any following animal types are not included for conservativeness. This means that the total average number of animals kept amounted to 3.98 dairy cows per household.
QA/QC procedures:	-
Purpose of data:	Calculation of baseline emissions
Additional comments:	-

[1] According to the BUS 2022, for 70% of household cows or buffalos were the primary animals. Some households reported pigs and other animals such as goat and poultry, but their figures are immaterial and have been excluded from the ex-ante calculation presented in this PDD for conservativeness

The monitored value applied of 3.98 comes from the average calculated for share of cows per household used for emission reductions and year of use by 5.66%, taking into account the responses on question 72.k “Number of cattle/buffalo/horse (after having biogas)”: 222 households using cowdung over 316 households using biodigesters of the survey.

Data/parameter:	**PL**
Unit	%
Description	Physical leakage of the biodigester
Measured/calculated/default	Default
Source of data	IPCC /25/
Value(s) of monitored parameter	Estimated using a 10% default rate of total methane production
Monitoring equipment	NA
Measuring/reading/recording frequency:	Annual
Calculation method (if applicable):	As per Annex 6 of the applied methodology
QA/QC procedures:	-
Purpose of data:	Calculation of project emissions
Additional comments:	-

Confirmed value applied according to the IPCC /25/: Volume 4, Chapter 10, Table 10.17.

Data/parameter:	**$BB_{p1,bio}$**
Unit	Tonnes
Description	Quantity of biomass consumed in project scenario p during year y, in tonnes
Measured/calculated/default	Measured
Source of data	KPT Survey, December 2021- January 2022 – “Biogas KPT & Non 2021.xls” | sheet 90-30 test | cell W103 /8/
Value(s) of monitored parameter	0.300
Monitoring equipment	Weight scale
Measuring/reading/recording frequency:	Updated every two years through a Project KPT
Calculation method (if applicable):	Project KPT was executed in December 2021-January 2022 targeting 93 households. These households reported an average daily use of 0.82 kg of wood, equivalent to 0.300 tonnes of wood per year. A weight scale manufactured by Wei Hang, Portable Electronic Scale company, was applied. /16/
QA/QC procedures:	Shall be in line with Section 7 of the applied methodology
Purpose of data:	Calculation of project emissions
Additional comments:	-

$BB_{p1,bio}$ calculated from the average estimated on the 93 households of the survey that resulted on a generation from average daily use of 0.82kg of firewood in biogas user households per day, which equals 300.19 kg per year and 0.3 tonnes per year. Results of this survey are observable on “Biogas KPT & Non 2021.xls”, sheet “90-30 test” and “Biogas HH 2021”, column CO. The latter column is the result of the subtraction of "The weight/volume of WOOD FUEL at the first measurement" and "The weight/volume of WOOD FUEL at the second measurement".

Data/parameter:	$BB_{p1,fuel}$
Unit	Tonnes
Description	Quantity of fossil fuel consumed in project scenario 1 during year y, in tonnes
Measured/calculated/default	Measured
Source of data	KPT Survey, December 2021- January 2022 – "Biogas KPT & Non 2021.xls" | sheet 90-30 test | cell AC103 /8/
Value(s) of monitored parameter	LPG: 0.100
Monitoring equipment	Weight scale
Measuring/reading/recording frequency:	Updated every two years through a Project KPT
Calculation method (if applicable):	Project KPT was executed in December 2021-January 2022 targeting 93 households. These households reported an average daily use of 0.27 kg of LPG, equivalent to 0.1tonnes of LPG per year. A weight scale manufactured by Wei Hang, Portable Electronic Scale company, was applied /16/.
QA/QC procedures:	Shall be in line with Section 7 of the applied methodology
Purpose of data:	Calculation of project emissions
Additional comments:	-

$BB_{p1,fuel}$ calculated from the average estimated on the 93 households of the survey that resulted on a generation average daily use of 0.27kg of LPG in biogas user households per day, which equals 100.11 kg per year and 0.1 tonnes per year. Results of this survey are observable on "Biogas KPT & Non 2021.xls", sheet "90-30 test" and "Biogas HH 2021", column CU. The latter column is the result of the subtraction of "The weight/volume of LPG GAS at the first measurement" and "The weight/volume of LPG GAS at the second measurement".

Data/parameter:	$MS_{P,S,K}$
Unit	%
Description	Fraction of livestock category T's manure not treated in bio-digester, in climate region k
Measured/calculated/default	Measured
Source of data	"20230308 BUS_2022_Tabulation.xlsx s" | sheet "Tabulation"| cell AC5676 /6/
Value(s) of monitored parameter	17.6
Monitoring equipment	NA
Measuring/reading/recording frequency:	Annual
Calculation method (if applicable):	
QA/QC procedures:	-
Purpose of data:	Calculation of project emissions
Additional comments:	-

The value applied for the fraction of livestock category T's manure not treated in bio-digester ($MS_{P,S,K}$), comes from the results estimated from the survey represented in BUS tabulation file, sheet Tabulation, question 90.aa: percentage of "Cow manure put into the digester" over the corresponding years of use of the VPA-1. The result of the parameter equals to the remaining percentage average calculated from the total result of each year (from Y7 to Y13): 100% - 82.4% = 17.6%.

Data/parameter:	$MS_{T,S,k}$
Unit	%
Description	Fraction of livestock category T's manure fed into the bio-digester, S in climate region k
Measured/calculated/default	Measured
Source of data	"20230308 BUS_2022_Tabulation.xlsx s" | sheet "Tabulation"| cell AC5675 /6/
Value(s) of monitored parameter	82.4
Monitoring equipment	NA
Measuring/reading/recording frequency:	Annual
Calculation method (if applicable):	-
QA/QC procedures:	-
Purpose of data:	Calculation of project emissions
Additional comments:	Applicable to VPAs applying Tier 2 only

Conversely, the value of the fraction of livestock category T's manure fed into the bio-digester corresponds to the calculation described above by 82.4%. This estimate is generated from the average percentage of total result each year in VPA-1.

Data/parameter:	GWP_{CH4}
Unit	-
Description	Global Warming Potential of methane
Measured/calculated/default	Default
Source of data	IPCC AR5; Updated according to changes by the IPCC /33/
Value(s) of monitored parameter	28
Monitoring equipment	NA
Measuring/reading/recording frequency:	Annual
Calculation method (if applicable):	
QA/QC procedures:	-
Purpose of data:	Emission reduction calculation
Additional comments:	-

Confirmed value applied according to the IPCC AR5 /33/: Climate Change 2014 Synthesis Report.

Data/parameter:	Bio
Unit	%
Description	Use of bio-slurry
Measured/calculated/default	Measured
Source of data	"20230308 BUS_2022_Tabulation.xlsx" | sheet "Tabulation", cells U4889 and U4883 | sheet "454", cells VN2743 and VM2743 /6/
Value(s) of monitored parameter	24.6

Monitoring equipment	NA
Measuring/reading/recording frequency:	Annual
Calculation method (if applicable):	To be updated through the annual Biogas User Survey
QA/QC procedures:	-
Purpose of data:	To be used for the calculation of project emissions associated with bio-slurry usage – the CH_4 emissions from the anaerobic decay of the residual organic content of digestate subjected to anaerobic storage
Additional comments:	-

The percentage value applied for use of bio-slurry comes from the survey done represented in BUS Tabulation 2022 file, sheet 454, cells VN2743 and VM2743, dividing the results of question "74. What is bio-slurry used for? Used for fertilizer on the farm itself" by 70 households with the total 285 households interviewed.

SDG impacts:

Data/parameter:	**GS-03 Soil condition**
Unit	Number
Description	Soil condition refers to changes compared to the baseline in organic matter content.
Measured/calculated/default	Measured
Source of data	"20230308 BUS_2022_Tabulation.xlsx" | sheet "Tabulation", cell U4888 | sheet "454", cells VN2743 and VM2743 /6/
Value(s) of monitored parameter	24.6%, equivalent to 4,974 households (24.6% * 20,252 biodigesters)
Monitoring equipment	NA
Measuring/reading/recording frequency:	Number of users applying the final biodigester slurry on agricultural land. Data is to be collected annually.
Calculation method (if applicable):	
QA/QC procedures:	
Purpose of data:	SDG impact monitoring
Additional comments:	-

The value applied on the parameter GS – 03 has been calculated from the extrapolation of the results of the survey carried out in BUS tabulation mentioned in the previous "Bio" parameter on all the bio-digesters installed throughout the VPA-1 (24.6% x 20,252 HHs), which equals 4,974 households using bio-slurry for fertilizer. That is to say, the result comes from multiplying the percentage of HHs using bio-slurry for fertilizer with the total biodigesters installed in the VPA.

The Excel file "20230308 BUS_2022_Tabulation.xlsx" was updated by the PD, where the traceability of these results was improved after communication with the audit team, in which also a call meeting was organized to understand the estimations done and the data filtering process regarding the surveys carried out and represented in the file.

Data/parameter:	**GS-06 Quality of employment**
Unit	Number
Description	Quality of employment refers to changes compared to the baseline in the qualitative value of employment, such as whether the jobs resulting from the project activity are highly or poorly qualified, temporary or permanent. The proportion of employees attending vocational training programs as well as Health and Safety courses, as proven

	through issuance of a certificate to all constructors, will be monitored.
Measured/calculated/default	Measured
Source of data	IDBP Database. See: "20230215_IDBP_Database_VPA1.xls" | sheet "SPV" | cells L211 and M211 /9/
Value(s) of monitored parameter	0 during the monitoring period 01/01/2022 – 31/12/2022. The trainings are conducted after new biodigesters are installed. In VPA1, there was no new installations in 2022 and hence no trainings were conducted. 1,382 during the lifetime of the project.
Monitoring equipment	NA
Measuring/reading/recording frequency:	
Calculation method (if applicable):	All vocational training and Health and Safety training attendees will be issued with a certificate proving their attendance, and a record of their names, contact details and gender, will be kept as part of the CME's consolidated monitoring database. Data is to be collected annually.
QA/QC procedures:	This will be monitored through sampling to satisfy the requirements put forth by the methodology 'Technologies and Practices to Displace Decentralized Thermal Energy Consumption'. Hard copies of all certificates issued will be kept by the CME.
Purpose of data:	SDG impact monitoring
Additional comments:	-

The audit team confirms through the source of data provided by the PP (20230215_IDBP_Database_VPA1.xls, sheet "SPV", cells M209, M210 and M211) the registration of 204 supervisors and 1,178 masons or constructors employed (see also "Mason" tab, cell N1186). These figures add up to a total of 1,382. However, as the installations of bio-digesters finalized in 2017 in the corresponded VPA-1, there have been 0 training records during the monitoring period 01/01/2022 – 31/12/2022.

Data/parameter:	**GS-07 Livelihood of the poor**
Unit	%
Description	Livelihood of the poor refers to changes compared to the baseline in living conditions, access to healthcare services including affordability and poverty alleviation.
Measured/calculated/default	Measured
Source of data	"20230308 BUS_2022 Tabulation.xlsx" | sheet "Tabulation", cells Y2419, Y2420 and Y2421 | sheet "454", cells KG2743, KG2744 and KG2745 /6/
Value(s) of monitored parameter	'No answer': 256 (equivalent to 1.3% of total units in operation) 'The same': 3,931 (equivalent to 19,4% of total units in operation) 'Improved': 16,065 (equivalent to 79.3% of total units in operation)
Monitoring equipment	NA
Measuring/reading/recording frequency:	Annually
Calculation method (if applicable):	Carried out as part of the annual Biogas User Survey conducted by the IDBP. As part of this survey the following question will be included: "Do you feel that your living conditions have a) improved, b) stayed the same, c) worsened; since the installation of the biogas digester?"

QA/QC procedures:	This will be monitored through sampling to satisfy the requirements put forth by the methodology 'Technologies and Practices to Displace Decentralized Thermal Energy Consumption'.
Purpose of data:	SDG impact monitoring
Additional comments:	-

Values applied to GS-07 have been verified through the source of data provided by the PP (20230308 BUS_2022_Tabulation Excel file), sheet "Tabulation", cells W2419, W2420 and W2421. The results of question 47 of the survey made and reflected in sheet "454": "Compared to before having biogas, what are your current social and economic living conditions?" The 79.3% of the responses were "Better", 19.4% "No change" and 1.3% "No answer". These results come from the summary table made by the PP on tab "454", cells KG2743 (188 HHs), KG2744 (46 HHs) and KG2745 (3 HHs) respectively, divided each by the total 237 households of those interviewed.

The Excel file "20230308 BUS_2022_Tabulation.xlsx" was updated by the PD, where the traceability of these results was improved after communication with the audit team, in which also a call meeting was organized to understand the estimations done and the data filtering process regarding the surveys carried out and represented in the file.

Data/parameter:	**GS-08 Access to affordable and clean energy services**
Unit	Number
Description	Access to energy services refer to changes in unsustainable energy use.
Measured/calculated/default	Measured
Source of data	See: "20230308 BUS_2022_Tabulation.xlsx" | sheet "'Drop_off_2022"| cell H29 /6/
Value(s) of monitored parameter	19,834 biodigester technologies in operation during monitoring period 01/01/2022 – 31/12/2022 and 20,252 biodigester technologies installed until 31/12/2022
Monitoring equipment	NA
Measuring/reading/recording frequency:	
Calculation method (if applicable):	
QA/QC procedures:	As per the VPA-DD, access to energy services refers to changes in unsustainable energy use. This parameter is monitored through the number of biogas units commissioned, and is therefore same as parameter '$N_{p1,y}$'
Purpose of data:	SDG impact monitoring
Additional comments:	

Although YRE is in permanent contact with the households to keep track of the bio-digesters operation, the assessment of the parameter GS-08 is represented in the BUS Tabulation Excel file, Drop-off 2022 tab. The percentage of units in operation are shown among the units built over the years of the VPA-1: age groups from 13 to 7, from 01/07/2009 to 31/12/2016 respectively: columns D and E of "Drop-off_2022" sheet. These percentages have been evaluated through the non-technical drop-off rate (row 10) identified of the total households interviewed for each age group along the 9 provinces of the project.

The 19,834 units of biodigester technologies in operation shown in cell H29 have been estimated through the sum of number of biogas plants in operation in this VPA displayed by multiplying the corresponding % of units in operation (column E) with the units built in that period (column G).

Data/parameter:	GS-09 Human and institutional capacity
Unit	Number
Description	Changes compared to the baseline in education and skills, gender equality and empowerment. Women spend much of their time collecting firewood and cooking, and have little spare time to undertake activities that stimulate personal and entrepreneurial development. The number of women attending the Operation and Maintenance training as well as the bio-slurry utilization training will be monitored.
Measured/calculated/default	Measured
Source of data	IDBP Database. See: "20230215_IDBP_Database_VPA1.xls" |sheet "O&M training" | cell G14558 and H14558 /9/
Value(s) of monitored parameter	0 during the monitoring period 01/01/2022 – 31/12/2022. The trainings are conducted after new biodigesters are installed. In VPA1, there was no new installations in 2022 and hence no trainings were conducted. 4,050 during the lifetime of the project.
Monitoring equipment	NA
Measuring/reading/recording frequency:	
Calculation method (if applicable):	As per the VPA-DD, the number of women attending the Operation and Maintenance training as well as the bio-slurry utilization training are monitored to indicate changes in gender equality. This data concerns cumulative results over the VPAs lifetime.
QA/QC procedures:	This will be monitored through sampling to satisfy the requirements put forth by the methodology Technologies and Practices to Displace Decentralized Thermal Energy Consumption, Version 3.1.
Purpose of data:	SDG impact monitoring
Additional comments:	

Results of GS-09 parameter are observable through the IDBP Database Excel file, where men and women belonging to benefited households that have received operation, maintenance and bio-slurry utilization training are registered and shown in "O&M TRAINING" sheet. Therefore, 4,050 women have been counted by separating the genders of the beneficiaries (cell H14558), but 0 belong to this monitoring period 01/01/2022 – 31/12/2022 (cell G14558) because since 2017 bio-digesters were no longer installed in the VPA-1.

Data/parameter:	GS-10 Quantitative employment and income generation
Unit	Number
Description	The number of jobs generated by within the IDBP as well as the number of constructors employed will be monitored. To evidence income generation, the amount of users selling biodigester slurry on the market will be monitored.
Measured/calculated/default	
Source of data	Employment records and through the IDBP Database; Biogas User Survey: 20230215_IDBP_Database_VPA1.xls | sheet "SPV"| cells L214 and M214 /9/ "20230308 BUS_2022_Tabulation.xlsx" | sheet "Tabulation"| cell U4891 | sheet "454", cells VP2743 and VM2743 /6/
Value(s) of monitored parameter	0 number of direct jobs created by the VPA during monitoring period 01/01/2022 – 31/12/2022

	497 households sell the bio-slurry on the market (2.5% of total) 1,501 number of direct jobs created by the VPA during the lifetime of VPA As per the VPA-DD, the number of jobs generated by the VPA as well as the number of constructors employed is monitored. To evidence income generation, the number of users selling biodigester slurry on the market is also monitored.
Monitoring equipment	NA
Measuring/reading/recording frequency:	Annually
Calculation method (if applicable):	Through the Biogas User Survey 2021 the number of users selling biodigester slurry on the market will be monitored.
QA/QC procedures:	This will be monitored through sampling to satisfy the requirements put forth by the methodology Technologies and Practices to Displace Decentralized Thermal Energy Consumption, Version 3.1.
Purpose of data:	SDG impact monitoring
Additional comments:	-

As mentioned before with GS-06, the audit team confirms through the source of data provided by the PP (20230215_IDBP_Database_VPA1.xls) the registration of 204 supervisors ("SPV" tab), 1,178 masons ("Mason" tab) and 119 CPOs ("CPO" tab). These figures add up to a total of 1,501 (cell M214 of "SPV" tab) considered as the total jobs generated by the project. However, as the installations of bio-digesters finalized in 2017 in the corresponded VPA-1, there have not been created direct jobs during the monitoring period 01/01/2022 – 31/12/2022. On the other hand, the audit team confirms that 497 households sell bio-slurry (cell U4891 of "Tabulation" tab, from BUS Tabulation Excel file) due to the 2.5% result estimated on question 74. "What is bio-slurry used for? – For sale – both unprocessed/processed/made vermicompost" from the BUS Tabulation surveys: 7 HHs from the total 285 surveyed.

Data/parameter:	**GS-12 Technology transfer and technological self-reliance**
Unit	Number
Description	Refers to changes compared to the baseline in activities that build usable and sustainable know-how in a region/country for a technology, where know-how was previously lacking. The number of constructors trained and users attending the operation and maintenance training will be monitored. Also, the entities outside of the programme in general and technical training about the functioning of the biodigester technology to promote knowledge dissemination and strengthen the domestic biogas market will be monitored.
Measured/calculated/default	Measured
Source of data	Training records /14/ and through the IDBP Database. See: 20230215_IDBP_Database_VPA1.xls | sheet "O&M training" | cell G14560 and H14560 /9/
Value(s) of monitored parameter	0 during monitoring period 01/01/2022 – 31/12/2022 14,529 during the lifetime of the VPA
Monitoring equipment	NA
Measuring/reading/recording frequency:	Annually

Calculation method (if applicable):	Records will be kept of all staff and their attendance at the vocational training programmes. All attendees will be issued with a certificate proving attendance and skills gained. Monitoring of this parameter will be combined with the monitoring of GS- 10. A record of all training held, and attendees, will be kept in the programme database.
QA/QC procedures:	This will be monitored through sampling to satisfy the requirements put forth by the methodology Technologies and Practices to Displace Decentralized Thermal Energy Consumption, Version 3.1.
Purpose of data:	SDG impact monitoring
Additional comments:	

Following the results described on GS-09 parameter above, the VVB has verified through the IDBP Database Excel file, that the total 14,529 benefited households that have received operation, maintenance and bio-slurry utilization training are registered and shown in "O&M TRAINING" sheet (see cell H14560). On the other hand, as there have not been bio-digester installations (cell G14560) since 2017 in VPA-1, there have not been training records for this monitoring period 01/01/2022 – 31/12/2022.

Data / Parameter	**GS-13 Establishment of sustainable food production area**
Unit	Hectare
Description	Area with application of bioslurry or compost.
Source of data	Collected through the annual Biogas User Survey. See: 20230308 GS-13 calculation 2022.xls | sheet 'Analysis' | cell B29 /6/
Value(s) applied	341.90
Measurement methods and procedures	Area of agricultural land with application of final biodigester slurry. Data is to be collected annually.
Monitoring frequency	Annually.
QA/QC procedures	This will be monitored through sampling to satisfy the requirements put forth by the methodology Technologies and Practices to Displace Decentralized Thermal Energy Consumption (Version 3.1).
Purpose of data	SDG impact monitoring.
Additional comment	

The audit team deems 341.90 hectare/month as satisfactory through the estimation done by the PP in the source of data provided, where 1kg of bioslurry equals 0.266m^2 and the application of the area has been calculated from the total usage/month (kg) for whole bioslurry users by 12,853,246kg.

To verify the assumption where 1kg of bioslurry is 0.266m^2, the PD has provided to the audit team evidence ("BIOSLURRY APPLICATION_BIOGAS BOOK"), where it has been tested in China, by using bio slurry from bio digester, the following applications:

- 5,000 jin/mu, where 1 jin = 0.500 Kg and 1 mu = 0.066 ha.
- 0.066 ha = 666.666 m^2.
- Thus, by using 1 jin or 0.5 Kg of bio slurry, it will able to cover around 0.133 m^2 land use. This means that while 2 jin or 1 Kg of bio slurry are applied, it will be able to cover around 0.266 m^2 land use /35/.

Data / Parameter	**GS-14 Time saved**
Unit	%
Description	The share of women indicating to save time by not having to collect biomass for cooking purposes after the installation of the biodigester.

Source of data	Collected through the annual Biogas User Survey. See: "20230308 BUS_2022_Tabulation.xlsx" | sheet "Tabulation", cell Z3577 | sheet "454", cells SS2741 and SS2742 /6/
Value(s) applied	87.35% (equivalent to 17,688 women)
Measurement methods and procedures	The BUS will ask respondents whether after the installation of a biodigester if they still collect firewood
Monitoring frequency	Annually.
QA/QC procedures	This will be monitored through sampling to satisfy the requirements put forth by the methodology Technologies and Practices to Displace Decentralized Thermal Energy Consumption (Version 3.1).
Purpose of data	SDG impact monitoring.
Additional comment	

In "20230308 BUS_2022_Tabulation", sheet "Tabulation", cells X3577 and X3576, the results of question 68.b of the survey made and reflected in sheet "454": Does your mother spend a lot of time looking for firewood for cooking? (after having biogas). The 87.3% of the responses were "Yes" and 2.1% "No". These results come from the summary table made by the PP on tab "454", cells SS2741 (207 HHs) and SS2742 (5 HHs) respectively, divided each by the total of those 237 households interviewed.

The Excel file "20230308 BUS_2022_Tabulation.xlsx" was updated by the PD, where the traceability of these results was improved after communication with the audit team, in which also a call meeting was organized to understand the estimations done and the data filtering process regarding the surveys carried out and represented in the file.

Data / Parameter	**GS-15 Productive use of time**
Unit	%
Description	Share of women indicating to use the additional saved time that has been freed up by not having to collect biomass for cooking purposes for income generating activities.
Source of data	Collected through the annual Biogas User Survey. See: "20230308 BUS_2022_Tabulation.xlsx" | sheet "Tabulation"| cells X3585 and Z3585 /6/
Value(s) applied	23.6% (equivalent to 4,785 women)
Measurement methods and procedures	The BUS will ask respondents how they use the saved time, with income generation activities as one of the possible responses.
Monitoring frequency	Annually.
QA/QC procedures	This will be monitored through sampling to satisfy the requirements put forth by the methodology Technologies and Practices to Displace Decentralized Thermal Energy Consumption (Version 3.1).
Purpose of data	SDG impact monitoring.
Additional comment	

In "20230308 BUS_2022_Tabulation", sheet "Tabulation", cells X3585, X3586 and X3587, the results of question 69.a of the survey made and reflected in sheet "454": After you have biogas, do you have other activities to get additional income? The 23.6% of the responses were "Yes", 69.6% "No" and 5.5% "No answer". These results come from the summary table made by the PP on tab "454", cells SZ2741 (56 HHs), SZ2742 (165 HHs) and SZ2743 (13 HHs) respectively, divided each one by the total 237 households interviewed.

It is noticeable, that the PP did not use "Count" function in the spreadsheet of BUS Tabulation 2022 because there are several rows that need to be filtered to be able to count the answers to different questions. Therefore, the PP manually filtered the VPA and then counted the answers to each question. The VVB team has verified these results.

	All data and supporting evidence were verified and found consistent and correct, which are detailed in the appendix 3 of this report.
Findings	CL 01 - Provide evidence of the following: 1. Cover letter sent by Hivos to Gold Standard in January 2022 to inform about the handover of CME function from Hivos to YRE, signed by the latter. 2. That the survey was executed between 9th December 2022 and 5th January 2023, for the Biogas User Survey (BUS). 3. Office training conducted on December 3rd, 2022. 4. Some record of the staff and their attendance at the vocational training programmes, regarding the functioning of the biodigester technology. 5. List of grievances with the respective responses/mitigation. 6. Document P_Biogas_as_renewable_energy _2005.pdf (reference 8 of the MR VPA-1). 7. Email communication dated 11 April 2016 by Gold Standard, confirming that the parameter 't' can be fixed at value 2.74 going forward to enable the definition of the VPA-1 threshold (reference 6). 8. ITTO (2009), used for the annual sustainable yield from the plantation's estimations (Section D.1.). 9. LIPI Stove Report, 2010; Indonesian Government standard on stove efficiency. Appendix 4 summarizes the findings from the desk review of the Monitoring Report /4/, the calculation spreadsheets /5/ and other supporting documents as well as findings from the interviews.
Conclusion	AENOR verification team confirms that: • The monitoring has been carried out in accordance with the monitoring plan in the registered VPA-DD. • All parameters required by the monitoring plan have been measured / determined without material misstatements and in line with all applicable standards and relevant requirements. • The registered monitoring plan has been properly implemented and followed by the project participants. • All parameters stated in the registered monitoring have been monitored and updated as applicable • The equipment used for monitoring is controlled and calibrated in accordance with the registered monitoring plan, the applied methodology and the national standard. • Monitoring results are consistently recorded as per the approved frequency. • The veracity of the data based on the total HHs interviewed by the PP among the 9 provinces of the project. • Quality assurance and quality control procedures have been applied in accordance with the registered monitoring plan.

D.6.3. Implementation of sampling plan

Means of verification	The verification team has checked whether the PP has applied a sampling approach to determine the monitored values. Further it has been checked whether the PP has correctly applied the implemented sampling plan including (i) description of the implemented sampling design (ii) collected data (iii) analysis of collected data (iv) demonstration on whether the required confidence/precision has been met. AENOR in accordance with the methodology monitoring requirements set forth in the methodology Technologies and Practices to Displace Decentralized Thermal Energy Consumption (Version 3.1), has checked the following parameters:

Item	BUS 2022 (US + CMS)	KPT (PFT)	KPT (BFT)
Sampling method	Households with a biodigester that has been in use for at least 6 months for each age group	Simple random sampling	Simple random sampling using PFT sampling frame
Cluster	Age group	N/A	N/A
Cluster size	48 – 67 households	N/A	N/A
Number of clusters	7 cluster were determining in accordance with the study and in accordance with the GS definition	N/A	N/A
Total sample size	409	93	39
Cross-checked	AENOR cross checked the sampling with the guidance of the applied GS methodology and the UNFCCC standard on sampling ('Standard for Sampling and Surveys for CDM Project Activities and Programme of Activities' (EB 69, Annex 4)) and BUS Tabulation 2022 /26//27//6/.	AENOR cross checked the sampling with the guidance of the applied GS methodology, the Biogas KPT & Non 2021, 2020 excel and questionnaire design, the Berkeley Air Kitchen Performance test questionnaire. The significant results were also cross check with the Outlier calculator (graphpad.com).	AENOR cross checked the sampling with the guidance of the applied GS methodology, the Biogas KPT & Non 2021, 2020 excel, questionnaire design, the Berkeley Air Kitchen Performance test questionnaire. The significant results were also cross checked with the Outlier calculator (graphpad.com)

Findings	No finding was raised regarding this issue.
Conclusion	The sampling has been developed according to the stated in the VPA-DD and the supporting information. The sampling results must meet the 90% confidence and 10% precision limit. This analysis was carried out per user group (i.e. households, SMEs, communities) and differentiated between small-scale digesters (defined as capacity up to 12m^3) and medium-scale digesters (defined as capacities larger than 12m^3). The households were selected using simple random sampling applied cross all nine provinces in accordance with TPDDTEC v3.1. The PP demonstrates, by means of the simple random that the 90/10 confidence/precision is achieved so the estimated values are considered correct and no need for additional sampling efforts is required.

D.7. Compliance with the calibration frequency requirements for measuring instruments

Means of verification	AENOR has verified the information stated in all the calibration certificates of the different equipment installed in the project and also their technical specifications from manufacturers in the current verification process.
Findings	No finding was raised regarding this issue.
Conclusion	AENOR verification team confirms that the calibration is conducted at the frequency specified by the methodology and the registered monitoring plan.

D.8. Assessment of data and calculation of SDG Impacts

D.8.1. Calculation of baseline value or estimation of baseline situation of each SDG Impact

Means of verification

Baseline estimates were calculated according to the GS4GG as follows:

SDG indicator	GS indicator	Baseline situation
SDG 13: Climate action	Climate change	Baseline emissions from fuel consumption: 101,617 tCO_2e
SDG 7: Affordable and Clean Energy	GS-08 Access to affordable and clean energy services	No access to biodigester technology. Combustion of LPG, kerosene and biomass continues to lead to particulate matter and carbon monoxide pollution and deforestation.
	GS-12 Technology transfer and technological self-reliance	No training opportunities and transfer of technology in the biogas sector.
SDG 5: Gender Equality	GS-09 Human and institutional capacity	No development as women spent much of their time collecting biomass and cooking, and remain with little spare time to undertake activities that stimulate personal and entrepreneurial development.
	GS-14 Time saved	No time savings, as women spend a significant proportion of their time having to collect biomass for cooking purposes.
	GS-15 Productive use of time	No productive use of time as women lack spare time to pursue income generating activities.
SDG 2: No Hunger	GS-03 Soil condition	No slurry is used as fertilizer on agricultural land (in terms of number of farmers).
	GS-13 Establishment of sustainable food production area	No slurry is used as fertilizer on agricultural land (in terms of area).
SDG 1: No Poverty	GS-06 Quality of employment	No training and employment opportunities linked to biogas market.
	GS-07 Livelihood of the poor	Livelihood of the poor is unchanged.
	GS-10 Quantitative employment and income generation	No training and employment opportunities linked to biogas market.

SDG 13:
Baseline emissions from fuel consumption:

	$BE_{b1CO2,y} = (\sum_b BB_{b1,fuel} * NCV_{fuel} * EF_{b1,fuel}) + (BB_{b1,bio} * NCV_{bio} * EF_{b1,bio} * f_{NRB})$ Baseline emissions from the animal waste management system: $\mathbf{BE_{b1,CH4,y}} = GWP_{CH4} * \sum_T (EF_{awms,T} * N_{T,h})$ Together amounting to (after correcting for drop off): 101,617 tCO_2e
Findings	CAR 02 and CL 02 were raised. Appendix 4 summarizes the findings from the desk review of the Monitoring Report /4/, the calculation spreadsheets /5/ and other supporting documents as well as findings from the interviews.
Conclusion	AENOR verification team confirms that: • A complete set of data for the monitoring period is available. • Calculations of baseline emissions have been carried out in accordance with the formulae and methods described in the monitoring plan and the applied methodology. • Appropriate emission factor, IPCC default values and other reference values have been correctly applied. • No errors, miscalculations, omissions, misstatements or incomplete information have been identified.

D.8.2. Calculation of project value or estimation of project situation of each SDG Impact

Means of verification

Project estimates were calculated according to the GS4GG as follows:

SDG indicator	GS indicator	Project situation
SDG13: Climate action	Climate change	50,735 tCO_2e
SDG 7: Affordable and Clean Energy	GS-08 Access to affordable and clean energy services	19,834 units in operation 20,252 biodigester technologies installed
	GS-12 Technology transfer and technological self-reliance	0 users attending training during monitoring period 14,529 users attending training during the lifetime of the project
SDG 5: Gender Equality	GS-09 Human and institutional capacity	0 women attend the Operation and Maintenance training during monitoring period 4,050 women attend the Operation and Maintenance training during the lifetime of the project
	GS-14 Time saved	17,688 women reporting to have saved time (87.35% of the 20,252 HHs with biodigesters installed)
	GS-15 Productive use of time	4,785 women reporting to have more time for productive use (23.6% of the 20,252)
SDG 2: No Hunger	GS-03 Soil condition	4,974 households use bio-slurry on land

	GS-13 Establishment of sustainable food production area	341.90 hectares applying bio-slurry
SDG 1: No Poverty	GS-06 Quality of employment	0 in 2022 during monitoring period 1,382 people attending vocational training during the lifetime of the project
	GS-07 Livelihood of the poor	'No answer: 0 (equivalent to 0% of total units in operation) 'The same': 3,931 (equivalent to 19.4% of total units in operation) 'Improved': 16,065 (equivalent to 79.3% of total units in operation)
	GS-10 Quantitative employment and income generation	0 number of direct jobs created by the VPA 497 households sell the bio-slurry on the market

<u>SDG 13:</u>
Project emissions from fuel consumption:

$$PE_{p1,CO2,y} = \sum(BB_{p1,fuel} * NCV_{fuel} * EF_{p1,fuel}) + (BB_{p1,bio} * NCV_{bio} * EF_{p1,bio} * f_{NRB})$$

Project emissions from the animal waste management system:

$$\mathbf{PE_{p1,CH4,y}} = GWP_{CH4} * \sum (N_{T,h,y} * EF_{awms,T}) * PL_y + \sum (N_{T,h,y} * EF_{awms,T}) * (1 - \eta_{new\ stove}) (1 - PL_y) + PE_{awms,NT}$$

Together amounting to after correcting for drop off: 50,735 tCO_2e

<u>SDG 7</u>:
19,834 units in operation and 20,252 biodigester technologies installed, calculated by tracking in the IDBP database all eligible biodigesters installed until 31/12/2022.
0 users attending training during monitoring period 01/01/2022 – 31/12/2022 according to training records.

<u>SDG 5</u>:
0 women attend the Operation and Maintenance training during monitoring period 01/01/2022 – 31/12/2022 according to training records.
17,688 women reporting to have saved time, as calculated by the BUS survey responses with 87.35% of the 20,252 biodigesters installed (0.8735* 20,252 = 17,688)
4,785 women reporting to have more time for productive use, as calculated by the BUS survey responses with 23.6% of the 20,252 biodigesters installed (0.236* 20,252 = 4,785)

<u>SDG 2</u>:
4,974 households use bio-slurry on land, as calculated by the BUS survey responses with 24.6% of the 20,252 biodigesters installed (0.246* 20,252 = 4,974)
341.90 hectares applying bio-slurry, per month, calculated by correcting the total units (20,252) by the drop-off rate (1.9%) and multiplying it by bio-slurry usage as fertilizer according to the BUS (43%) and finally applying conversions to get to hectares

<u>SDG 1</u>:

	0 people attending vocational training in the monitoring period 01/01/2022 – 31/12/2022 according to training records Livelihood of the poor 'no answer': 256 (equivalent to 1.3% of total units in operation), 'the same': 3,931 (equivalent to 19.4% of total units in operation), 'improved': 16,065 (equivalent to 79.3% of total units in operation) according to survey 0 number of direct jobs created by the VPA during monitoring period according to records 497 households sell the bio-slurry on the market (equivalent to 2.5% taken from BUS of total units in operation (20,252) during the monitoring period
Findings	CAR 02 and CL 02 were raised. Appendix 4 summarizes the findings from the desk review of the Monitoring Report /4/, the calculation spreadsheets /5/ and other supporting documents as well as findings from the interviews.
Conclusion	AENOR verification team confirms that: • A complete set of data for the monitoring period is available. • Calculations of project emissions have been carried out in accordance with the formulae and methods described in the monitoring plan and the applied methodology. • Appropriate emission factor, IPCC default values and other reference values have been correctly applied. • Questions regarding SDG impacts on the project period were designed and made in the household interviews during the on-site visit to confirm the results reported are reliable and realistic. • No errors, miscalculations, omissions, misstatements or incomplete information has been identified. In AENOR's opinion, monitoring practices are deemed appropriate and consistent with the monitoring plan.

D.8.3. Calculation of leakage GHG emissions

Means of verification	Leakage is monitored every 2 years using survey methods to satisfy the requirements put forth by the methodology TPDDTEC v3.1 requirements. Leakage is calculated as the usage of non-renewable biomass and fossil fuel. The leakage assessment was carried out as part of the BUS 2022. Leakage per household per year was calculated as a quantitative emissions volume (tCO_2e). According to the results reported by households that are neighbors to biogas users, 8/140 of the households uses more fuel (biomass, LPG, and/or kerosene) because of the neighbor having a biogas digester. This amounts to household leakage emissions of 0.016 tCO_2e per year. The audit team checked the calculations on spreadsheets and information in the MR, along with the surveys regarding leakage.
Findings	CAR 02 and CL 02 were raised. Appendix 4 summarizes the findings from the desk review of the Monitoring Report /4/, the calculation spreadsheets /5/ and other supporting documents as well as findings from the interviews.
Conclusion	AENOR verification team confirms that: • A complete set of data for the monitoring period is available. • Calculations of emission reductions have been carried out in accordance with the formulae and methods described in the monitoring plan and the applied methodology.

	• Appropriate emission factor, IPCC default values and other reference values have been correctly applied. • No errors, miscalculations, omissions, misstatements or incomplete information has been identified. Thus, calculations of leakage are deemed correct.

D.8.4. Summary calculation of net benefits or direct calculation for each SDG Impact

Means of verification

Net benefits were calculated according to the GS4GG as follows:

SDG	SDG Impact	Baseline estimate	Project estimate	Net benefit
SDG13: Climate action	Climate change	Baseline emissions from fuel consumption: 101,617 tCO_2e	50,735 tCO_2e	50,568tCO_2e
SDG 7: Affordable and Clean Energy	GS-08 Access to affordable and clean energy services	No access to biodigester technology. Combustion of LPG, kerosene and biomass continues to lead to particulate matter and carbon monoxide pollution and deforestation.	19,834 units in operation 20,252 biodigesters installed	19,834 units in operation 20,252 biodigesters installed
	GS-12 Technology transfer and technological self-reliance	No training opportunities and transfer of technology in the biogas sector.	0 users attending training during monitoring period 14,529 users attending training during the lifetime of the project	0 users attending training during monitoring period 14,529 users attending training during the lifetime of the project
SDG 5: Gender Equality	GS-09 Human and institutional capacity	No development as women spent much of their time collecting biomass and cooking, and remain with little spare time to undertake activities that stimulate personal and entrepreneurial development.	0 women attend the Operation and Maintenance training during monitoring period 4,050 women attend the Operation and Maintenance training during the lifetime of the project	0 women attend the Operation and Maintenance training during monitoring period 4,050 women attend the Operation and Maintenance training during the lifetime of the project
	GS-14 Time saved	No time savings, as women spend a significant proportion of their time having to collect biomass for cooking purposes.	17,688 women reporting to have saved time (87.35% of the 20,252 biodigesters installed)	17,688 women reporting to have saved time (87.35% of the 20,252 biodigesters installed)

	GS-15 Productive use of time	No productive use of time as women lack spare time to pursue income generating activities.	4,785 women reporting to have more time for productive use (23.6% of the 20,252 biodigesters installed)	4,785 women reporting to have more time for productive use (23.6% of the 20,252 biodigesters installed)
SDG 2: No Hunger	GS-03 Soil condition	No slurry is used as fertilizer on agricultural land (in terms of number of farmers).	4,974 households use bio-slurry on land	4,974 households use bio-slurry on land
	GS-13 Establishment of sustainable food production area	No slurry is used as fertilizer on agricultural land (in terms of area).	341.90 hectares applying bio-slurry	341.90 hectares applying bio-slurry
SDG 1: No Poverty	GS-06 Quality of employment	No training and employment opportunities linked to biogas market.	0 in the 2022 during monitoring period 1,382 people attending vocational training during the lifetime of the project	0 in the 2022 during monitoring period 1,382 people attending vocational training during the lifetime of the project
	GS-07 Livelihood of the poor	Livelihood of the poor is unchanged.	'No answer: 256 (equivalent to 1.3% of total units in operation) 'The same': 3.931 (equivalent to 19.4% of total units in operation) 'Improved': 16,065 (equivalent to 79.3% of total units in operation)	'No answer: 256 (equivalent to 1.3% of total units in operation) 'The same': 3,931 (equivalent to 19.4% of total units in operation) 'Improved': 16,065 (equivalent to 79.3% of total units in operation)
	GS-10 Quantitative employment and income generation	No training and employment opportunities linked to biogas market.	0 number of direct jobs created by the VPA (1,501 number of direct jobs created by the VPA during the lifetime of the project) 497 households sell the bio-slurry on the market	0 number of direct jobs created by the VPA (1,501 number of direct jobs created by the VPA during the lifetime of the project) 497 households sell the bio-slurry on the market

SDG 13:
Emissions reductions

ER y = BE y – PE y – LE y

Together amounting to after correcting for drop off: 50,568tCO_2e.

Findings	No finding was raised regarding this issue.
Conclusion	AENOR verification team confirms that: • A complete set of data for the monitoring period is available.

	• Calculations of emission reductions have been carried out in accordance with the formulae and methods described in the monitoring plan and the applied methodology. • Appropriate emission factor, IPCC default values and other reference values have been correctly applied. • No errors, miscalculations, omissions, misstatements or incomplete information has been identified.

D.8.5. Comparison of actual SDG Impacts with estimates in validated PDD

Means of verification

As the VPA-DDs was developed prior to the GS for Global Goals, most of the ex-ante SDG impacts were not reported.

	Current MP	PDD estimate
SDG 13	Total emission reduction: 50,568 tCO_2e/ this monitoring period.	Total emission reduction: 55,056 tCO_2e/ ex ante estimate in PDD.
SDG 7: Affordable and Clean Energy	19,834 units in operation 20,252 biodigesters installed	20,253 biodigester technologies installed.
	0 users attending training.	-
SDG 5: Gender Equality	0 women attend the Operation and Maintenance training.	-
	17,688 women reporting to have saved time.	-
	4,785 women reporting to have more time for productive use.	-
SDG 2: No Hunger	4,974 households use bio-slurry on land	-
	341.90 hectares applying bio-slurry, per month	-
SDG 1: No Poverty	0 number of direct jobs created by the VPA 497 households sell the bio-slurry on the market (3.1% of total)	-
	'No answer': 256 (equivalent to 1.3% of total units in operation) 'The same': 3,931 (equivalent to 19.4% of total units in operation) 'Improved': 16,065 (equivalent to 79.3% of total units in operation)	-
	0 vocational trainings conducted	-

In regard to SDG 13, the ex-post value is higher than the VPA-DD estimate due to the update of the GWP CH4 value from 25 to 28 in accordance with the rule update of Applicability Of Global Warming Potential For Gold Standard for the Global Goals Projects.

For SDG 7, the difference is due to one unit been taken out as it related to a household that switched to using tofu as input for feed, rather than dung.

Findings	CAR 02 - The following errors have been found on the 20230322 VPA1 MR v01:

	1. Update the MR publication date on the cover page, the title of the Table 38 (page 60) and the year of the vintage on Table 39 (page 61). 2. In the spreadsheet "IDBP_Database", the number of all installations sum 20,255 instead of the 20,252 reported in the MR. It has been adjusted by subtracting 3. Justify. 3. Some references as the following: - Reference 16, 66 and 67 of with the "20230308 BUS_2022_Tabulation". - Reference 56 with ER Calculation spreadsheet, "GS VER 2022". - Source data of the parameters NT,h, Bio, GS-03 Soil condition and GS-14 Time saved in section D.2. 4. The CDM link provided as the reference number 19 (page 14) cannot be opened from the document. 5. Percentages shown in the table of the E.2. section of the MR in GS-14 Time saved and GS-15 Productive use of time. 6. The leakage represented in the column 'Project situation' of the table of Section E.3., is not consisted with the spreadsheet ER Calculation. 7. Update BUS 2022 with the proper percentage using cows in 'Appendix. Detailed Emission Reduction Calculation', page 53. CL 02 - Clarification of the following points of the MR VPA-1 is required: 1. In Section D.1. Data and parameters fixed ex ante or at renewal of crediting period: - According to the explanation represented for the value applied on parameter NRB, PP is requested to provide the traceability of the 35,974,483m3. - According to the explanation represented for the value applied on parameter NRB: 86,396,000m3 x 58.36% = 50,420,506.6m3. The result is not consistent. - According to the explanation represented for the value applied on parameter DRB, PP is requested to provide the traceability of the 42,041,000m3. 2. Bio-slurry usage as fertilizer by 43% according to the BUS (table of Section E.2., page 40). 3. According to the "20180702 IDBP VPA1-DD CP2 v10.1" received, there are many differences with the data displayed on Table 16 of the MR VPA1. 4. Add the references of the following: Thermal energy demand on Table 18 and 21, MST,S,k Share fed into biodigester on Table 30 and Project emissions from animal waste management on Table 36. 5. The data displayed on Table 23: 90/30 rule check on baseline emissions, cannot be found in the reference shown. 6. Value shown of BEb1,CH4,y on Table 28, page 54, has different result than the same parameter calculated on the above Table 27. 7. In the database evidence provided 'IDBP_Database_VPA', tab 'MASTER VPA', some cells from the column 'NO.OF.CATTLE' are empty. Please clarify. Appendix 4 summarizes the findings from the desk review of the Monitoring Report /4/, the calculation spreadsheets /5/ and other supporting documents as well as findings from the interviews.
Conclusion	AENOR verification team confirms that: A comparison of actual GHG emission reductions or net anthropogenic GHG removal of the programme achieved during this monitoring period with the estimates in the registered VPA-DD has been provided. The verification team considers that the calculation of the comparison is correct.

D.8.6. Remarks on difference from estimated value in registered PDD

Means of verification	The actual emission reductions achieved during the current monitoring period are lower than the emission reductions stated in the registered PDD.
Findings	No finding was raised regarding this issue.
Conclusion	The comparison of emission reductions is transparently included in the Monitoring report. It is not necessary to provide a justification because the emission reductions achieved during the current monitoring period are lower than the emission reductions stated in the registered PDD.

D.9. Local stakeholder consultation process

During the interviews with local people, the verification team confirmed that local stakeholders are satisfied about the project, in general, because although some specific situation can cause discomfort in someone the communication channels with the project staff are clear and available and appropriate answer to each problem is provided quickly.

The audit team interviewed during the on-site visit the following PP team to verify the correct function of the grievance mechanism of the program:

- Danastri Widoningtyas as IDBP Program Assistant (Yayasan Rumah Energi, YRE),
- Supriyanto as IDBP Field Officer (YRE),
- Witono Pujo Sasongko as IDBP's construction partner organization,
- Eko Kristy as IDBP's construction partner organization,
- Tribowo as Rogomulyo local community coordinator,
- Priyono as Cepogo local farmers group representative.

The PP team explained that the village coordinators are in permanent contact with the members of the benefited households and YRE. The HHs that report incidents with the biodigester get on a waiting list of a repairment program managed by YRE and are periodically attended to address the grievances. The frequency of attendance depends on the demand of families with incidents claimed and the delay can take several months. The local partners are the main actors to repair the physical incidents of the program activity. They sell to the affected family the stove or parts of it to be repaired if necessary and help them to install it. The local partner is always being supervised and coordinated by YRE. The different phases of communication of this process are explained on Section G of the MR: 1. IDBP hotline, 2. directly contact YRE field officer and 3. Directly contact to the CPO.

The audit team verified the external communication record for 2022 where all the input/grievances received are registered and the evidence of some of the answers delivered to the input/grievances received. There were just 3 grievances during the monitoring report that were closed and no grievances ongoing after. Hence it is accepted by the verification team /12/.

The grievances registered in the database has been provided as evidence asked by the audit team, as explained in the finding of Section D.1 above. This database registers the following information about each HH that intervenes:

- Number
- ID Plant
- User name
- Construction date
- Corresponding VPA
- Address
- CPO name
- Grievance date of claiming
- Grievance receiver
- Problem description

- Grievance date of response
- Response description
- Photo of the stoves with the main HH member

D.10. Double counting of emissions reductions

According to the rules stated by Gold Standard, to assure that no double counting could happen AENOR has verified during the desk review and the interviews that all biogas obtained from the programme is registered and used by the GS project and no other carbon project exist close that can use the same biogas or installations. Furthermore, in the IDBP database each biodigester has a unique number and different construction date. Thus, the database does not allow for double-entries. The records of biogas units were checked by the audit team.
AENOR thus confirms that there is no evidence of a possible double counting of emissions reductions during the current monitoring period.

SECTION E. Internal quality control

Following the completion of the assessment process by the verification team, all documentation undergoes an internal quality control through a technical review before the request for Issuance of VERs is submitted. The Technical reviewer is a qualified member of AENOR, independent from the team that carried out the verification of the programme. The technical reviewer or the team appointed for the technical review is qualified in the technical area(s) and sectoral scope(s) of the programme.

SECTION F. Verification opinion

AENOR has performed the verification of the emission reductions of the “Indonesia Domestic Biogas Programme of Activities” VPA-1 GS1174 for the period from 01/01/2022-31/12/2022.
The verification approach was based on the requirements as defined under the Kyoto Protocol, Marrakech accord, Montreal COP/MOP 1, Nairobi COP/MOP 2 as well as those defined by the CDM Executive Board and GS4GG.
AENOR planned and performed the verification to obtain the information, explanations and evidence considered necessary to provide sufficient evidence to give reasonable assurance that the amount of GHG emission reductions for the reporting period, prepared on the basis of both the registered monitoring plan and the final monitoring report, are fairly stated.
AENOR conducted the verification with regard to the monitoring plan included in the registered Project Design Document, and the applied methodology as registered for the project. This assessment included:

- Collection of evidence supporting the reported data
- Checking whether the provisions of the monitoring plan, were consistently and appropriately applied.

AENOR has verified whether the information included in the final monitoring report is correct and that the emissions reductions achieved have been determined correctly.
In AENOR's opinion, GHG emissions reported for the project in the final monitoring report are fairly stated.
The GHG emission reductions were calculated without material errors, omissions or misstatements in a conservative and appropriate manner according to the approved methodology “Technologies and Practices to Displace Decentralized Thermal Energy Consumption” version 3.1 and the monitoring plan and formulae provided in the registered VPA-DD.

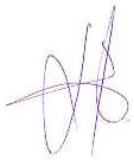
SECTION G. Certification statement

AENOR is able to certify that the results achieved by the “Indonesia Domestic Biogas Programme of Activities” VPA-1 GS1174 for the period from 01/01/2022-31/12/2022 amount to 50,568 GS GSVERs.

Sustainable Development Goals Targeted	SDG Impact	Amount Achieved	Units/ Products
SDG 13: Climate Action	Climate change	50,568	VER
SDG 7: Affordable and Clean Energy	GS-08 Access to affordable and clean energy services	19,834	Units in operation
	GS-12 Technology transfer and technological self-reliance	0	Users attending training
SDG 5: Gender Equality	GS-09 Human and institutional capacity	0	Women attending Operation and Maintenance training
	GS-14 Time saved	17,688	Women reporting to have saved time
	GS-15 Productive use of time	4,785	Women reporting to have more time for productive use
SDG 2: No Hunger	GS-03 Soil condition	4,974	Households using bio-slurry on land
	GS-13 Establishment of sustainable food production area	341.90	Hectares applying bio-slurry, per month
SDG 1: No Poverty	GS-06 Quality of employment	0	Vocational trainings conducted
	GS-07 Livelihood of the poor	256 3,931 16,065	'No answer' 'The same' 'Improved'
	GS-10 Quantitative employment and income generation	0 497	Number of direct jobs created by the VPA Households selling bio-slurry

Madrid, December 13, 2023.





Asís Arranz Arbex
Team Leader

José Luis Fuentes
Climate Change Manager

Appendix 1. Abbreviations

Abbreviation	Full text
AENOR	AENOR Internacional S.A.U.
BUS	Biogas User Survey
CAR	Corrective Action Requests
CDM	Clean development mechanism
CL	Clarification Actions
EF	Emissions factor
ER	Emission reduction
FAR	Forward action requests
GHG	Greenhouse gas
GS	GoldStandard
GS4GG	Gold Standard for the global Goals
GWP	Global warming potential
IDBP	Indonesia Domestic Biogas Programme of Activities
IPCC	Intergovernmental Panel on Climate Change
IR	Internal resources
KPT	Kitchen Performance Test
LPG	Liquified petroleum gas
MP	Monitoring period
MR	Monitoring report
MW	Megawatt
N/A	Not applicable
PP	Project proponent
QA/QC	Quality assessment/quality control
SDG	Sustainable development goal
Tco2	Tons of carbon dioxide
TJ	Tera Joules

Abbreviation	Full text
TPDDTEC	Technologies and Practices to Displace Decentralized Thermal Energy Consumption
UNFCCC	United Nations Framework Convention on Climate Change
VER	Verified emission reductions
VPA	Validated project design document
VPA-DD	Component project design document
VVB	Validation and verification body
YRE	Yayasan Rumah Energy

Appendix 2. Competence of team members and technical reviewers

CERTIFICATE OF QUALIFICATION

Subject: Verification and Technical Review Team for “Indonesia Domestic Biogas Programme of Activities (IDBP) (GS 1174)”

Madrid, 13/12/2023

Hereby I confirm the following records of qualification, according to Gold Standard approved Validation and Verification Bodies and in relation with the verification process of the above mentioned programme:

Name: Luís Javier Arribas Alonso

GS Team Leader: Yes

GS Team Leader Under Supervision: N/A

GS Validator: N/A

GS Verifier: Yes

GS Technical Reviewer: N/A

External Technical Expert: N/A

Technical areas related with the project activity:

Community Service Activities



Jose Luis Fuentes
Climate Change Manager

CERTIFICATE OF QUALIFICATION

Subject: Verification and Technical Review Team for “Indonesia Domestic Biogas Programme of Activities (IDBP) (GS 1174)”

Madrid, 13/12/2023

Hereby I confirm the following records of qualification, according to Gold Standard approved Validation and Verification Bodies and in relation with the verification process of the above mentioned programme:

Name: Asís Arranz Arbex

GS Team Leader (2): Yes

GS Validator: N/A

GS Verifier: Yes

GS Technical Reviewer: N/A

External Technical Expert: N/A

Technical areas related with the project activity:

Community Service Activities



Jose Luis Fuentes
Climate Change Manager

CERTIFICATE OF QUALIFICATION

Subject: Verification and Technical Review Team for “Indonesia Domestic Biogas Programme of Activities (IDBP) (GS 1174)”

Madrid, 13/12/2023

Hereby I confirm the following records of qualification, according to Gold Standard approved Validation and Verification Bodies and in relation with the verification process of the above mentioned programme:

Name: Jose Luis Fuentes Perez

GS Team Leader: N/A

GS Validator: N/A

GS Verifier: N/A

GS Technical Reviewer: Yes

External Technical Expert: N/A

Technical areas related with the project activity:

Community Service Activities



Jose Luis Fuentes
Climate Change Manager

Appendix 3. Documents reviewed or referenced

No.	Author	Title	References to the document	Provider
1	PP	Registered GS VPA-DD	version 10.2	GS Website
2	PP	Monitoring plan registered	version 10.2	GS Website
3	PP	Monitoring report	version 0.1	PP
4	PP	Monitoring report	version 0.3	PP
5	PP	20230320 ER Calculation VPA1 MP5 CP2	version 1	PP
6	PP	20230308 BUS 2022 Tabulation	version 1	PP
7	PP	20230308 GS-13 calculation 2022	2022	PP
8	PP	Biogas KPT & Non 2021	2021	PP
9	PP	20230215 IDBP Database VPA1	version 1	PP
10	PP	Reparation report	-	PP
11	PP	Grievance mechanism	-	PP
12	PP	List of Grievances 2022	2022	PP
13	PP	20180407 KPT December 2017	2017	PP
14	PP	Training reports	-	PP
15	PP	KPT non-users	-	PP
16	PP	KPT user biogas	-	PP
17	PP	MOU Hivos-YRE	-	PP
18	GS	Gold Standard for the global Goals, Principles and Requirements	version 1.2	GS Website
19	GS	Gold Standard for the Global Goals, Community Services Activities Requirements	version 1.2	GS Website
20	UNFCCC	CDM Validation and Verification Standard for programmes of activities	Version 03.0	UNFCCC Website
21	TÜV NORD CERT GmbH	GS Verification and Certification report previous monitoring period	Version 1	TÜV NORD CERT GmbH
23	GS	Template Guide - Monitoring report	Version 1.1	GS Website

No.	Author	Title	References to the document	Provider
24	GS	Technologies and Practices to Displace Decentralized Thermal Energy Consumption	version 3.1	GS Website
25	IPCC	2006 IPCC Guidelines on National GHG Inventories	2006	IPCC
26	UNFCCC	Guideline: Sampling and surveys for CDM project activities and programmes of activities	Version 04.0	UNFCCC Website
27	UNFCCC	Standard Sampling and surveys for CDM project activities and programmes of activities	Version 09.0	UNFCCC Website
28	GS	Gold Standard for the Global Goals Safeguarding Principles & Requirements	Version 1.2	GS Website
29	PP	LIPI Stove Report_Khazanah Bahari	2010	PP
30	PP	LIPI Stove Report_Metalindo	2010	PP
31	PP	[en]_ITTO_2009	2009	PP
32	FAO	Global Forest Resources Assessment 2010	2010	FAO Website
33	IPCC	Climate Change 2014 Synthesis Report	2014	IPCC Website
34	PP	20220420 Leakage 2021	2021	PP
35	PP	BIOSLURRY APPLICATION_BIOGAS BOOK	2015	PP

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

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

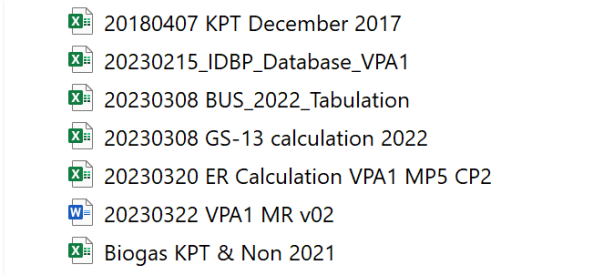
FAR ID		Date:
Description of FAR		
NA		
Project participant response		**Date:**
Documentation provided by project participant		
VVB assessment		**Date:**

Table 2. CAR from this verification

CAR ID:	01	Date: 19/06/2023
Description of CAR		
The following sections of the MR have not been completed in accordance with GS template: 1. In Section D.4: "Clearly reference the spreadsheets used (including sheet names as necessary), the aim is to direct your assurance providers to the information as quickly as possible, which will result in a quicker review process". Some evidence as "20230308 BUS_2022_Tabulation", "20230308 GS-13 calculation 2022" or "20230215_IDBP_Database_VPA2" could be mentioned. 2. In Section E.3: "Clearly reference the spreadsheets used (including sheet names as necessary)... The aim is to direct your assurance providers to the information as quickly as possible, which will result in quicker review process". PP may clearly reflect the corresponding reference as in the other sections. 3. In Section G.1: "Include all disputes, inputs and comments received via the approved CIGM and show how these were responded to and/or mitigated. Please clarify any items that have not been fully addressed and that require follow up action." Under the criteria of the VVB, PP can describe with more detail the procedures to fully address the grievances.		
Project Developer response		Date: 10/07/2023
1. Thank you for this comment. However, Section D.4 is a narrative explanation of the sampling plan and there is no other document that has been referenced/used for this section. 2. Reference added in the MR. 3. Detailed narrative of how grievances are addressed is now added in the MR.		
Documentation provided by the Project Developer		
-		
VVB Assessment		Date: 12/07/2023

1. Under VVB criteria, the Section D.4 narrative explanation is closely related with the "20230308 BUS_2022_Tabulation", "20230308 GS-13 calculation 2022" or "20230215_IDBP_Database_VPA2" spreadhseets, and **some of them could be mentioned as references**.
2. PP has added the corresponded reference in Section E.3.
3. PP has explained with more detail how grievances are addressed in Section G.1.

After receiving the following documentation updated with the MR by the PP, **AENOR can closes CAR 01.** However, some references could be mentioned in Section D.4. as footnote, like in the rest of the MR:



Project Developer response	Date: 17/07/2023

1. Section D.4 of the MR is now updated with references to KPT, Database, and BUS Tabulation.

CAR ID:	02	Date: 19/06/2023

Description of CAR

The following errors have been found on the 20230322 VPA1 MR v01:

1. Update the MR publication date on the cover page, the title of the Table 38 (page 60) and the year of the vintage on Table 39 (page 61).
2. In the spreadsheet "IDBP_Database", the number of all installations sum 20,255 instead of the 20,252 reported in the MR. It has been adjusted by subtracting 3. Justify.
3. Some references as the following:
   - Reference 16, 66 and 67 of with the "20230308 BUS_2022_Tabulation".
   - Reference 56 with ER Calculation spreadsheet, "GS VER 2022".
   - Source data of the parameters $N_{T,h}$, Bio, GS-03 Soil condition and GS-14 Time saved in section D.2.
4. The CDM link provided as the reference number 19 (page 14) cannot be opened from the document.
5. Percentages shown in the table of the E.2. section of the MR in GS-14 Time saved and GS-15 Productive use of time.
6. The leakage represented in the column 'Project situation' of the table of Section E.3., is not consisted with the spreadsheet ER Calculation.
7. Update BUS 2022 with the proper percentage using cows in 'Appendix. Detailed Emission Reduction Calculation', page 53.

Project Developer response	Date: 10/07/2023

1. The date is the MR template publication date and not MR's. Titles of Tables 38 and 39 are now corrected. 2. In the provinces calculations, there are three digesters (SUP0070, RGP0078 and YSP1460) that do not meet the size threshold (they are 2m3, 20m3 and 30m3) so they were deducted from the total number of digesters. 3. References corrected. 4. Link updated. 5. Numbers corrected. 6. Number corrected in the MR. 7. Updated MR based on the BUS data.	
Documentation provided by the Project Developer	
-	
VVB Assessment	**Date: 12/07/2023**
1. PP has corrected the dates and titles mentioned in the findings properly. 2. PP has clarified the correction of the "IDBP_Database" installations calculation. 3. PP has corrected the references detected in the MR properly. 4. The CDM link represented in the reference 19 of the MR has been updated and it can be opened from the document now. 5. The percentages identified in Section E.2. of the MR have been corrected properly by the PP. 6. The leakage represented in the column 'Project situation' of Section E.3. is now consistent with the ER Calculation spreadsheet. 7. PP has updated the marked paragraph according to the updated BUS 2022 correctly. **Therefore, CAR 02 is closed.**	

Table 3. CL from this verification

CL ID	01	Date: 19/06/2023
Description of CL		
Please provide evidence of the following: 1. Cover letter sent by Hivos to Gold Standard in January 2022 to inform about the handover of CME function from Hivos to YRE, signed by the latter. 2. That the survey was executed between 9th December 2022 and 5th January 2023, for the Biogas User Survey (BUS). 3. Office training conducted on December 3rd, 2022. 4. Some record of the staff and their attendance at the vocational training programmes, regarding the functioning of the biodigester technology. 5. List of grievances with the respective responses/mitigation. 6. Document P_Biogas_as_renewable_energy _2005.pdf (reference 8 of the MR VPA-1). 7. Email communication dated 11 April 2016 by Gold Standard, confirming that the parameter 't' can be fixed at value 2.74 going forward to enable the definition of the VPA-1 threshold (reference 6). 8. ITTO (2009), used for the annual sustainable yield from the plantation's estimations (Section D.1.). 9. LIPI Stove Report, 2010; Indonesian Government standard on stove efficiency.		
Project Developer response		**Date: 03/07/2023**
1. Cover letter from Hivos to Gold Standard regarding the CME Function Handover with file name: "20220128 GS Registry Change CME GS1172" is available in dropbox 2. Evidence from Kobo Toolbox dashboard regarding Biogas User Survey submission during 9th Dec 2022 to 5th Jan 2023 with file name "BUS evidence 9 Dec 22 to 5 Jan 23.png" is available in dropbox 3. Office training evidences are available with file name "Enumerator Office Training Attendance List.jpeg" and "Enumerator Training Photos.pdf" in dropbox 4. Record of Vocational training is available in Vocational Training dropbox 5. List of grievances with file name "List of Grievances 2022" is available in dropbox 6. "Biogas as renewable Energy (3rd edition).pdf" is available in dropbox 7. Email saved on dropbox folder. 8. ITTO report is available with file name "[en]_ITTO_2009.pdf" 9. LIPI Stove Report are available with file name "LIPI Stove Report_Khazanah Bahari.pdf" and "LIPI Stove Report_Metalindo.pdf" in dropbox		
Documentation provided by the Project Developer		
Mentioned above		
VVB assessment		**Date: 12/07/2023**

After reviewing all the documentation provided by the PP, AENOR can confirm the validation of all of the evidence requested.

Therefore, CL 01 is closed.

CL ID:	02	Date: 19/06/2023

Description of CL

Clarification of the following points of the MR VPA-1 is required:

1. In Section D.1. Data and parameters fixed ex ante or at renewal of crediting period:
   - According to the explanation represented for the value applied on parameter NRB, PP is requested to provide the traceability of the 35,974,483m^3.
   - According to the explanation represented for the value applied on parameter NRB: 86,396,000m^3 x 58.36% = 50,420,506.6m^3. The result is not consistent.
   - According to the explanation represented for the value applied on parameter DRB, PP is requested to provide the traceability of the 42,041,000m^3.
2. Bio-slurry usage as fertilizer by 43% according to the BUS (table of Section E.2., page 40).
3. According to the "20180702 IDBP VPA1-DD CP2 v10.1" received, there are many differences with the data displayed on Table 16 of the MR VPA1.
4. Add the references of the following: Thermal energy demand on Table 18 and 21, $MS_{T,S,k}$ Share fed into biodigester on Table 30 and Project emissions from animal waste management on Table 36.
5. The data displayed on Table 23: 90/30 rule check on baseline emissions, cannot be found in the reference shown.
6. Value shown of $BE_{b1,CH4,y}$ on Table 28, page 54, has different result than the same parameter calculated on the above Table 27.
7. In the database evidence provided 'IDBP_Database_VPA', tab 'MASTER VPA', some cells from the column 'NO.OF.CATTLE' are empty. Please clarify.

Project Developer response	Date: 27/06/2023

1. This is a fixed parameter and not evaluated on an annual basis. Please refer to section B.3. in the PDD for data sources and calculations of NRB and DRB.
2. That was a typo and is now corrected.
3. Thank you for noticing this. Table 16 of the MR VPA1 is now corrected.
4. For Table 18 and 21, "20180407 KPT December 2017" is added on Dropbox for reference. Source for MST,S,k Share fed into biodigester on Table 30 is now added. Source for project emissions from animal waste management on Table 36 is now added. For tables 18 and 21, Thermal energy demand is result of fuel consumption multiplied by NCV so (A * B) in these tables. This is now added in the tables.
5. Correct reference added.
6. Thank you noticing. The error is corrected now.
7. Some ID Plants in East Java don't have cattle (KPP0353, KPP0355, KPP0356, KPP0357 and KPP0364). They take cattle dung from neighbors. Other ID plants with source: human waste, tofu or water hyacinth. You can find those ID Plants in sheet "Other Biogas". Also see: "No Cattle on Database.xlsx" in dropbox.

Documentation provided by the Project Developer

- 20180407 KPT December 2017

VVB Assessment	Date: 12/07/2023

1. Clarified according to the Section B.3. of the PDD data sources and calculations of NRB and DRB.
2. PP has corrected properly the typo detected.
3. PP has modified Table 16 of the MR according to the "20180702 IDBP VPA1-DD CP2 v10.1".
4. The reference "20180407 KPT December 2017" has been provided and verified with the information reflected in tables 18 and 21 of the MR. Also, the tables have been modified with more explanatory titles. The source of table 30 has been marked and the reference of table 36 has been added.
5. PP has evidenced the reference correctly.
6. VVB has verified the correct modifications from the PP on table 28 of the MR.
7. PP has clarified the finding satisfactorily. Additionally, the VVB and the PP could clarify this issue during a virtual call on June 21, where evidence were provided.

Therefore, CL 02 is closed.

Table 4. FAR from this verification

FAR ID		**Date:** DD/MM/YYYY
Description of FAR		
NA		
Project participant response		**Date:** DD/MM/YYYY
Documentation provided by project participant		
VVB assessment		**Date:** DD/MM/YYYY