Gold Standard for the Global Goals

TEMPLATE

Key Project Information & VPA Design Document (VPA DD)

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VERSION **v.2.3**

RELATED SUPPORT

- Programme of Activity requirements
- TEMPLATE GUIDE VPA Design Document

This document contains the following sections

KEY PROJECT INFORMATION

Type of VPA	☐ Real case VPA ☒ Regular VPA
Scale of VPA Note that a VPA can be of one scale. Please select applicable scale accordingly.	☐Microscale ☒Small scale ☐Large scale
Title of corresponding real case VPA (if applicable)	Indonesia Domestic Biogas Programme of Activities (IDBP) (ID1172), VPA-2 (GS5303)
GS ID of real case VPA (if applicable)	GS5303
GS ID of VPA	GS1174
Title of VPA	Indonesia Domestic Biogas Programme of Activities (IDBP) (ID1172), VPA-1 (GS1174)
Time of First Submission Date	31/05/2011
Date of Design Certification	31/05/2013
Version number of the VPA-DD	2.4
Completion date of version	17/03/2026
Coordinating/managing entity	PT. Biru Karbon Nusantara
VPA Implementer (s)	Yayasan Rumah Energi
Project Participants and any communities involved	Yayasan Rumah Energi
Host Country (ies)	Indonesia
GS ID and Title of applicable Design Certified VPA	
GS ID and Title of applicable Performance Certified VPA	
Activity Requirements applied	☒ Community Services Activities ☐ Renewable Energy Activities

	☐ Land Use and Forestry Activities/Risks & Capacities ☐ N/A
Other Requirements applied	Programme of Activity Requirements and Procedures (version 3.0)
Methodology (ies) applied and version number	Methodology for Animal Manure Management and Biogas use for Thermal Energy Generation (version 1.1)
Product Requirements applied	☒ GHG Emissions Reduction & Sequestration ☐ Renewable Energy Label ☐ N/A
VPA Cycle:	☒ Regular ☐ Retroactive

Land-use & Forest and Agriculture - Key Project Information[1]

N/A

Table 1. Estimated Sustainable Development Contributions

SUSTAINABLE DEVELOPMENT GOALS TARGETED	SDG IMPACT (DEFINED IN B.6.)	ESTIMATED ANNUAL AVERAGE	UNITS OR PRODUCTS
13 Climate Action (mandatory)	Amount of GHGs emissions avoided or sequestered	51,393	tCO_2eq per year
1. No poverty	Average yearly household savings i.e., decrease in expenditure on basic service such cooking, lighting, drinking	60.1	Billion Rupiah per year

[1] Please refer to Appendix 3 for detailed information on LUF projects

2. Zero hunger	Land area (hectares) under improved or new soil conservation practices as a result of project activity	7,326.95	ha per year
5. Gender equality	Average time saving associated with cooking time and fuel collection	321.2	hr per household per year
5. Gender equality	Number of women serving in managerial/ leadership /ownership role	2	Number
7. Affordable and clean energy	Number of beneficiaries: Households	20,252	Number of households
7. Affordable and clean energy	Total thermal energy produced: Renewable	139.7	GJ/year
8. Decent work and economic growth	Number of jobs	6	Number of jobs

SECTION A. DESCRIPTION OF PROJECT

A.1. Purpose and general description of project

The IDBP started implementation of biodigesters on 24 October 2009, following an agreement reached between the Royal Netherlands Embassy to support the Indonesian Ministry of Energy and Mineral Resources in rolling out a national biodigester initiative. This first Voluntary Project Activity (VPA-1) was retroactively included to cover the emission reductions that have been generated up to two years prior to the registration date of this PoA, which occurred on 31/05/2013. Since 2023 PT. Biru Karbon Nusantara (PT. BKN) is the new official project representative of the IDBP PoA and Yayasan Rumah Energi (YRE) is the VPA implementer. In February 2021, YRE and Hivos signed MoU to transfer the facility management, disbursement and MRV from Hivos to YRE. It also stated Hivos transfers the full responsibility for the management of Carbon Fund, ownership of the VER and MRV responsibilities of the

PoA and VPAs to YRE. And in January 2022, Hivos sent a letter to Gold Standard to inform about the handover of CME function from Hivos to YRE with the supporting document: Cover Letter signed by Hivos and YRE. In February 2022, Gold Standard confirmed the changes in the registry accounts of IDBP. To comply with the Presidential Regulation 98/2021 about Carbon Economic Value which regulates the provision for conducting carbon trading system must be in the form of a business entity, YRE established PT. BKN as a company who will continue manage carbon fund of IDBP. In October 2023, YRE send a letter to Gold Standard to inform about the handover of CME function from YRE to PT. BKN. Also in October, Gold Standard has confirmed the changes in the registry accounts of IDBP.

The overall development objective of the VPA-1, and the IDBP programme which manages it, is to disseminate domestic biodigesters as a local, sustainable energy source through the development of a commercial, market-oriented sector in selected Indonesian provinces.

This VPA covers the installation of fixed-dome type biodigesters of up to and including $12m^3$ in households that prior to the implementation of the project activity were using non-renewable biomass (NRB) and fossil fuels as their main source of cooking fuel. The biodigesters are fed with manure mixed with water, which undergo anaerobic digestion and produce biogas that is channeled directly to a cook stove. This biogas replaces the combustion of NRB and fossil fuels, thereby reducing carbon dioxide (CO_2) emissions. The biodigesters also reduce methane (CH_4) emissions by diverting manure that would otherwise decompose without the capture and use of the methane. The technical specification of the biodigester used in VPA-1 shall comply with the related technical requirement under IDBP, and is further outlined in Section A.3 of this PDD.

VPA-1 reached the small-scale methodology threshold of 20,000 biodigesters to be included under the VPA in 2017. The third crediting period of VPA 1 covers emission reductions between 01/06/2025 – 31/05/2032 from biodigesters installed until 31/12/2016. The number of active biodigesters, based on which ex-post calculations will be done, will be confirmed upon verification. Table 5 shows the biodigesters location per province. Figure 3 displays the project boundary.

A.1.1. Eligibility of the VPA under approved PoA

Table 2. Eligibility for VPA inclusion as per PoA requirements

NO.	ELIGIBILITY CRITERION	DESCRIPTION/ REQUIRED CONDITION	DESCRIPTION OF THE VPA IN RELATION TO THE CRITERIA, MEANS OF VERIFICATION AND SUPPORTING EVIDENCE FOR INCLUSION
1	**Types of Projects:** Eligible projects shall include physical action/implementation on the ground. Pre-identified eligible project types are identified in the Eligibility Principles and Requirements section.	Project is pre-identified as eligible by being referenced in Gold Standard Activity Requirements. According to the activity requirements, paragraph 3.1.1: "Methane recovery project activities shall be eligible for emission reductions from both methane avoidance (including from the flared biogas fraction) and non-renewable fuel substitution as long as evidence is provided on time for validation to demonstrate that the system was designed in a way to at least make use of some of the biogas recovered for the delivery of energy services (e.g. electricity, heat)"	The VPA consists of physical action through the installation of the biodigesters. Verifiable evidence: IDBP Database See section A.1 of this VPA-DD
2	**Location of Project:** Projects may be located in any part of the world	All biogas systems listed in a VPA are installed within the geographical boundaries of Indonesia. Each biodigester in a VPA has a unique serial number that is recorded in the User's Manual and/or engraved or permanently attached as a nameplate which confirms the location of the biodigester. The serial numbers are listed in the IDBP database.	The VPA is developed in Indonesia. See section A.2 of this document. Verifiable evidence: • Completion Report; • Household Agreement; • IDBP Database; or • User's Manual.

3	**Project Area, Project Boundary and Scale:** The Project Area and Project Boundary shall be defined. Projects may be developed at any scale although certain rules, requirements and limitations may apply under specific Activity Requirements, Impact Quantification Methodologies and Products Requirements. In order to avoid double counting the Project shall not be included in any other voluntary or compliance standards programme unless approved by Gold Standard (for example through dual certification). Also, if the Project Area overlaps with that of another Gold Standard or other voluntary or compliance standard programme of a similar nature, the project shall demonstrate that there is no double counting of impacts at design and performance certification (for example use of similar technology or practices through which the potential arises for double counting or misestimation of impacts amongst projects)	All biogas systems listed in a VPA are installed within the geographical boundaries of Indonesia. The biodigesters are uniquely identified and defined in an unambiguous manner by providing the serial number of the systems installed. The serial numbers are listed in the IDBP database. It avoids double counting. Participating users must confirm that they are not taking part in other registered PoAs through signing of a Household Agreement for each biodigester. VPAs must be registered in the National Registration System of Indonesia (SRN) as per Presidential Regulation 98/2021. IDBP has already registered in the Gold Standard, thus registration in the SRN is through mutual recognition process with corresponding adjustment to prevent double counting of impacts. Double counting has been included as part of the monitoring plan (see B.7.1).	The project area, boundary, and scale are defined and shown Table 5, section A.4, and Figure 3. Verifiable evidence: • IDBP Database; • Completion Report; or • Household Agreement
4	**Host Country Requirements:** Projects shall be in compliance with applicable Host	All VPAs under the IDBP shall comply with: • Indonesian Law 6/2023 regarding	The VPA complies with all the listed regulations. Verifiable evidence:

	Country's legal, environmental, ecological and social regulations.	environmental management • Regulation of the Minister of Agriculture of Indonesia No. 1011/Permentan/OT.140/7/2014 that regulates waste processing units for farmers to produce biogas and organic fertilizer. • Regulation of the Minister of Energy and Mineral Resources (MEMR) of Indonesia No. 36/2018 which regulates the design, capacity, and construction of household-scale biodigester. • Presidential Decree No. 98/2021 regarding climate change mitigation and actions project registration. • Regulation of the Minister of Environment and Forestry (MoEF) of Indonesia No. 21/2022 concerning the implementation of carbon economic value through carbon trading activities.	See section B.6.2 of this VPA-DD
5	**Contact Details:** As part of the Project Documentation the Project Developer shall provide (i) name and (ii) contact details of all Project Participants; AND in case of an organisation	Contacts of each VPA Project Developer will be included in each VPA-DD.	The VPA documentation includes contact details. Verifiable evidence: PoA-DD

	(iii) the legal registration details and (iv) documentation by the governing jurisdiction that proves that the entity is in good standing (defined as being a legal or other appropriate entity registered in or allowed to operate within the required jurisdiction and with no evidence of insolvency or legal/criminal notices placed against it or any of its Directors). Gold Standard retains the right (at its own discretion) to refuse use of the Standard where reputational concerns are highlighted		
6	**Legal Ownership:** Full and uncontested legal ownership of any Products that are generated under Gold Standard Certification, (for example carbon credits) shall be demonstrated. Where such ownership is transferred from project beneficiaries this must be demonstrated transparently and with full, prior and informed consent (FPIC). Note that for certain Project types there is a requirement for full and uncontested legal land title/tenure to be demonstrated. These are contained within specific Activity or Product Requirements. All projects shall immediately	The individuals responsible for the biodigesters are individual users of the biogas equipment. Each biodigester user as IDBP's beneficiary agrees by a 'Household Agreement' to transfer the ownership title of the generated emission reductions to the project developer, which is PT. Biru Karbon Nusantara. Each biodigester user will be asked to read and sign a contract stating that they ask a construction partner to build them biodigester in compliance with the IDBP technology design, both biodigester user and the construction partner agree to transfer the ownership rights of the emission reductions generated by the	The VPA obtained legal ownership of the emissions through the household agreement. See section B.6.2. Verifiable evidence: Household Agreement

	report to Gold Standard any land title/tenure disputes arising.	biodigester technology to PT. Biru Karbon Nusantara, as well as allow PT. Biru Karbon Nusantara to act on their behalf in receiving emission reduction rights and the carbon fund generated. Copies of these signed contracts will be kept by the project developer. Hence, the project developer is the sole legal owner of the carbon rights.	
7	**Other Rights:** As well as legal title and ownership, the Project Developer shall also demonstrate where required uncontested legal rights and/or permissions concerning changes in use of other resources required to service the Project (for example, access rights, water rights etc.). Any known disputes or contested rights must be declared immediately to Gold Standard by the Project Developer and resolved prior to further project implementation in affected areas.	Not Applicable	Not Applicable

Table 3. Eligibility criteria as per Community Services Activity Requirements.

No.	ELIGIBILITY CRITERION	DESCRIPTION/ REQUIRED CONDITION	DESCRIPTION OF THE VPA IN RELATION TO THE CRITERIA, MEANS OF VERIFICATION AND SUPPORTING EVIDENCE FOR INCLUSION
1	**Types of Projects:** Pre-identified CSA project types are noted below.	Project is pre-identified as eligible by being referenced in Gold	This VPA is referenced in the Gold Standard Community Services

	Project Developers may submit new project types to Gold Standard for approval following the Principles & Requirements	Standard Community Services Activity Requirements, v1.2, section 3.1.1, item (c) "Waste management and handling: All waste management activities that deliver energy or a usable product with sustainable development benefits such as composting, biogas etc."	Activity Requirements, v1.2 Verifiable evidence: • Sections B.1 and B.2 of this VPA-DD
2	**Project area, boundary and scale:** Area and Boundary shall be defined in line with the applicable Impact Quantification Methodologies and Product Requirements.	All biogas systems listed in a VPA are installed within the geographical boundaries of Indonesia. VPAs shall issue emission reductions less than or equal to 60,000 tCO_{2eq} per annum.	The project area, boundary, and scale are defined and shown Table 5, section A.4, and Figure 3. Verifiable evidence: • IDBP Database; • Completion Report; or • Household Agreement.
3	**Project area, boundary and scale**: Certain Impact Quantification methodologies allow projects to account Suppressed Demand scenario when establishing a baseline. In such cases, the application of Suppressed Demand baseline is limited to Small Scale and Microscale Projects. Where a Suppressed Demand baseline is applied, it is not possible to 'stack' Gold Standard Certified Impact Statements or Products as the definition of the	The applicability of suppressed demand is assessed solely on whether the baseline continues to reflect an unmet basic service need, and whether conditions have changed since the original validation in regards to dependency on firewood and charcoal as a source of thermal energy for cooking purposes is high in Indonesia and dependency on fossil fuels as a source of thermal energy for cooking purposes	The baseline conditions are defined in section B.4. Verifiable evidence: • Baseline survey results; and • BFT;

	baseline may be contradictory.	remain unchanged within the geographical boundaries of VPA.	
4	**Legal Ownership:** (a) Projects involving the distribution of a large number of devices for services such as heating, cooking, lighting, electricity generation, water treatment technology such as water filter, etc. shall provide a clear description of the ownership of the Products that are generated under Gold Standard Certification all along the investment chain. In line with the FPIC requirement, the proofs that end-users are aware of and willing to give up their rights on Products shall be provided (b) The transfer of Product ownership shall be discussed during local stakeholder consultations for projects.	The individuals responsible for the biodigesters are individual users of the biogas equipment. Each biodigester user as IDBP's beneficiary agrees by a 'Household Agreement' to transfer the ownership title of the generated emission reductions to the project developer, which is PT. Biru Karbon Nusantara. Each biodigester user will be asked to read and sign a contract stating that they ask a construction partner to build them biodigester in compliance with the IDBP technology design, both biodigester user and the construction partner agree to transfer the ownership rights of the emission reductions generated by the biodigester technology to PT. Biru Karbon Nusantara, as well as allow PT. Biru Karbon Nusantara to act on their behalf in receiving emission reduction rights and the carbon fund generated. Copies of these signed contracts will be kept by the project developer. Hence, the project developer is the	The VPA obtained legal ownership of the emissions through the household agreement. See section B.6.2. Verifiable evidence: • Household Agreement

	sole legal owner of the carbon rights.

A.1.2. Legal ownership of products generated by the VPA and legal rights to alter use of resources required to service the project

Table 4. Legal ownership of products generated by the project and legal rights to alter use of resources required to service the project

Criteria, the project owner has	Justification
Full and uncontested legal ownership of all Products that are generated under Gold Standard Certification (where such ownership is transferred from project beneficiaries this must be demonstrated transparently and be discussed during local stakeholder consultations)	The individuals responsible for the biodigesters are individual users of the biogas equipment. Each biodigester user as IDBP's beneficiary agrees by a 'Household Agreement' to transfer the ownership title of the generated emission reductions to the project developer, which is PT Biru Karbon Nusantara. Each biodigester user will be asked to read and sign a contract stating that they ask a construction partner to build them biodigester in compliance with the IDBP technology design, both biodigester user and the construction partner agree to transfer the ownership rights of the emission reductions generated by the biodigester technology to PT Biru Karbon Nusantara, as well as allow PT Biru Karbon Nusantara to act on their behalf in receiving emission reduction rights and the carbon fund generated. Copies of these signed contracts will be kept by the project developer.

A.2. Location of VPA

The geographic boundary for the VPA is the Republic of Indonesia.

Figure 1. Map of Indonesia (geographic boundary of the project). Source: Nations Online Project

All of the biodigesters implemented under this VPA will have a unique serial number that is recorded in the CME's database. Each entry is clearly divided and it will not be possible to make the same serial number entry twice. The numbers are recorded in the User's Manual that will enable the verifier to identify systems listed in the database. The database also includes information regarding the address of the installed biodigester, information on the owner, and its operational status.

Table 5. Project location by provinces in Indonesia and GPS coordinates of provincial capitals

Province	Latitude	Longitude
Lampung	5° 27' 0.0000'' S	105° 16' 0.0120'' E
West Java	6° 54' 53.0784'' S	107° 36' 35.3160'' E
Central Java	7° 47' 49.4448'' S	110° 22' 13.9044'' E
East Java	7° 15' 1.6020'' S	112° 46' 7.8420'' E

Bali	8° 24' 34.2648'' S	115° 11' 20.1084'' E
Nusa Tenggara Barat	8° 39' 10.5602" S	117° 21' 41.9314" E
Nusa Tenggara Timur	8° 39' 26.575" S	121° 4' 45.732" E
Yogyakarta	7° 47' 49.4448'' S	110° 22' 13.9044'' E
South Sulawesi	5° 8' 51.5940'' S	119° 25' 57.8352'' E

Provinces Banten and Sumatera Selatan are included in the West Java province Province Kalimantan Tengah, Gorontalo, Central Sulawesi and Southeast Sulawesi is included in South Sulawesi province

By 2023, 20,252 biodigesters were constructed as of 31/12/2016, end date of VPA-1 project boundary. **Table 6** shows the distribution of the biodigesters across the targeted provinces.

Table 6. Distribution of biodigesters per province, until 31/12/2023[2]

Province	Number of biodigesters
Lampung	419
West Java	1,447
Central Java	1,368
East Java	7,638
Bali	1,066
Nusa Tenggara Barat	4,330
Nusa Tenggara Timur	649
Yogyakarta	1,408
South Sulawesi	1,930
Total	20,252

A.3. Technologies and/or measures

The technology implemented under this VPA covers biodigesters fed with a mixture of water and animal manure that is anaerobically digested. The capacity of the biodigesters ranges from 2 m^3 to (and including) 12 m^3. As per the Methodology for Animal Waste Management and Biogas Application, baseline emission quantification from AWMS will be calculated using AWMS method 2 for those biodigesters where annual emission reductions for methane recovery component is higher than 5 tCO_2e. Where annual emission reduction for methane recovery component is lower than 5 tCO_2 per biodigester, AWMS method 1 shall be applied for baseline emission quantification. Therefore, under this VPA, baseline emission quantification from AWMS will be calculated using AWMS method 1.

[2] As per "2024_IDBP_Database_VPA1.xls" sheet 'Master VPA-1' cells Q20447 to T20455

The generated biogas is intended for use as fuel for cooking. This VPA targets the implementation of fixed-dome biodigesters (see Figure 2). This model is constructed with bricks and stone masonry. The fixed-dome technology has a proven durability, and can be installed underground, saving space and protecting the installation. Materials for its construction can be sourced locally.
The use of the fixed-dome biodigester model is simple:

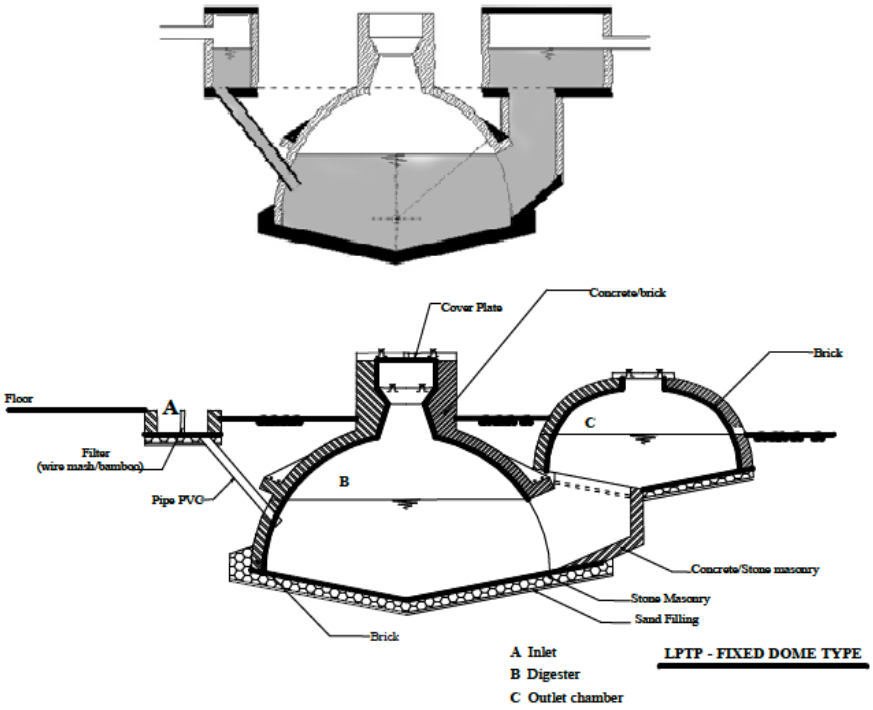
1. Collect manure and mix with water;
2. Feed this mix into the biodigester;
3. Both biogas and sludge are produced.

The biogas is used as cooking fuel. The build-up of gas will push out slurry through the exit pipe of the biogas system, and is a fertilizer that can either be applied directly to crops or composted with other organic material.

Maintenance needs are limited since the biodigester has no moving parts. Over time, some indigestible material can build up in the digester, limiting the reactor volume. This issue is solved simply by scooping the indigestible material out and re-filling the biodigester with manure. Scientific literature finds that domestic biodigesters typically have lifetimes of 25-35 years.[3]

[3] Rajendran, K., Aslanzadeh, S., Taherzadeh, M. (2012) Household Biogas Digesters—A Review. Energies. Available at https://www.mdpi.com/1996-1073/5/8/2911

Figure 2. Graphic representation of the applied fixed-dome biodigester model.



A.4. Scale of the VPA

The project is a small-scale project. Small-scale VPAs are subject to the thresholds set forth by the CDM; 15 MW (45 MWth) for the renewable energy component and an emissions cap of 60,000 tCO_2e for the methane avoidance component. The VPA will not exceed this threshold.

The average biodigester size implemented in this VPA-1 upon conclusion of the second crediting period is 5.99 m^3 [4]. As per the calculation presented in footnote 66 below, this biodigester size requires daily feeding of (5.99 m^3 * 7.5 kg =) 44.92 kg of manure, equivalent to 1.80 m^3 of biogas per day . As per the Table below, this amounts to a maximum output of 1.91 kW_{th}, which is below the established threshold of 450 kW_{th} per unit. Also, given 20,000 units implemented to date under the VPA-1 this cumulates to 38.742 MW_{th}, below the 45 MW_{th} threshold.

[4] See 2024_IDBP Database_VPA1 ||Sheet "MASTER VPA1"|Cell I20436

The calculation for how the capacity threshold is expected to be met throughout the third crediting period based on the implemented 20,252 units is presented below:

Table 7. Calculation of total capacity under VPA-1

$Th_{cap} = \frac{E}{t}$ *where* $E = \eta * H_b * V_b$		
Where:	Value:	Comments:
t = hours/day usage	2.74	See "Crosstab BUS by Province_18May2016.xls", sheet "raw_data" cell J2683. As per Gold Standard confirmation by email, the parameter 't' can be fixed at value 2.74 going forward to enable the definition of the VPA-1 threshold. See email communication dated 11 April 2016.
η = efficiency of stove	50%	Indonesian Government standard on stove efficiency[5]
H_b = heat of combustion per unit volume of biogas	21.0 MJ/m^3 [6]	Derived from IPCC defaults
V_b = volume of biogas	1.80 m^3/day[7]	calculated
E = Energy available from the biogas system	18.87 MJ/day[8]	Calculated
E_{th} =	5.25 kWh/day	1 MJ = 0.2778 kWh
Th_{cap} =	1.91 kW_{th}	Given a 2.74 hour/day usage

[5] Adbdullah,K. (2002) Biomass Energy Potentials And Utilization In Indonesia. https://stoves.bioenergylists.org/stovesdoc/Fuels/msoB2D82.pdf
[6] Methane has an energy value of 37.78 MJ/m3; thus, biogas at 55% CH4 has an energy value of 21 MJ/m3
[7] Cow dung produces approximately 40 litres biogas per kg. Each m3 capacity of the biodigester needs 7.5 kg dung per day. Given an average biodigester size of 6.0 m3, 45 kg of cow dung per day is required per biodigester. This translates into approximately 1.86m3 of gas produced per day. See VPA 1 ER calculation CP renewal_fNRB changed.xlsx | Tab Capacity calculation | Cell C17 and Khan et al. 2017. Production of biogas by the co-digestion of cow dung and crop residue at Univerity of the Punjab, Lahore, Pakistan. DOI: 10.5897/AJEST2017.2446
[8] Calculated as: 50% efficiency * 21 MJ/m3 * 1.80 m3/day

Total capacity	38.742 MW_{th}[9]	Given 20,252 units installed

A.5. Funding sources of VPA

The VPA is supported through public funding from a number of sources. From 2017 to 2018, the contribution came from the Government of the United States, which channels finance through the Millennium Challenge Programme. A trustee institution formed by the Government of Indonesia (MCA Indonesia) acts as the implementer of aid programme. Another co-funder of the VPA is Energising Development (EnDev). EnDev is an energy access partnership currently financed by seven donor countries: the Netherlands, Germany, Norway, Australia, United Kingdom, Switzerland and Sweden. Contribution from the EnDev Program ended in December 2020, hence since 2021 the VPA is mostly supported with carbon funds and other co-funder from Corporate Social Responsibility (CSR) funds.

The carbon credits to be generated by the VPA shall not be transferred, directly or indirectly, to meet GHG reduction requirements of any of the stated parties involved. The VPA is located in Indonesia, which is part of the OECD Development Assistance Committee's ODA recipient list.10 A written declaration of IDBP's non-use of ODA has been issued and submitted to the Gold Standard Foundation, attached in to this PDD

SECTION B. APPLICATION OF APPROVED GOLD STANDARD METHODOLOGY (IES) AND/OR DEMONSTRATION OF SDG CONTRIBUTIONS

B.1. Reference of approved methodology (ies)

- Methodology for Animal Manure Management and Biogas use for Thermal Energy Generation (version 1.1)

[9] Figures may not add up due to rounding – see "VPA 1 ER calculation CP renewal_fNRB changed.xlsx" | sheet "Capacity calculation" | cell "C6"
[10] OECD (2023). DAC List of ODA Recipients. See https://www.oecd.org/dac/financing-sustainable-development/development-finance-standards/DAC-List-of-ODA-Recipients-for-reporting-2022-23-flows.pdf

- Standard for sampling and surveys for CDM project activities and programme of activities (version 9.0)
- TOOL 33 – Default values for common parameters (version 3.0)
- GS SDG Impact Tool (version 1.3)
- Gold Standard for the Global Goals Community Services Activity Requirements (version 1.2)
- Methodological Tool: Demonstration of Additionality of Small-scale Project Activities (version 13.1)

B.2. Applicability of methodology (ies)

The VPA applies only the "Methodology for Animal Manure Management and Biogas use for Thermal Energy Generation (version 1.1)". This methodology applies to the fraction of the manure[11], which would decay anaerobically in the absence of the project activity and reduced fuel use as established by a survey. This methodology replaces the application of the "Technologies and Practices to Displace Decentralised Thermal Energy Consumption (TPDDTEC) v4.0" methodology for biogas generation and application for thermal energy project activities, originally adopted under the IDBP PoA.

To be eligible, the following applicability criteria apply:

Table 8. Eligibility criteria of applied methodology

Condition	Justification
This methodology applies only to the fraction of the manure, which would decay anaerobically in the absence of the project activity established by a survey	Biodigesters installed divert manure that would decay anaerobically in the absence of the project.

[11] Co-digestion of manure with other organic waste streams such as agricultural residue, kitchen food waste, fresh septic tank sludge etc. is permitted.

The methodology offers two methods for baseline emission quantification from AWMS: a) AWMS method 1 – IPCC Tier 1 approach, b) AWMS method 2 – IPCC Tier 2 approach, Where annual emission reduction for methane recovery component is higher than five tonnes of CO_2eq per biodigester the AWMS method 2 shall be applied. The project may include both type of biodigesters – applying AWMS method 1 and AWMS method 2 in the same activity. In such cases, the project must clearly differentiate groups (applying AWMS method 1 and AWMS method 2) and demonstrante compliance to elegibility requirements, quantification and monitoring approach for each group separately as outlines in this methodology.	The annual emission reduction for the methane recovery component is lower than 5 tonnes of CO_2eq per biodigester, therefore only the AWMS method 1 is applied.
The methodology is applicable under the following conditions when applying AWMS method 1: a) The category is limited to measures at individual households, small farms (e.g., installation of a domestic biogas digester) or livestock farms or institutional settings.	The domestic biodigesters are solely installed in individual households.

b) The activity shall ensure that: i. The digestate must be handled aerobically. In soil application of the final digestate, proper conditions and procedures (resulting in negligible methane emissions) must be ensured.	The digestate is a fertiliser that can either be applied directly to crops or composted with other organic material and will therefore be handled aerobically.
ii. The biogas captured from the biodigesters is utilized (e.g., combusted or burnt for thermal applications).	The biogas is used as cooking fuel.
The methodology is applicable under the following conditions when applying AWMS method 2 (Not applicable to AWMS method 1) a. The livestock population in the farm is managed fully or partly under confined conditions; b. Manure or the streams obtained after treatment are not discharged into natural water resources (e.g., river or estuaries); c. The annual average temperature of baseline site where anaerobic manure treatment facility is located is higher than 5°C; d. In the baseline scenario, the retention time of manure waste in the anaerobic treatment system is greater than one month, and if anaerobic lagoons are used in the baseline, their depths are at least 1 m; e. No methane recovery and destruction by flaring or combustion for gainful use takes place in the baseline scenario.	N/A

f. The storage time of the manure after removal from the animal barns, including transportation, should not exceed 45 days before being fed into the anaerobic digester. If the project developer can demonstrate that the dry matter content of the manure when removed from the animal barns is larger than 20%, this time constraint will not apply. g. A technical measure to ensure that the gas holding capacity of the biodigester is sufficiently large to capture the biogas during periods of non-usage. A justification to demonstrate compliance with this requirement pertaining to the biogas digester size shall be included in the PDD.	
The activity is implemented by a project developer and can include additional project participants listed in Appendix 2 of the PDD template. The individual households may be represented collectively by community organizations, etc., but do not individually act as project participants.	BKN is the unique project developer of this VPA. Households are recorded in the IDBP Database.

The developer must design incentive mechanism(s), which should be effective as fast as possible, for the displacing the use of inefficient baseline stoves or cooking practices by the project cooking devices for daily usage and describe the incentive mechanism(s) in the PDD/VPA-DD at the time of validation.	The project activities under the VPA provided access to finance for biodigester users through loans from cooperatives that are LPOs (loan partner organizations) of the IDBP.
To avoid double counting or double claiming, the project developer must: a. clearly communicate its ownership rights and intention of claiming the emission reductions resulting from the project activity to the following parties by contract or clear written assertions in the transaction paperwork: all other project participants; project technology manufacturers; and retailers of the project technology; and b. inform and notify the end users that they cannot claim emission reductions from the project, and c. exclude from the project activity, any biodigester and cookstoves that are included in any other voluntary market or CDM or Article 6 based mechanisms project activity/PoA and strive not to displace the cooking devices of another CDM or voluntary project/PoA.	Double counting is avoided through recording the unique serial number of each biodigester in a centralised database system operated by the CME. Participating users will confirm that they are not taking part in other registered PoAs through signing of a Household Agreement for each biodigester.

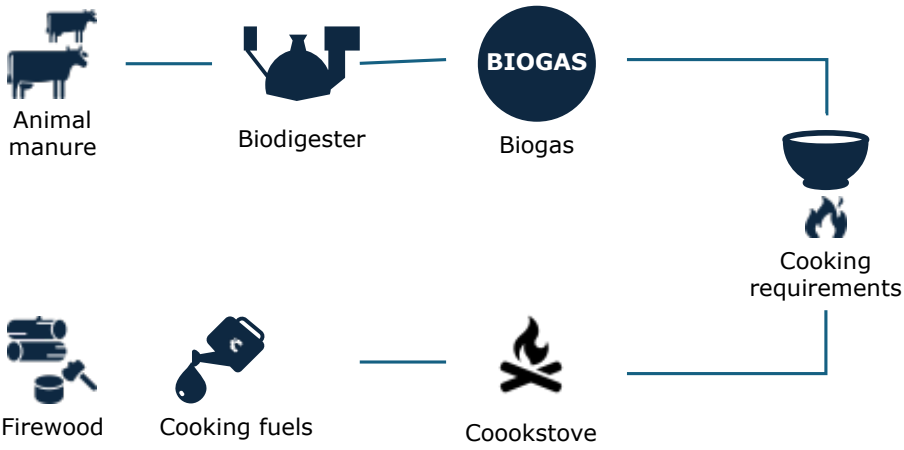
B.3. VPA boundary

All of the biodigesters implemented under this VPA will have a unique serial number that is recorded in the CME's database. Each entry is clearly divided and it will not be possible to make the same serial number entry twice. The numbers are recorded in the User's Manual that will enable the verifier to identify systems listed in the database. The database also includes information regarding the address of the installed biodigester, information on the owner, and its operational status. A map of the project is included under paragraph A.2.

Table 9. Emissions sources included under project

	Source	GHGs	Included?	Justification/Explanation
Baseline scenario	Animal Waste Management System	CO_2	**No**	CO_2 emissions from the decomposition of organic waste are not included.
		CH_4	**Yes**	CH_4 emissions from the baseline treatment methods of manure
		N_2O	**No**	Only included for Tier 2
	Delivery or thermal energy	CO_2	**Yes**	CO_2 emissions from - Fossil fuel cooking stoves - Cookstoves using NRB
		CH_4	**Yes**	Important source of emissions
		N_2O	**No**	Insignificant
Project scenario	Animal Waste Management System	CO_2	**No**	CO_2 emissions from the decomposition of organic waste are not included.
		CH_4	**Yes**	Emissions from physical leakage, as well as emissions from animal waste not treated into the bio-digester
		N_2O	**No**	Excluded as a biodigester does not produce N_2O gasses
	Heat delivery	CO_2	**Yes**	Continued CO_2 emissions from - Fossil fuel cooking stoves - Cookstoves using non-renewable biomass
		CH_4	**Yes**	Important source of emissions
		N_2O	**No**	Insignificant

Figure 3. Project boundary diagram.



B.4. Establishment and description of baseline scenario

The baseline scenario is composed of three components leveraged from a baseline survey. All three components are covered by the methodology 'Methodology for Animal Manure Management and Biogas Use for Thermal Energy Generation' and include the following:

i. Consumption of non-renewable biomass for cooking.
Dependency on firewood and charcoal as a source of thermal energy for cooking purposes is high in Indonesia.[12,13] The usage of NRB (including charcoal) contributes to deforestation and forest degradation and results in emission of GHGs. The applicable methodology states that the baseline scenario is, in the absence of the project activity, the use of NRB meeting similar thermal energy demands.

ii. Consumption of fossil fuel for cooking.
Dependency on fossil fuels as a source of thermal energy for cooking purposes, especially kerosene and LPG, is also significant in Indonesia.[13] The combustion of

[12] Laboratory of Energy and Agricultural Electrification (2002) 'Biomass energy potentials and utilization in Indonesia' https://stoves.bioenergylists.org/stovesdoc/Fuels/msoB2D82.pdf
[13] Tiandho, Yuant & Indriawati, Anisa & Kesuma Putri, Aning & Afriani, Fitri. (2021). Induction stoves: An option for clean and efficient cooking in Indonesia. IOP Conference Series: Materials Science and Engineering. 1034. 012068. 10.1088/1757-899X/1034/1/012068

fossil fuels for cooking results in emission of GHGs. The applicable methodology states that the baseline scenario is, in the absence of the project activity, the use of fossil fuels meeting similar thermal energy demands.

iii. Methane emissions from manure handling.

The baseline scenario is the situation where, in the absence of the project activity, organic matter is left to decay anaerobically within the project boundary and methane is emitted to the atmosphere.[14] The amount of methane that is emitted under this scenario is contingent upon the baseline manure management practice, which can include storing manure in anaerobic lagoons, deep pits, liquid storage, deep bedding, or other practices outlined in the '2006 IPCC Guidelines for National Greenhouse Gas Inventories'.[15] The applicable methodology establishes that baseline emissions are calculated by using the amount of the waste that would decay anaerobically in the absence of the project activity, with the most recent IPCC Tier 1 or 2 approaches.[16]

B.5. Demonstration of additionality

Table 10. Additionality criteria

Specify the methodology, activity requirement or product requirement that establishes deemed additionality for the proposed project (including the version number and the specific paragraph, if applicable).	The methodology applied refers to the Gold Standard "Community Services Activity Requirements (version 1.2)" document for demonstrating additionality. This document considers a positive list for additionality that includes the following requirement (Annex B, paragraph 1.1.3): Project activities solely composed of isolated units where the users of the technology/measure are households or communities or institutions and

[14] al Zahra, W., Apdini, T. A. P., van Middelaar, C. E., de Boer, I. J. M., & Oosting, S. J. (2020). Carbon footprint of milk produced in Indonesian smallholder dairy farms: greenhouse gas emissions associated with different manure management systems. In 12th International Conference on Life Cycle Assessment of Food: Towards Sustainable Agri - Food Systems (pp. 70-74)

[15] See table 10.A.6 in chapter 'Emissions from Livestock and Manure Management' under the volume 'Agriculture, Forestry and other Land use' of the 2006 IPCC Guidelines for National Greenhouse Gas Inventories. Available at https://www.ipcc-nggip.iges.or.jp/public/2019rf/pdf/4_Volume4/19R_V4_Ch10_Livestock.pdf

[16] See table 10.A.6 in chapter 'Emissions from Livestock and Manure Management' under the volume 'Agriculture, Forestry and other Land use' of the 2006 IPCC Guidelines for National Greenhouse Gas Inventories. Available at https://www.ipcc-nggip.iges.or.jp/public/2019rf/pdf/4_Volume4/19R_V4_Ch10_Livestock.pdf

	where each unit results in <= 600 MWh of energy savings per year or <=600 tonnes of emission reductions per year.
Describe how the proposed VPA meets the criteria for deemed additionality.	The installed biodigesters (average size 5.99 m3) will result in 5.25 kWh/day, which equals 1.91 MWh per year. Please see table 5.

The largest biodigester type implemented in this VPA, the 12 m^3 unit, is estimated to produce up to 3.6 m^3 of biogas per day. This amounts to a maximum output of 10.5 kWh/day and 3.83 MWh per year, which is below the established threshold of 600 MWh per year. The calculation is presented below:

Table 11. Additionality demonstration of project

$\mathbf{Th_{cap}} = \frac{E}{t}$ Where $\mathbf{E} = \eta \times H_b \times V_b$		
Where:	Value:	Comments:
t = hours/day usage	2.74	See "Crosstab BUS by Province_18May2016.xls ", sheet "raw_data" cell J2683. As per Gold Standard confirmation by email, the parameter 't' can be fixed at value 2.74 going forward to enable the definition of the VPA-1 threshold. See email communication dated 11 April 2016.[17]
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 PT BKN
E = Energy available from the biogas system	18.87 MJ/day	Calculated
E_{th} =	5.24 kWh/day	1 MJ = 0.2778 kWh

[17] As per Gold Standard confirmation by email, the parameter 't' can be fixed at value 2.74 going forward to enable the definition of the VPA-1 threshold. See email communication dated 11 April 2016. See "GS confirmation on threshold pdf"

Th_{cap} =	1.91 kW_{th}	Given a 2.74 hour/day usage

The above calculation also proves that VPA-1 can be deemed additional based on paragraph 2 of the Guidelines on the Demonstration of Additionality of Small-Scale Project Activities' (EB68 Annex 27, version 09.0) referred to in Section E.5.1 of the PoA-DD.

As defined in paragraph 2 of the referred guidance document, the documentation of barriers, as per paragraph 1 of the guidance, is not required for a positive list of technologies and project activity types that are defined as automatically additional for project sizes up to and including the small-scale CDM thresholds. Paragraph 2 c is applicable to this VPA-1. It states the condition:

"Project activities solely composed of isolated units where the users of the technology/measure are households or communities or Small and Medium Enterprises (SMEs) and where the size of each unit is no larger than 5% of the small-scale CDM thresholds. This size limitation translates into units under 750 kW installed capacity or under 3000 MWh of energy savings per year or 3000 tonnes of emission reductions per year."

This VPA successfully demonstrates compliance with the indicated size limit and is thereby defined as additional.

B.5.1. Prior Consideration

Prior consideration is evidenced at the PoA level. Please refer to the PoA-DD available on the Gold Standard registry.[18]

B.5.2. Ongoing Financial Need

[18] Available: https://registry.goldstandard.org/projects/details/1619

All Gold Standard activities need to demonstrate to be additional, meaning that their impact in terms of climate mitigation and sustainable development are beyond those that would have occurred in the absence of the certified Gold Standard project. For its third crediting period, this VPA-DD demonstrates Ongoing Financial Need for carbon revenues by evidencing how the finance derived Gold Standard Certification is material to the ongoing sustainability of the VPA. The demonstration for the continued need for carbon revenues is structured along the following three identified barriers:

- *Barrier 1: Continued affordability barrier on the household level*, whereby it is crucial that the VPA-1 continues to deliver the guarantees and free-of-charge repair and maintenance services to ensure effective use of the project technology throughout the duration of the third crediting period;
- *Barrier 2: Continued capacity barrier on the household level*, whereby it is vital that the VPA-1 continues to train both masons and households on the use and maintenance of the project technology to secure a maximum lifetime of the units included in VPA-1;
- *Barrier 3: Access to finance barrier on the overall VPA-level*, whereby restricted commitments from public donors and development organizations are insufficient to support the activity's overheads and general management expenses.

Barrier 1: Continued affordability barrier on the household level

With a cost of IDR of IDR 11,000,000 (EUR 663) for the average size biodigester implemented under this VPA (6.0 m^3), [19] the payback period of over 10 years is far too long for the average household and is thus financially not the most accessible and attractive option for the target households. The targeted households lack the cash to cover the upfront payment associated with the purchase of the biodigester and could only do so if supported by the subsidy payment and micro-credit in combination with the free-of-charge repair and maintenance services that continue to be offered under this VPA-1.

[19] 2024_IDBP_Database_VPA1 | Tab MASTER VPA1 | Cell R20468

Individual households lack the financial credibility to access credit to finance the biodigester. The VPA enables these households access to micro-credit through the programme's affiliation with financial institutions. The provision of the IDR 2 million subsidy payment, the free-of-charge repair and maintenance services, and the guaranteed high quality of the biodigester reduces upfront and future costs associated with the purchase and maintenance of the biodigester. This in turn reduces the indebtedness and credit risk of the participating households, giving the affiliated financial institutions firmer security regarding the credit they extend. Without these components supported under the VPA, the affiliated financial institutions are unwilling to extend micro-credit loans to the target users as the outstanding credit risk and collection expenses are considered too high when the full cost of the biodigester is considered. The biodigester is not considered as collateral by banks and given the lack of history of a commercial market for domestic biodigesters in Indonesia, banks are reluctant to offer loans covering the entire investment cost.

Barrier 2: Continued capacity barrier on the household level

Implementation of the biodigester technology across Indonesia has also been limited due to limited knowledge of households on the existence, operation and maintenance of the technology. In the baseline scenario, households collect biomass and source fossil fuel from the marketplace, which has been the habitual norm for centuries. Switching to renewable biogas and continuing its usage once the biodigester is in place is hampered by the general lack of understanding of how the systems can benefit households, as well as traditional objections to the application of animal manure for domestic cooking purposes.

To maintain the sustainability of the digesters — which is also a concern of the buyers (beside the installation of new biodigesters) — IDBP allocates a portion of the carbon funds to repair biodigesters that have been in use for more than three years since installation. Without the anticipated revenues earned through the sale of carbon credits, the CPO network (which are based not farther than a one-hour travel for biogas users), the repair and maintenance services and the quality guarantee are not sustainable. It is therefore apparent that without the continued support of carbon revenues, households are likely to stop using the biodigester the moment that an element of the technology wears down, forcing households to turn back to their dependence on fossil fuel and non-renewable biomass to meet their thermal energy

demands.The VPA has therefore an ongoing need for carbon revenues as it continues to need capacity to monitor functioning of digesters, ensure their maintenance, and repair them in case of damage.

Barrier 3: Access to finance barrier on the overall VPA-level
As described in Section A.5, VPA-1 was supported through Official Development Assistance from several sources during the first crediting period. Despite this assistance, this funding was of short-term and unpredictable nature. This made it challenging to meet the continuous budget needs and to ensure a stable delivery of the support activities pursued under VPA-1. Therefore, carbon revenues have played a significant role in sustaining the activities implemented under VPA-1.

The provision of donor funding ended in 2021 and the VPA is entirely supported with carbon fund and other co-funders which are CSR funds from companies. Carbon funds completely replaced the required funds and allow for the continued provision of repair and guarantee services across the nine provinces covered by VPA-1.

The existence of these three different barriers demonstrate Ongoing Financial Need for carbon revenues for VPA-1. The project's ongoing financial need is evidenced by a cost structure dominated by upfront and recurrent technology-related outgoings, complemented by significant operational and certification expenses. Across recent years, 63% of total expenditure has been allocated to biogas investment subsidies and system maintenance, together representing the clear majority of project outgoings, while human resources, travel, user training, promotion, and administrative costs account for a smaller (15%) but necessary operational share. Certification-related costs (including monitoring, verification, consultants, and Gold Standard fees) consistently represent 16% of total expenditures, but generate no alternative income stream outside carbon finance. Finance derived from Gold Standard certification is therefore material to the project's sustainability, as it directly covers monitoring, verification, issuance, and regulatory compliance costs and indirectly enables continued investment in system repairs, user engagement, and quality assurance that underpin emission reductions. Without revenue from Gold Standard certification in a given period, these certification and MRV activities would not be financially viable and would constitute a Forward Action Request (FAR) for the

subsequent issuance, as the project would lack the means to sustain compliance and long-term operation at the required integrity level.

B.6. Sustainable Development Goals (SDG) outcomes

Relevant Target/Indicator for each of the three SDGs

SUSTAINABLE DEVELOPMENT GOALS TARGETED	MOST RELEVANT SDG TARGET	SDG IMPACT **INDICATOR (PROPOSED OR SDG INDICATOR)**
13 Climate Action (mandatory)	13.2 Integrate climate change measures into national policies, strategies and planning	Amount of GHGs emissions avoided or sequestered
1. No poverty	1.1 By 2030, eradicate extreme poverty for all people everywhere, currently measured as people living on less than $1.25 a day	Average household savings i.e., decrease in expenditure on basic service such cooking, lighting, drinking
2. Zero hunger	2.4 By 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality	Land area (hectares) under improved or new soil conservation practices as a result of project activity

5. Gender equality	5.4 Recognize and value unpaid care and domestic work through the provision of public services, infrastructure and social protection policies and the promotion of shared responsibility within the household and the family as nationally appropriate	Average time saving associated with cooking time and fuel collection
5. Gender equality	5.5 Ensure women's full and effective participation and equal opportunities for leadership at all levels of decision-making in political, economic and public life	Number of women serving in managerial/ leadership /ownership role
7. Affordable and clean energy	7.1 By 2030, ensure universal access to affordable, reliable and modern energy services	Number of beneficiaries: Households
7. Affordable and clean energy	7.2 By 2030, increase substantially the share of renewable energy in the global energy mix	Total thermal energy produced: Renewable
8. Decent Work and Economic Growth	8.5 By 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value	Total number of jobs

B.6.1. Explanation of methodological choices/approaches for estimating the SDG Impact

Outcome of SDG 1 (No Poverty)

Average household savings i.e., decrease in expenditure on basic service such cooking, lighting, drinking (GSDM-I1.1.1)

In the baseline scenario, the main sources of energy for cooking are LPG and wood. Baseline households use on average 286.56 kg of LPG per year equivalent to 23.88 kg per month.[20] The second dominant fuel used for cooking purposes in the baseline is wood as 30.19% of households in the Baseline Fuel Test (BFT) used wood.[21] On average, each project household uses 448.85 kg of wood per year which is equivalent to 37.40 kg per month.[22] The average repair cost of the biodigesters in VPA-1 is 109,570 IDR.[23]

Project activities reduce the use of these non-renewable fuels as project householders shift to biodigester use, hence the household will save money from using less LPG, Kerosene and wood.

The amount of money saved is calculated as follows:

$T_{s,y} = C_{f,b,\ y} - C_{m,p,y}$ (1)

Where:

$T_{s,y}$ = Total costs savings
$C_{f,b,\ y}$ = Total cost of fuel in year y in baseline
$C_{m,p,y}$ = Total cost of maintenance of biodigesters in year

Outcome of SDG 2 (Zero Hunger)

Land area (hectares) under improved or new soil conservation practices as a result of project activity (GSDM-I2.4.7)

The use of the slurry as an organic fertilizer on agricultural soils can significantly improve soil quality and offset costs that would otherwise be incurred in the purchase

[20] See 20240705 KPT December 2023_YRE1| Sheet "90-30 test"|Cells L61 and L67
[21] See 20240705 KPT December 2023_YRE1| Sheet "90-30 test"|Cells F65 – L65
[22] See 20240705 KPT December 2023_YRE1| Sheet "90-30 test"|Cells F61 and F67
[23] BUS_2023_ Tabulation_15072024|Sheet "Tabulasi"|average of cell E2024 and E2066

of chemical fertilizers. The nutrient value of the slurry produced has also been shown to be higher than raw manure and hence support food production.[24]

Project activities will result in use of slurry from biodigesters in the farm for food production. The area in which slurry is applied as a result of project will be calculated as follows:

$$T_{Lbio,y} = P_{bio,y} - B_{Lbio,y} \quad (2)$$

Where:
$T_{Lbio,y}$ = Total land area in hectares applied with bioslurry
$B_{Lbio,y}$ = Total baseline area (hectares) applied with bioslurry. This will be 0 as per the GS TOOL
$P_{bio,y}$ = Total project area (hectares) applied with bioslurry

Outcome of SDG 5 (Gender Equality)

Average time saving associated with cooking time and fuel collection (GSDM-I5.4.1)

In Indonesia and globally, women and girls perform the majority of unpaid domestic work. This leaves them with less time to rest, study and realize their economic potential, leaving them in time poverty. In regard to time, women are poorer than men as unpaid domestic duties, such as collecting firewood, cooking and cleaning, must be added to their market productive work, making time much scarcer. Women are widely recognized as being principally responsible for natural resource collection, including gathering of cooking fuel and for cooking and cleaning.

Project activities will reduce the amount of time the project participating households (mainly women) will spend on gathering fuel, cooking, and cleaning. This reduces *time poverty* of women because such time burden falls disproportionately on women.

[24] Lukehurst, C.T., Frost, P. and Al Seadi, T (2010) 'Utilisation of digestate from biogas plants as biofertiliser'. IEA Bioenergy

The reduction in time spent on collection fuel wood and for cooking and cleaning is calculated per household as follows:

$$T_{r,y} = T_{b,y} - T_{p,y} \quad (3)$$

Where:

$T_{r,y}$ = Total time spent on collecting fuel wood for cooking and cleaning for project activity in year y (hours)

$T_{b,y}$ = Time spent on collecting fuel wood for cooking cleaning per household per day prior to project (hours). Default value of 1.2 hours for Indonesia from GS SDG Tool.

$T_{p,y}$ = Time spent on collecting fuel and cooking and cleaning per household per day in project (hours)

Number of women serving in managerial/leadership/ownership positions (GSDM-I5.5.1)

In addition, the IDBP employs women in management positions for implementing project activities. The number of women employed in management positions will be monitored annually.

Outcome of SDG 7 (Affordable and Clean Energy)

Number of beneficiaries: Households (GSDM-I7.1.1)

The number of households benefiting from access to affordable and clean energy equal to number of households provided with a biodigester which is collected and stored in the project database.

Total thermal energy produced: Renewable (GSDM-I7.2.2)

In addition, under this SDG, renewable energy generation is calculated which refers to thermal energy production from biodigesters. The calculation is presented below:

Table 12. Energy generation calculation

$E = \eta * H_b * V_b$		
Where:	Value:	Comments:
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 [25]	Derived from IPCC defaults
V_b = volume of biogas	1.80 m^3/day[26]	calculated
E = Energy available from the biogas system	**18.87 MJ/day[27]**	**Calculated**

Outcome of SDG 8 (Decent Work and Economic Growth)

Total number of jobs (GSDM-I8.3.1)

The project activities under the VPA provide access to finance for biodigester users through through loans from cooperatives that are LPOs (loan partner organizations) of the IDBP. This number will be monitored annually.

Outcome of SDG 13 (Climate Action)

Amount of GHGs emissions avoided or sequestered (GSDM-I13.2.1)

Approach to accounting for baseline emissions from AWMS following method 1 or IPCC Tier 1 approach:

AWMS method 1 is applicable to measures at individual households, small farms (e.g., installation of a domestic biogas digester) or livestock farms and when the digestate is handled aerobically and the biogas captured from the biodigesters is utilized (e.g.,

[25] Methane has an energy value of 37.78 MJ/m^3; thus, biogas at 55% CH_4 has an energy value of 21 MJ/m^3

[26] Cow dung produces approximately 40 litres biogas per kg. Each m^3 capacity of the biodigester needs 7.5 kg dung per day. Given an average biodigester size of 6.0 m^3, 45 kg of cow dung per day per biodigester is required. This translates into approximately 1.80 m^3 of gas produced per day. See Document P_Biogas_as_renewable_energy _2005.pdf, pages 79 and 140.

[27] Calculated as: 50% efficiency * 21 MJ/m^3 * 1.80 m^3/day.

combusted or burnt for thermal applications). Baseline emissions per production system are determined as follows:

$$BE_{AWMS,y} = N_{b,p,y} \div 365 \times GWP_{CH4} \times UF_b \times U_{p,y} \times \sum_{j,LT} \left(N_{LT,y} \times VS_{LT,y} \times MS\%_{Bl,j} \times EF_{LT,y}\right) \div 1000 \quad (4)$$

Where:

$BE_{AWMS,y}$ = Baseline emissions in year *y* (t CO e)

$N_{b,p,y}$ = Number of project technology-days included in the project database for each project scenario in year y

GWP_{CH4} = Global Warming Potential (GWP) of CH applicable to the crediting period

UF_b = Model correction factor to account for model uncertainties (0.89)[28]

$U_{p,y}$ = Usage rate for technologies in project scenario p in year y (fraction).

LT = Index for all types of livestock

J = Index for animal waste management system

$N_{LT,y}$ = Annual average number of animals of type *LT* in year *y* (numbers)

$VS_{LT,y}$ = Volatile solids production/excretion per animal of livestock *LT* in year *y*

$MS\%_{Bl,j}$ = Fraction of animal manure handled in baseline animal manure management system *j*. (%)

$EF_{LT,y}$ = Emission factor for direct CH emissions by livestock *LT*, in manure management system j.

Approach to accounting for baseline emissions from thermal application following method 1 or IPCC Tier 1 approach

The baseline scenario for VPA-1 is defined by the baseline fuel consumption patterns in a household population that is targeted for adoption of the biodigester technology. The following formula calculates the baseline emissions per household:

[28] UNFCCC. (2003). Good practice guidance and uncertainty management in national greenhouse gas inventories: Report of the expert meeting on good practice guidance and uncertainty management in national greenhouse gas inventories (FCCC/SBSTA/2003/10/Add.2). page 25. https://unfccc.int/resource/docs/2003/sbsta/10a02.pdf

$$BE_{TA,y} = \sum_{b,p} \left(N_{b,py} \times U_{p,y} \times \left(f_{NRB,i,y} \times SE_{b,y,CO2} + SE_{b,y,non-CO2} \right) \right) \quad (5)$$

Where:

$BE_{TA,y}$ = Baseline emissions for total project activity in year y (tCO_2e/yr)

$\sum_{b,p}$ = Sum over all relevant baseline b/project p pairs

$N_{b,py}$ = Number of project technology-days included in the project database for each project scenario in year y. The start date is the day a plant start producing biogas. A default of 2 weeks may be use for the period from installation date and start date.

$U_{p,y}$ = Usage rate for technologies in project scenario p in year y (fraction)

$SE_{b,y,CO2}$ = Specific CO_2 emissions for a baseline b technology in year y (tCO_2/technology*day)

$SE_{b,y,non-CO2}$ = Specific non-CO_2 emissions for a baseline b technology in year y (tCO_2e/technology*day)

$f_{NRB,i,y}$ = Fraction of biomass used in year y for baseline scenario b that can be established as non-renewable biomass (fraction).

Approach to accounting project emissions from AWMS following method 1 or IPCC Tier 1 approach:

The project emissions involve emissions from the biodigester, which include:

a. Physical leakage biogas

b. Emissions from the use of fossil fuels or electricity for the operation

$$PE_{AWMS,y} = PE_{PL,y} + PE_{power,y} \quad (6)$$

Where:

$PE_{AWMS,y}$ = Project emissions in year y (t CO_2e)

$PE_{PL,y}$ = Emissions due to physical leakage of biogas in year y (t CO_2e)

$PE_{power,y}$ = Emissions from the use of fossil fuel or electricity for the operation of the installed facilities in the year y (t CO_2e)

The physical leakage from biodigesters is calculated as 10% of the maximum methane producing potential of the manure fed into the management systems implemented by the project activity, as per the following equation:

$$PE_{PL,y} = 0.10 \times N_{b,p,y} \div 365 \times U_{p,y} \times GWP_{CH4} \times D_{CH4} \times \sum_k \sum_{i,LT} B_{O,LT} \times N_{LT,y} \times VS_{LT,y} \times MS\%_{i,y} \quad (7)$$

Where:

$PE_{PL,y}$ = Project emissions from physical leakage in year y (t CO_2e)

GWP_{CH4} = Global Warming Potential (GWP) of CH_4 applicable to the crediting period.

D_{CH4} = CH_4 density (0.00067 t/m3 at room temperature (20 °C) and 1 atm pressure)

LT = Index for all types of livestock

i = Index for animal manure management system

$B_{O,LT}$ = Maximum methane producing potential of the volatile solid generated for animal type LT.

$MS\%_{i,y}$ = Fraction of manure handled in project animal manure management system i

k =Climate region k

Approach to accounting for project emissions from thermal application following method 1 or IPCC Tier 1 approach

The Project emission from thermal application in year y shall be calculated as follows:

$$PE_y = \sum_{b,p} \left(N_{b,py} \times U_{p,y} \times \left(f_{NRB,i,y} \times SE_{p,y,CO2} + SE_{p,y,non-CO2} \right) \right) \quad (8)$$

Where:

PE_y = Baseline emissions for total project activity in year y (tCO_2e/yr)

$\sum_{b,p}$ = Sum over all relevant baseline b/project p pairs

$N_{b,p,y}$ = Number of project technology-days included in the project database for each project scenario in year y. The start date is the day a plant start producing biogas. A default of 2 weeks may be use for the period from installation date and start date.

$U_{p,y}$ = Usage rate for technologies in project scenario p in year y (fraction)

$SE_{p,y,CO2}$ = Specific CO_2 emissions for a project b technology in year y (tCO_2/technology*day)

$f_{NRB,i,y}$ = Fraction of biomass used in year y for project scenario b that can be established as non-renewable biomass (fraction).

$SE_{p,y,non-CO2}$ = Specific non-CO_2 emissions for a project b technology in year y (tCO_2/technology*day)

Determining $SE_{p,y,CO2}$ and $SE_{p,y,non-CO2}$

The following formula is used to calculate $SE_{p,y,CO2}$:

$$SE_{p,y,CO2} = \sum_i P_{p,i,y} \times NCV_{p,i,fuel} \times EF_{p,i,fuel,CO2} \quad (9)$$

The following formula is used to calculate $SE_{p,y,non-CO2}$:

$$SE_{p,y,non-CO2} = \sum_i P_{p,i,y} \times NCV_{p,i,fuel} \times EF_{p,i,fuel,non-CO2} \quad (10)$$

Where:

$P_{p,i,y}$ = Average yearly consumption of project fuel i per household (tonnes/household/year)

$NCV_{p,i,fuel}$ = Net calorific value of the fuel(s) i that is used in project p (TJ/tonne)

$EF_{p,i,fuel,CO2}$ =CO_2 emission factor arising from use of fuels i in project scenario (tCO_2/TJ)

$EF_{p,i,fuel,non-CO2}$ =non-CO_2 emission factor arising from use of fuels i in project scenario (tCO_2/TJ)

A baseline survey covering the target household population was conducted in April-August 2023. The results indicate that the dominant types of fuel used in the baseline

scenario are: LPG (69% of households) and biomass (31% of households).[29] This indicates that the fuel types used is the same as that in the BFT which was executed in the period from the 29 December 2023 and 2 April 2024.

Therefore, for determining $P_{p,i,y}$, the results from the PFT testing were used. In the PFT, 89 randomly selected household from the project database. Simple random sampling, each observation is chosen randomly and entirely by chance, such that each observation has the same probability of being chosen. Oversampling was conducted to minimise the necessity to redo the KPT in cases of wrongly filled out questionnaires or unreliable results. Outliers were excluded using the Grubb's test. A significance of 0.01, two-sided has been applied.[30] All data has been deemed consistent and passes the Grubb's test assessment.

Determining $P_{p1,fuel,y}$

On average, project households used 143.04 kg of LPG per year equivalent to 11.92 kg per month.[31] This is equal to 0.00039 tons per day.

Determining $P_{p1,bio,y}$

On average, each project household uses 251.62 kg per year which is equivalent to 20.97 kg per month.[32] This is equal to 0.00069 tons per day.

Determining $P_{p1,\ kero,y}$

On average, each project household uses 67.98kg per year which is equivalent to 5.66 kg per month.[33] This is equal to 0.000186 tons per day.

Emission reductions from VPA-1

[29] Baseline_QNaire_2023_ver_4|Sheet "fuel cons"| Cells M5 and M7
[30] For more on the Grubbs' test, please refer to http://www.itl.nist.gov/div898/handbook/eda/section3/eda35h1.htm For a cross-check of the significance of the results, please refer to an online tool available on: http://www.graphpad.com/quickcalcs/Grubbs1.cfm
[31] 20240705 KPT December 2023_YRE1 |Sheet" 90-30 test" | Cell AC98 and AC102
[32] 20240705 KPT December 2023_YRE1 |Sheet" 90-30 test" | Cell W98 and W102
[33] 20240705 KPT December 2023_YRE1 | Sheet '90-30 test | Cell Z98 and Z102

The emission reductions for each of the two components (AWMS and thermal energy) are calculated separately as follows:

$$ER_y = BE_y - PE_y - LE_y \quad (10)$$

Where:

ER_y	=	Emission reductions in year y (t CO_2e/yr)
BE_y	=	Baseline emissions in year y (t CO_2e/yr)
PE_y	=	Project emissions in year y (t CO_2e/yr)
LE_y	=	Leakage emissions in year y (t CO_2e/yr)

The total emission reduction from project activity will be the sum of emission reductions from AWMS and Thermal energy.

B.6.2. Data and parameters fixed ex ante

SDG13

Data/parameter	Avoidance of double counting or double claiming among project participants
Unit	N/A
Description	Evidence of avoidance of double counting or double claiming with other parties directly involved with the project or programme.
Source of data	Double counting is avoided through recording the unique serial number of each biodigester in a centralised database system operated by the CME. Participating users will confirm that they are not taking part in other registered PoAs through signing of a Household Agreement for each biodigester.
Value(s) applied	N/A

Choice of data or Measurement methods and procedures	Recording during biodigester installation
Purpose of data	Avoid double counting
Additional comment	Any written assertions not available at validation shall be included as a FAR and be provided and verified at the time of first verification.

Data/parameter	Avoidance of double counting or double claiming with other mitigation actions
Unit	N/A
Description	Review and analysis of mitigation actions in other voluntary market or UNFCCC/compliance mechanisms
Source of data	-
Additional comment	-

Data/parameter	Regulatory framework for provision of animal waste management and thermal energy services.
Unit	N/A
Description	Evidence that the project does not undermine or conflict with any national, sub-national or local regulations or guidance for thermal energy supply/devices or fuel supply or use.
Source of data	Two national regulations are relevant to biogas dissemination in Indonesia, which are: (1) energy mix target (legitimized in 2006 and renewed in 2017) and (2) the national climate change mitigation plan for climate change or NAMA (legitimized in 2011). Both regulations are related to the emergence of biogas programs. (1) has a target of 10% of bioenergy by 2025, including a sub target for biogas on household scale. (2) is targeted to

	achieve 26% emission reductions by 2020 and includes biogas as one of the action plans.[34] The IDBP team participated in a workshop of developing biogas sector in Indonesia organized by the Directorate General of New, Renewable Energy and Energy Conservation of the Indonesian Ministry of Energy and Mineral Resources. Furthermore, IDBP has been engaging with a wide range of stakeholders in developing the biogas sector in the country.[35] This evidence that the project complies with the regulatory framework of Indonesia.
Additional comment	Undertake at the start of each crediting period.

Data/parameter	Project technology description
Unit	N/A
Description	The detailed description of the project technology (including both biodigester and biogas stove) shall include as a minimum: - manufacturer name (if applicable), - product name (if applicable), - technology type, - capacity characteristics (e.g., volume of digester14), - continuous useful energy output demonstration, - rated thermal efficiency of biogas stove, - any performance certifications from national standards body or certification body recognised by national standards body also shall be provided.
Source of data	IDBP database
Additional comment	N/A

[34] See page 1921 section: Biogas-related regulation of 'The complexity of barriers to biogas digester dissemination in Indonesia: challenges for agriculture waste management'
[35] See section 4.3.1. Policy – Stakeholder Engagement of 'Indonesia Domestic Biogas Program 2022 Annual Report'

Data/parameter	Expected technical life of project technology.
Unit	Operating hours
Description	The expected technical life of an individual project technology shall be defined in the PDD.
Source of data	Scientific literature finds that domestic biodigesters typically have lifetimes of 25-35 years.[36] With normal usage of 2.74 hours[37] per day and an assumed lifetime of 30 years, this makes 30.000 hours.
Value(s) applied	30.000
Choice of data or Measurement methods and procedures	
Purpose of data	Ex-ante estimations of emission reductions
Additional comment	The project shall ensure that the units are replaced or retrofitted at the end of their technical life within a valid crediting period to continue claiming emission reductions. However, a new project or programme cannot be registered for replacement/retrofitted project devices.

Data/parameter	Baseline scenario survey results
Unit	NA
Description	Report the results of the baseline scenario survey
Source of data	Sheet Baseline_QNaire_2023_ver_4
Value(s) applied	Refere to section B.4 above

[36] Rajendran, K., Aslanzadeh, S., Taherzadeh, M. (2012) Household Biogas Digesters—A Review. Energies. Available at https://www.mdpi.com/1996-1073/5/8/2911

[37] See "Crosstab BUS by Province_18May2016.xls", sheet "raw_data" cell J2683. As per Gold Standard confirmation by email, the parameter 't' can be fixed at value 2.74 going forward to enable the definition of the VPA-1 threshold. See email communication dated 11 April 2016.

Choice of data or Measurement methods and procedures	N/A
Purpose of data	To calculate the baseline emissions and define the baseline scenario
Additional comment	Not relevant for third crediting period

Data/parameter	GWP_{CH4}
Unit	tCO_2/tCH_4
Description	Global Warming Potential (GWP) of CH_4 applicable to the crediting period
Source of data	IPCC AR5
Value(s) applied	28
Choice of data or Measurement methods and procedures	-
Purpose of data	Emission reduction calculations
Additional comment	The GWP value will be updated in future as it gets updated by the IPCC

Parameters related to AWMS

Data/parameter	$MS\%_{Bl,j}$
Unit	%
Description	Fraction of manure handled in baseline animal manure management system j
Source of data	Default values from table 10.A.6 (New) 'Emissions from Livestock and Manure Management' under the volume 'Agriculture, Forestry and other Land use' of the 2019

	IPCC Guidelines for National Greenhouse Gas Inventories (AWMS method 1).[38]
Value(s) applied	**Management System** / Fraction of manure handled ($MS\%_{BI,j}$) Anaerobic lagoon: 0 Liquid/Slurry: 1 Solid storage: 21 Dry lot: 29 Daily spread: 0 Digester: 0 Burned for fuel: 11 Paddlock: 38
Choice of data or Measurement methods and procedures	-
Purpose of data	Emission reduction calculation
Additional comment	-

Data/parameter	EF_{LT}
Unit	$kgCH_4$ per animal per year for livestock type LT
Description	Animal manure methane emission factor by average temperature
Source of data	Default values from table 10.14 of chapter 'Emissions from Livestock and Manure Management' under the volume 'Agriculture, Forestry and other Land use' of the 2019 IPCC Guidelines for National Greenhouse Gas Inventories.[39]

[38] See https://www.ipcc-nggip.iges.or.jp/public/2019rf/pdf/4_Volume4/19R_V4_Ch10_Livestock.pdf
[39] See https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/4_Volume4/V4_10_Ch10_Livestock.pdf

Value(s) applied	Uncovered anaerobic lagoon: 69.7 Liquid/Slurry: 66.2 Solid storage: 4.4 Dairy spread: 0.9 Dry lot: 1.7 Burned for fuel: 8.7
Choice of data or Measurement methods and procedures	-
Purpose of data	Emission reduction calculation
Additional comment	Applicable for AWMS method 1

Data/parameter	$VS_{rate,LT}$
Unit	kg VS / (1000 kg animal mass) / day
Description	Default Volatile solids production/excretion rate per animal of livestock LT in year y.
Source of data	IPCC default: Table 10.13A of Chapter 10 of chapter 'Emissions from Livestock and Manure Management' under the volume 'Agriculture, Forestry and other Land use' of the 2019 IPCC Guidelines for National Greenhouse Gas Inventories.[40]
Value(s) applied	9
Choice of data or Measurement methods and procedures	Method – 1 – IPCC Default Values
Purpose of data	Calculations of emission reduction

[40] See https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/4_Volume4/V4_10_Ch10_Livestock.pdf

Additional comment	-

Data / Parameter	TAM_{LT}
Unit	kg/animal
Description	Typical animal mass for livestock LT
Source of data	Table 10A.5 as well of Chapter 10 of chapter 'Emissions from Livestock and Manure Management' under the volume 'Agriculture, Forestry and other Land use' of the 2019 IPCC Guidelines for National Greenhouse Gas Inventories.[41]
Value(s) applied	386 kg per dairy cow for Asian continent
Measurement methods and procedures	Fixed parameter
Purpose of data	ER calculations
Additional comment	-

Data / Parameter	B_{0LT}
Unit	m3 CH4/kg-dm
Description	Maximum methane production potential of the volatile solid generated for animal type LT.
Source of data	Table 10.16A of Chapter 10 of chapter 'Emissions from Livestock and Manure Management' under the volume 'Agriculture, Forestry and other Land use' of the 2019 IPCC Guidelines for National Greenhouse Gas Inventories.[42]
Value(s) applied	0.13 for low productivity system

[41] See https://ipcc-nggip.iges.or.jp/public/2006gl/pdf/4_Volume4/V4_10_Ch10_Livestock.pdf
[42] www.ipcc-nggip.iges.or.jp/public/2019rf/pdf/4_Volume4/19R_V4_Ch10_Livestock.pdf For all regions except North America, Western Europe, Eastern Europe, and Oceania, low productivity is considered the default value for Tier 1.

Measurement methods and procedures	Fixed parameter
Purpose of data	ER calculations
Additional comment	-

Parameters related to Thermal application

Data/parameter	$EF_{b,i,CO2}$
Unit	tCO_2/TJ
Description	CO_2 emission factor arising from use of fuels in baseline scenario
Source of data	Methodology default: [43] **Wood**: 112 tCO_2/TJ **Charcoal**: 112 tCO_2/TJ IPCC default: [44] **Kerosene** = 71.9 tCO_2/TJ **LPG** = 63.1 tCO_2/TJ
Value(s) applied	Wood: 112 tCO_2/TJ LPG = 63.1 tCO_2/TJ Kerosene = 71.9 tCO_2/TJ
Choice of data or Measurement methods and procedures	-
Purpose of data	Emission reduction calculation

[43] Methodology for Animal Manure Management and Biogas Use for Thermal Energy Generation, version 1.1. Methodology for animal manure management and biogas use for thermal energy generation – Gold Standard for the Global Goals

[44] IPCC (2006) Guidelines for National Greenhouse Inventories. Volume 2: Energy. Chapter 2 Stationary Combustion. Table 2.2. https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf

Additional comment	Applicable for Thermal application method 1 and Thermal application method 2

Data/parameter	$EF_{b,i,non\text{-}CO2}$
Unit	tCO_2/TJ
Description	Non-CO_2 emission factor arising from use of fuels in baseline scenario
Source of data	**Wood**: Methodology default: - 9.46 tCO_2e/TJ (AR5 GWP) or - 8.692 tCO_2e/TJ (AR4 GWP) **Charcoal**: Methodology defaults: - 5.865 tCO_2e/TJ (AR5 GWP) (combustion only) - 44.83 tCO_2e/TJ (AR5 GWP) (includes charcoal production emissions), - Methodology cap: 92.29 tCO_2e/TJ (AR5 GWP) (includes charcoal production emissions) - or - 5.298 tCO_2e/TJ (AR4 GWP) (combustion only) - 40.26 tCO_2e/TJ (AR4 GWP) (includes charcoal production emissions) - Methodology cap: 82.90 tCO_2e/TJ (AR4 GWP) (includes charcoal production emissions) IPCC defaults: [45] - **LPG** = 63.1 tCO_2/TJ - **Kerosene** = 71.9 tCO_2/TJ
Value(s) applied	Wood: 112 tCO_2/TJ LPG = 63.1 tCO_2/TJ Kerosene = 71.9 tCO_2/TJ

[45] IPCC (2006) Guidelines for National Greenhouse Inventories. Volume 2: Energy. Chapter 2 Stationary Combustion. Table 2.2. https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf

Choice of data or Measurement methods and procedures	-
Purpose of data	Emission reduction calculation (Equation 10 $SEb,y,non-CO_2$ parameter)
Additional comment	Applicable for Thermal application method 1 and Thermal application method 2

Data/parameter	$NCV_{b,i}$
Unit	TJ/ton
Description	Net calorific value of the fuels used in the baseline
Source of data	Methodology default: [46] **Wood**: 0.0156 TJ/ton **Charcoal**: 0.0295 TJ/ton IPCC default:[47] **Kerosene**: 0.0438 TJ/ton **LPG**: 0.0473 TJ/ton
Value(s) applied	**Wood**: 0.0156 TJ/ton **Kerosene**: 0.0438 TJ/ton **LPG**: 0.0473 TJ/ton
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	For the calculation of emission reductions derived from fuel usage (Equation 10 $SEb,y,non-CO2$ parameter)

[46] Methodology for Animal Manure Management and Biogas Use for Thermal Energy Generation, version 1.1. Methodology for animal manure management and biogas use for thermal energy generation – Gold Standard for the Global Goals

[47] IPCC (2006) Guidelines for National Greenhouse Inventories. Volume 2: Energy. Chapter 2 Stationary Combustion. Table 2.2. https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf

Additional comment	Applicable for Thermal application method 1 and Thermal application method 2

Data/parameter	$NCV_{p,i}$
Unit	TJ/ton
Description	Net calorific value of the fuels used in the project
Source of data	Methodology default: **Wood**: 0.0156 TJ/ton **Charcoal**: 0.0295 TJ/ton IPCC default: **Kerosene**: 0.0438 TJ/ton **LPG**: 0.0473 TJ/ton
Value(s) applied	**Wood**: 0.0156 TJ/ton **Kerosene**: 0.0438 TJ/ton **LPG**: 0.0473 TJ/ton
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	For the calculation of emission reductions derived from fuel usage. This parameter is used to calculate $SEp,y,CO2$ and $SEp,y,non-CO2$
Additional comment	Applicable for Thermal application method 1 and Thermal application method 2

Data/parameter	$P_{b,i,y}$
Unit	tonnes/household/year

Description	Average yearly consumption of baseline fuel i per household before the start of the project activity or at the renewal of each crediting period, whichever is later.
Source of data	KPT 2023[48]
Value(s) applied	Biomass: 0.449 Kerosene: 0.028 LPG: 0.287
Choice of data or Measurement methods and procedures	-
Purpose of data	Emission reduction calculation
Additional comment	Applicable for Thermal application method 1 and Thermal application method 2

SDG 1– No poverty: GSDM-I1.1.1

Data/parameter	$C_{f,b,y}$
Unit	Indonesian Rupiahs
Description	Total cost of fuel 1 in year y in baseline
Source of data	Baseline survey
Value(s) applied	LPG[49] = 20,730 Indonesian Rupiahs Wood[50] = 559 Indonesian Rupiahs
Choice of data or Measurement methods and procedures	
Purpose of data	To calculate financial savings
Additional comment	

SDG 2 – Zero Hunger: GSDM-I2.4.7

Data/parameter	$BL_{bio,y}$

[48] 20240705 KPT December 2023_YRE1 | Tab 90-30 test | Cells F62-L62
[49] Baseline_QNaire_2023_ver_4 |Sheet "Tabulasi"|Cell P570
[50] Baseline_QNaire_2023_ver_4 |Sheet "Tabulasi"|Cell P576

Unit	ha
Description	Total baseline area (hectares) applied with bioslurry
Source of data	GS SDG tool
Value(s) applied	0
Choice of data or Measurement methods and procedures	Baseline is 0 based on the GS SDG Impact Tool
Purpose of data	For estimating land under improved or new soil conservation practices as a result of project activity.
Additional comment	

SDG 5 – Gender equality: GSDM-I5.5.1

Data/parameter	$T_{b,y}$
Unit	minutes/hr per household
Description	Time spent on collecting fuel wood for cooking cleaning per household per day prior to project (hours)
Source of data	Indonesia value from the State of the Global Clean and Improved Cooking Sector, world bank 2015
Value(s) applied	1.2 hours
Choice of data or Measurement methods and procedures	Fixed data from the GS SDG impact tool
Purpose of data	To calculate women empowerment and gender equality
Additional comment	

SDG 7 – Affordable and clean energy: GSDM-I7.2.2

Data/parameter	Th_{cap}
Unit	MJ/day
Description	Thermal energy production from biodigester
Source of data	Calculated "VPA 1 ER calculation CP renewal_fNRB changed.xlsx | Tab Capacity calculation | Cell C7"
Value(s) applied	1.91 MJ/day
Choice of data or Measurement methods and procedures	**Table 13**, below, describes the calculation

Purpose of data	SDG Impact calculation
Additional comment	This will be monitored through sampling to satisfy the requirements put forth by the methodology

B.6.3. Ex ante estimation of SDG Impact

As per Sections B.6.1 and B.6.2 above, this section will only present the calculations for estimating the SDG 1 (No poverty), 2 (Zero hunger), 5 (Gender equality), 7 (Affordable and clean energy), 8 (Decent work and economic growth) and 13 (Climate Action) impacts including the ex-ante GHG emission reductions achieved under VPA-1.

Calculation of SDG 1 (No Poverty) Outcome

GSDM-I1.1.1

As per the BFT, the main sources of energy for cooking in the baseline are LPG and wood. Baseline households use on average 286.56 kg of LPG per year equivalent to 23.88 kg per month.[51] The second dominant fuel used for cooking purposes in the baseline is wood. On average, each household uses 448.85 kg of wood per year which is equivalent to 37.40 kg per month. Biogas users in the project use 143.04 kg of LPG per householder per year and 251.62kg of wood per household per year.[52] The average repair cost of biodigester is 118,688 Indonesian Rupiah.[53]

As per the baseline survey, the price of each kilogram of fuel is as below:

LPG[54] = 20,730 Indonesian Rupiahs
Wood[55] = 559 Indonesian Rupiahs

Therefore, cost of use of LPG and wood per household in the baseline is:

[51] 20240705 KPT December 2023_YRE1 | Sheet "90-30 test" | Cell L61 and 67
[52] 20240705 KPT December 2023_YRE1 | Sheet "90-30 test" | Cell W98 and AC98
[53] BUS_2023_Tabulation 15072024 | Sheet "Tabulasi" | Cell Z2064
[54] Baseline_QNaire_2023_ver_4 |Sheet "Tabulasi"|Cell P570
[55] Baseline_QNaire_2023_ver_4 |Sheet "Tabulasi"|Cell P576

$C_{f,b,y}$ = (286.56 x20,730)+(448.85 x 559) = 5,940,388.8 + 250,907.15 = 6,191,295.95

And cost of of use of LPG and wood per household in the project is:

$C_{f,p,y}$ = (143.04 x 20,730)+(251.62 x 559) = 2,965,219.20 + 140,655.58 = 3,105,874.78

$C_{m,p,y}$ = 118,688 Indonesian Rupiah

The amount of money saved per household is calculated as follows:

$T_{s,y}$ = 6,191,295.95 - 3,105,874.78- 118,688 = 2,966,733.17 Indonesian Rupiah

Outcome of SDG 2 (Zero Hunger)

GSDM-I2.4.7:

The use of the slurry as an organic fertilizer on agricultural soils can significantly improve soil quality and offset costs that would otherwise be incurred in the purchase of chemical fertilizers. The nutrient value of the slurry produced has also been shown to be higher than raw manure and hence support food production[56].

Project activities will result in use of slurry from biodigesters in the farm for food production. The area in which slurry is applied as a result of project will be calculated as follows:

$$T_{Lbio,y} = P_{bio,y} - B_{Lbio,y} \quad (2)$$

[56] Lukehurst, C.T., Frost, P. and Al Seadi, T (2010) 'Utilisation of digestate from biogas plants as biofertiliser'. IEA Bioenergy

Where:

$T_{Lbio,y}$ = Total land area in hectares applied with bioslurry

$B_{Lbio,y}$ = Total baseline area (hectares) applied with bioslurry. This will be 0 as per the GS TOOL

$P_{bio,y}$ = Total project area (hectares) applied with bioslurry

Calculation of of SDG 5 (Gender Equality) Outcome

GSDM-I5.4.1

Project activities will reduce the amount of time the project participating households (mainly women) will spend on gathering fuel, cooking, and cleaning. This reduces *time poverty* of women because such time burden falls disproportionately on women. For baseline, we will use the GS SDG Tool default value of 1.2 hours for Indonesia for time spent on fuel gathering. For the project scenario, the Biogas User Survey conducted in each monitoring period will ask women about time used for operating the biodigester and for collecting wood after installing the biodigester. For the ex-ante calculations, the Biogas User Survey was used and the amount of time saved is calculated as follows.[57]

T_b = time spent in baseline for collecting firewood for cooking (hrs/day)

T_{pw} = time spent in project scenrio for collecting wood (hrs/day)

T_{pd} = time used for operating the biodigester (hrs/day)

T_s = time saved from using the biodigester (hrs/ day)

$T_s = T_b - T_{pw} - T_{pd}$

T_b = 1.2 hours (default for Indonesia in GS SDG Tool)

T_{pw} = 0.06 hours

T_{pd} = 0.26 hours

T_s = 1.2 – 0.06 – 0.26 = 0.88 hours per day

[57] See 20250226 SDG outcomes– sheet 'SDG 5'

This parameter will be monitored annually.

GSDM-I5.5.1

In addition, the IDBP employs **two** women in management positions for implementing project activities. This will be recorded in the project database and monitored annually.

Calculation of SDG 7 (Affordable and Clean Energy) Outcome

GSDM-I7.1.1

The number of households benefiting from access to affordable and clean energy equal to number of households provided with a biodigester which is collected and stored in the project database. Under VPA 1, the project provides 20,252 households access to clean energy.

GSDM-I7.2.2

In addition, under this SDG, renewable energy generation is calculated which refers to thermal energy production from biodigesters. The calculation is presented below:

Table 13. Energy generation calculation[58]

$E = \eta * H_b * V_b$		
Where:	Value:	Comments:
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 [59]	Derived from IPCC defaults
V_b = volume of biogas	1.80 m^3/day[60]	calculated

[58] See „VPA 1 ER calculation CP renewal_fNRB changed.xlsx "|Sheet "Capacity calculation"|Rows 15-18
[59] Methane has an energy value of 37.78 MJ/m^3; thus, biogas at 55% CH_4 has an energy value of 21 MJ/m^3
[60] Cow dung produces approximately 40 litres biogas per kg. Each m^3 capacity of the biodigester needs 7.5 kg dung per day. Given an average biodigester size of 5.99 m^3, 44.925 kg of cow dung per day per biogas unit is required. This translates into approximately 1.80 m^3 of gas produced per day. See Document P_Biogas_as_renewable_energy _2005.pdf, pages 79 and 140.

E = Energy available from the biogas system	**18.87 MJ/day[61]**	**Calculated**

Calculation of SDG 8 (Decent work and economic growth) Outcome

GSDM-I8.5.1

Based on the GS SDG tool, under SDG 8, the number of jobs generated by the project can be used as indicator for SDG 8 impact. The IDBP database records number of masons who are hired to provide services for the maintenance of biodigesters during a monitoring period of VPA1. In 2024, 11 masons were hired to do maintenance work on biodigesters under VPA1.[62]

Calculation of SDG 13 (Climate Action) Outcome (GSDM-I13.2.1)

Accounting for baseline emissions from AWMS following method 1 or IPCC Tier 1 approach:

AWMS method 1 is applicable to measures at individual households, small farms (e.g., installation of a domestic biogas digester) or livestock farms and when the digestate is handled aerobically and the biogas captured from the biodigesters is utilized (e.g., combusted or burnt for thermal applications). Baseline emissions per production system are determined as follows:

$$BE_{AWMS,y} = N_{b,p,y} \div 365 \times GWP_{CH4} \times UF_b \times U_{p,y} \times \sum_{j,LT} \left(N_{LT,y} \times VS_{LT,y} \times MS\%_{Bl,j} \times EF_{LT,y}\right) \div 1000 \quad (1)$$

Where:

$BE_{AWMS,y}$ = Baseline emissions in year *y* (t CO e)

[61] Calculated as: 50% efficiency * 21 MJ/m^3 * 1.86 m^3/day
[62] See 2024_IDBP_Database_VPA1, tab "Plant maintenance", cell I43056

$N_{b,p,y}$ = Number of project technology-days included in the project database for each project scenario in year y

GWP_{CH4} = Global Warming Potential (GWP) of CH applicable to the crediting period

UF_b = Model correction factor to account for model uncertainties (0.89)[63]

$U_{p,y}$ = Usage rate for technologies in project scenario p in year y (fraction).

LT = Index for all types of livestock

J = Index for animal waste management system

$N_{LT,y}$ = Annual average number of animals of type *LT* in year *y* (numbers)

$VS_{LT,y}$ = Volatile solids production/excretion per animal of livestock *LT* in year *y*

$MS\%_{Bl,j}$ = Fraction of animal manure handled in baseline animal manure management system *j*. (%)

$EF_{LT,y}$ = Emission factor for direct CH emissions by livestock *LT*, in manure management system j.

Calculating $N_{LT,y}$*:*

The annual average number of animals ($N_{LT,y}$) is determined as follows:

$$N_{LT,y} = N_{da,y} \times \left(\frac{N_{p,y}}{365}\right) \quad (8)$$

Where:

$N_{da,y}$ = Number of days animal is alive in the farm in the year *y* (numbers)

$N_{p,y}$ = Number of animals produced annually of type *LT* for the year *y* (numbers)

Determining $N_{da,y}$*:*

A baseline survey covering the target household population was conducted in 2023. A total of 125 end users without project technologies representative of the end users targeted in the VPA-1 were surveyed nationwide. Respondents were asked to clarify how many days their animals were alive in the preceding year. The households

[63] Reference: FCCC/SBSTA/2003/10/Add.2, page 25.

reported their dairy cows were alive on average 298.37 days in the preceding 365 days and their pigs were alive 333 days on average in the preceding 365 days.[64]

Determining $N_{p,y}$:

A baseline survey covering the target household population was conducted in April 2023. A total of 125 end users without project technologies representative of the end users targeted in the VPA were surveyed nationwide. Respondents were asked to clarify what types and how many animals they are keeping. In total, 89.6% of the households reported to keep dairy cows (average of 4.9 heads) and 7.2% reported to keep pigs (average of 7 heads). This means that total average of animals kept per household averages ((0.896*4.92) = 4.408 cows and (0.072*7.22) = 0.520 pigs) [65]

For conservativeness, methane emissions from secondary and tertiary animal types are not included in the baseline calculation.

Calculation of $N_{LT,y}$:

The annual average number of animals ($N_{LT,y}$) is calculated as follows:

$$N_{LT,y} = 298.37 \times \left(\frac{4.408}{365}\right) = 3.60$$

Determining $VS_{LT,y}$:

Volatile solids (VS) are the organic material in livestock manure and consist of both biodegradable and non-biodegradable fractions. The parameter $VS_{LT,y}$ is calculated as per the equation below:

$$VS_{LT,y} = VS_{rate,LT} \times \left(\frac{TAM_{LT}}{1000}\right) \times nd_y \quad (9)$$

Where:

[64] Baseline_QNaire_2023_ver_4| sheet Data | cells BO128 and CE128
[65] Baseline_QNaire_2023_ver_4| sheet Data | cell AZ135 and AZ136

$VS_{LT,y}$ = Annual volatile solid excretions for livestock *LT* entering all animal waste management systems on a dry matter weight basis (kg-dm/animal/yr)

$VS_{rate,LT}$ = VS excretion rate (kg VS / (1000 kg animal mass) / day)

TAM_{LT} = Typical animal mass for livestock LT (kg/animal).

nd_y = Number of days that the animal manure management system was operational in year *y*

Determining $VS_{rate,LT}$:

The volatile solid excretions for dairy cows is sourced from Table 10.13A of chapter 'Emissions from Livestock and Manure Management' under the volume 'Agriculture, Forestry and other Land use' of the 2019 IPCC Guidelines for National Greenhouse Gas Inventories. This was 9.

Determining TAM_{LT}:

The typical animal mass for dairy cows was sourced from Table 10A.5 of chapter 'Emissions from Livestock and Manure Management' under the volume 'Agriculture, Forestry and other Land use' of the 2019 IPCC Guidelines for National Greenhouse Gas Inventories shall be selected accordingly. TAM_{LT} is 386 kg per dairy cow for Asian continent.

Determining nd_y:

Number of days that the treatment plant is operational is recorded in the project database. For the ex-ante calculations, 365 operational days is used.

Calculating $VS_{LT,y}$:

Annual volatile solid excretions for livestock *LT* entering all animal waste management systems on a dry matter weight basis in the project area was calculated as follows:

$$VS_{LT,y} = 9 \times \left(\frac{386}{1000}\right) \times 365 = 1282.10$$

Determining LT_j:

According to AWMS Method 1 (IPCC Tier 1), each manure management system (j) and livestock type (LT) has associated emission factors and fraction of animal manure handled in baseline animal manure management system.
The following table presents these values that are included in the calculations:

Table 14. Emissions from different manure management systems in the baseline.[66]

Management System	Fraction of manure handled ($MS\%_{Bl,j}$)	Methane Emission Factor ($EF_{LT,y}$)	Average number of cows ($N_{LT,y}$)[67]	Annual volatile solid excretions for cows ($VS_{LT,y}$)	$N_{LT,y}$ x $VS_{LT,y}$ x $MS_{\%Bl,j}$ x $EF_{LT,y}$)%1000 (see formula 1)
Anaerobic lagoon	0	69.7%	3.605	1282.10	0.00
Liquid/Slurry	0.01	66.2%	3.605	1282.10	0.03
Solid storage	0.21	4.4%	3.605	1282.10	0.04
Dry lot	0.29	1.7%	3.605	1282.10	0.02
Daily spread	0	0.9%	3.605	1282.10	0.00
Digester	0	9.5%	3.605	1282.10	0.00
Burned for fuel	0.11	8.7%	3.605	1282.10	0.04
Paddlock	0.38	0.6%	3.605	1282.10	0.01
$\sum_{j,LT}(N_{LT,y} \times VS_{LT,y} \times MS\%_{Bl,j} \times EF_{LT,y}) \div 1000$					**0.15**

Calculation of baseline emissions from AWMS

The baseline methane emissions per household per year under the VPA-1 are:[68]
$BE_{AWMS,y}$ = ((365 / 365) x 28 x 0.899 x 0.15 = 3.38 tCO_2/yr/hh

Accounting for baseline emissions from thermal application following method 1 or IPCC Tier 1 approach

[66] VPA 1 ER calculation CP renewal_fNRB changed.xlsx, Tab 'Manure management systems', 'D10-D17'
[67] VPA 1 ER calculation CP renewal_fNRB changed.xlsx, Tab 'EX-ante 2025', 'E11'
[68] Figures may not add up due to rounding – see emission reduction calculation (VPA1 ER calculaton CP renewal_fNRB changed.xlsx, Tab EX-ante 2025, Cell E22)

The baseline scenario for VPA-1 is defined by the baseline fuel consumption patterns in a household population that is targeted for adoption of the biodigester technology. The following formula calculates the baseline emissions per household:

$$BE_{TA,y} = \sum_{b,p} \left(N_{b,py} \times U_{p,y} \times \left(f_{NRB,i,y} \times SE_{b,y,CO2} + SE_{b,y,non-CO2} \right) \right) \quad (9)$$

Where:

$BE_{TA,y}$ = Baseline emissions for total project activity in year y (tCO_2e/yr)

$\sum_{b,p}$ = Sum over all relevant baseline b/project p pairs

$N_{b,py}$ = Number of project technology-days included in the project database for each project scenario in year y. The start date is the day a plant start producing biogas. A default of 2 weeks may be use for the period from installation date and start date.

$U_{p,y}$ = Usage rate for technologies in project scenario p in year y (fraction)

$SE_{b,y,CO2}$ = Specific CO_2 emissions for a baseline b technology in year y (tCO_2/technology*day)

$SE_{b,y,non-CO2}$ = Specific non-CO_2 emissions for a baseline b technology in year y (tCO_2e/technology*day)

$f_{NRB,i,y}$ = Fraction of biomass used in year y for baseline scenario b that can be established as non-renewable biomass (fraction).

Determining specific emission CO_2

CO_2 emissions are determined using the following formula, for each baseline scenario b /project scenario p pair separately:

$$SE_{b,y,Co2} = \sum_{i} P_{b,i,y} \times NCV_{b,i,fuel} \times EF_{b,i,CO2} \quad (10)$$

Where:

$SE_{b,y,CO2}$ = Specific CO_2 emissions for a baseline b technology in year y (tCO_2/technology/day)

i = Index for the type of baseline/fossil fuel consumed

$P_{b,i,y}$ = Average yearly consumption of baseline fuel *i* per household before the start of the project activity or at the renewal of each crediting period

$NCV_{b,i,}$ = Net calorific value of the fuel(s) *i* that is substituted in baseline b (TJ/tonne)

$EF_{b,i,CO2}$ = CO emission factor arising from use of fuels *i* in baseline scenario (tCO_2/TJ)

Determining $P_{b,i,y}$:

A baseline survey covering the target household population was conducted in April-August 2023. The results indicate that the dominant types of fuel used in the baseline scenario are: LPG (69% of households) and biomass (31% of households).[69] This indicates that the fuel type used is same as that in the BFT which was executed during December 2023 – April 2024. Therefore, for determining $P_{b,i,y}$, the results from the BFT testing were used. In the BFT, 53 samples of non-biogas households residing close to the biogas household participants were also chosen for becoming comparison sample used for the baseline KPT.[70] Care was taken that these households were similar in nature (household size, number of cattle, similar socio-economic conditions) as their neighbors with the biodigester.

Oversampling was conducted to minimise the necessity to redo the KPT in cases of wrongly filled out questionnaires or unreliable results. Outliers were excluded using the Grubb's test. A significance of 0.01, two-sided has been applied. [71] All data has been deemed consistent and passes the Grubb's test assessment.

Determining $P_{b1,fuel,y}$

[69] Baseline_QNaire_2023_ver_4|Sheet "fuel cons"| Cells M5 and M7
[70] 20240705 KPT December 2023_YRE1 | Sheet "90-30 test" | Cell B58
[71] For more on the Grubbs' test, please refer to http://www.itl.nist.gov/div898/handbook/eda/section3/eda35h1.htm For a cross-check of the significance of the results, please refer to an online tool available on: http://www.graphpad.com/quickcalcs/Grubbs1.cfm

In the BFT, for 90.6% of households, LPG is their primary fuel source for cooking purposes. These households used on average 286.56 kg of LPG per year equivalent to 23.88 kg per month.[72]

Determining $P_{b1,bio,y}$

In the BFT, the second dominant fuel used for cooking purposes in the baseline is wood as 30.19% of households in the BFT used wood. On average, each household uses 448.85 kg per year which is equivalent to 37.40 kg per month.[73]

Determining $P_{b1,kero,y}$

In the BFT, the third dominant fuel used for cooking purposes in the baseline is kerosene, as 3.77% of households in the BFT used kerosene. On Average, each household uses 27.99 kg per year which is equivalent to 2.33 kg per month.[74]

Determining f_{NRB}

TOOL33 lists a default value of 9% as the national value for Indonesia. [75]

Determining NCV and EF

Reference is made to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories for the default EF and NCV values for wood and LPG. The values are listed in Section B.6.3.

Calculating $\mathbf{SE_{b,y,Co2}}$

The above formula is applied to calculate $\mathbf{SE_{b,y,Co2}}$ for LPG (fuel) and firewood (bio) and as follows:

(a) LPG[76] per household per day:

[72] 20240705 KPT December 2023_YRE1 | Sheet ”90-30 test” | Cell L65
[73] 20240705 KPT December 2023_YRE1 | Sheet ”90-30 test” | Cell F61
[74] 20240705 KPT December 2023_YRE1 | Sheet ”90-30 test” | Cell I61
[75] UNFCCC (2025) Default values for common parameters. Table 3. Default values for frction of fRNB at national level. Retrieved from: https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-33-v3.pdf
[76] VPA 1 ER calculation CP renewal_fNRB changed.xlsx, Tab EX-ante 2025, Cell E30

$SE_{b,y,Co2} = 0.00079 \times 0.0473 \times 63.1 =$ 0.002358

(b) Wood[77] per household per day:

$SE_{b,y,Co2} = 0.0012 \times 0.0156 \times 112 =$ 0.0021

(c) Kerosene[78] per household per day:

$SE_{b,y,Co2} = 0.000077 \times 0.0438 \times 71.9 =$ 0.000242

Calculating baseline emissions from Thermal application:

The below formula is applied to calculate baseline emissions from LPG and from biomass:

$$BE_{TA,y} = \sum_{b,p} \left(N_{b,py} \times U_{p,y} \times \left(f_{NRB,i,y} \times SE_{b,y,CO2} + SE_{b,y,non-CO2}\right)\right) \quad (12)$$

a) Baseline emissions from LPG[79] in tons per household per year:

$BE_{b,fuel1,y}$ = 365x 0.899 x 0.00236 = 0.7737

b) Baseline emissions from biomass[80] in tons per household per year

$BE_{b,bio,y}$ = 365x 0.899 x 0.09 x 0.0021 = 0.0619

c) Baseline emissions from kerosene[81] in tons per household per year

$BE_{b,kero,y}$ = 365 x 0.899 x 0.000242 = 0.0796

[77] VPA 1 ER calculation CP renewal_fNRB changed.xlsx, Tab EX-ante 2025, Cell E43
[78] VPA 1 ER calculation CP renewal_fNRB changed.xlsx, Tab EX-ante 2025, Cell E36
[79] VPA 1 ER calculation CP renewal_fNRB changed.xlsx, Tab EX-ante 2025, Cell E31
[80] VPA 1 ER calculation CP renewal_fNRB changed.xlsx, Tab EX-ante 2025, Cell E44
[81] VPA 1 ER calculation CP renewal_fNRB changed.xlsx, Tab EX-ante 2025, Cell E37

Total baseline emissions from thermal application is:

$BE_{TA,y}$ = 0.7737 + 0.0619 + 0.0796 = **0.9152** tons per household per year

Calculating total baseline emissions:

Total Baseline Emissions = $BE_{AWMS,y} + BE_{TA,y}$ = 3.380 + 0.9152 = **4.295** tons per household per year

Accounting for project emissions from AWMS following method 1 or IPCC Tier 1 approach:

The project emissions involve emissions from the biodigester, which include:

a. Physical leakage biogas
b. Emissions from the use of fossil fuels or electricity for the operation

$$PE_{AWMS,y} = PE_{PL,y} + PE_{power,y} \quad (13)$$

Where:

$PE_{AWMS,y}$ = Project emissions in year y (t CO_2e)

$PE_{PL,y}$ = Emissions due to physical leakage of biogas in year y (t CO_2e)

$PE_{power,y}$ = Emissions from the use of fossil fuel or electricity for the operation of the installed facilities in the year y (t CO_2e)

The physical leakage from biodigesters is calculated as 10% of the maximum methane producing potential of the manure fed into the management systems implemented by the project activity, as per the following equation:

$$PE_{PL,y} = 0.10 \times N_{b,p,y} \div 365 \times U_{p,y} \times GWP_{CH4} \times D_{CH4} \times \sum_k \sum_{i,LT} B_{O,LT} \times N_{LT,y} \times VS_{LT,y} \times MS\%_{i,y} \quad (14)$$

Where:

$PE_{PL,y}$ = Project emissions from physical leakage in year y (t CO_2e)

$N_{b,p,y}$ = 365[82]

$U_{p,y}$ = 0.899[83]

GWP_{CH4} = 28

D_{CH4} = 0.00067 tonnes per m^3

$B_{O,LT}$ = 0.13[84]

$MS\%_{i,y}$ = 1

$N_{LT,y}$ =4.62[85]

$VS_{LT,y}$ =1,282.1[86]

$$PE_{PL,y} = 0.10 \times 365 \div 365 \times 0.899 \times 28 \times 0.00067 \times 0.132 \times 4.62 \times 1282.10 \times 1 = \mathbf{1.30}$$

tons per household per year[87]

$PE_{power,y}$ = 0 as there is no electricity used to operate the biodigesters

Hence:

$\boldsymbol{PE_{AWMS,y}}$ = 1.30 + 0 = **1.30**

Accounting for project emissions from thermal application following method 1 or IPCC Tier 1 approach

The Project emission from thermal application in year y is calculated as follows:

$$PE_{TA,y} = \sum_{b,p} \left(N_{b,py} \times U_{p,y} \times \left(f_{NRB,i,y} \times SE_{p,y,CO2} + SE_{p,y,non-CO2}\right)\right) \quad (15)$$

Where:

[82] VPA 1 ER calculation CP renewal_fNRB changed.xlsx, Tab EX-ante 2025, Cell E19
[83] Drop_off_BUS2023_rev | sheet Drop-off_2023 | Cell I30
[84] IPCC default: Table 10.16 of chapter 'Emissions from Livestock and Manure Management' under the volume 'Agriculture, Forestry and other Land use' of the 2019 IPCC Guidelines for National Greenhouse Gas Inventories
[85] BUS_2023_Tabulation_15072024 | sheet Tabulasi | cell AF3860
[86] VPA 1 ER calculation CP renewal_fNRB changed.xlsx, Tab EX-ante 2025, Cell E19
[87] VPA 1 ER calculation CP renewal_fNRB changed.xlsx, Tab EX-ante 2025, Cell E64

$PE_{TA,y}$ = Project emissions for total project activity in year y (tCO_2e/yr)

$\sum_{b,p}$ = Sum over all relevant baseline b/project p pairs

$N_{b,py}$ = Number of project technology-days included in the project database for each project scenario in year y. The start date is the day a plant start producing biogas. A default of 2 weeks may be use for the period from installation date and start date.

$U_{p,y}$ = Usage rate for technologies in project scenario p in year y (fraction)

$SE_{p,y,CO2}$ = Specific CO_2 emissions for a project b technology in year y (tCO_2/technology*day)

$f_{NRB,i,y}$ = Fraction of biomass used in year y for project scenario b that can be established as non-renewable biomass (fraction).

As the two dominent fuel sources used in the project are LPG and fuelwood, the emissions from these sources are calculated as follows.

Calculating PE from LPG:

$$PE_{fuel\,1\,,y} = \sum_{b,p} \left(N_{b,py} \times U_{p,y} \times \left(SE_{fuel1,y,CO2}\right)\right) \quad (18)$$

Step 1: Calculating $SE_{p,y,CO2}$ of LPG

$SE_{fuel1,y,CO2}$ = Specific CO_2 emissions for a project per household per day

$NCV_{p1,,fuel}$ = 0.0473 (IPCC Default)[88]

$P_{p1,,y}$ = Average daily consumption of LPG per household (tonnes/household/day) = 0.00039[89]

$EF_{p1,CO2}$ = 63.1 (IPCC Default)

[88] Table 1.2. at https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf
[89] 20240705 KPT December 2023_YRE1 |Sheet" 90-30 test" | Cell AC100

Hence:

$$SE_{fuel1,y,CO2} = 0.0473 \text{ x } 0.00039 \text{ x } 63.1 = \mathbf{0.00116}$$

Step 2: Calculating project emissions from LPG

$PE_{fuel\,1\,,y}$ = Tons per household per year

$N_{b,py}$ = 365

$U_{p,y}$ = 0.899[90]

$PE_{fuel\,1\,,y}$ = 365 x 0.899 x 0.00116 = **0.382**

Calculating PE from Kerosene:

$$PE_{bio,y} = \sum_{b,p} \left(N_{b,py} \times U_{p,y} \times \left(f_{NRB,i,y} \times SE_{p,y,CO2}\right)\right) \quad (18)$$

Step 1: Calculating $SE_{p,y,CO2}$ of Kerosene

$SE_{fuel2,y,CO2}$ = Specific CO_2 emissions for a project per household per day

$NCV_{p,,fuel2}$ = 0.0438 (IPCC Default)[91]

$P_{p,fuel2,y}$ = Average daily consumption of Kerosene per household (tonnes/household/day) =0.000019[92]

$EF_{p,fuel2,CO2}$ = 71,9 (IPCC Default)

Hence:

$$SE_{fuel2,y,CO2} = 0.0438 \text{ x } 0.000019 \text{ x } 71.9 = 0.000059$$

Step 2: Calculating project emissions from Kerosene

[90] See 20230308 BUS_2022_Tabulation , Tab "Drop-off", Cell I30
[91] Table 1.2. at https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf
[92] 20240705 KPT December 2023_YRE1 |Sheet" 90-30 test" | Cell Z100

$PE_{fuel\,1,y}$ = Tons per household per year

$N_{b,py}$ = 365

$U_{p,y}$ = 0.899[93]

$PE_{fuel\,1,y}$ = 365 x 0.899 x 0.000059 = 0.019

Calculating PE from woodfuel:

$$PE_{bio,y} = \sum_{b,p} \left(N_{b,py} \times U_{p,y} \times \left(f_{NRB,i,y} \times SE_{p,y,CO2}\right)\right) \quad (18)$$

Step 1: Calculating $SE_{p,y,CO2}$ of woodfuel:

$SE_{p,bio,y,CO2}$ = Specific CO_2 emissions for a project per household per day

$NCV_{p,bio}$ = 0.0156 (IPCC Default)[94]

$P_{p,bio,y}$ = Average daily consumption of woodfuel per household (tonnes/household/day) = 0.00069[95]

$EF_{p,bio,CO2}$ = 112 (IPCC Default)

$SE_{bio,y,CO2}$ = 0.0156 x 0.00069 x 112 = **0.0012**

Step 2: Calculating project emissions from woodfuel

$PE_{bio,y}$ = Tons per household per year

$N_{b,py}$ = 365

$U_{p,y}$ = 0.899[96]

[93] See 20230308 BUS_2022_Tabulation Sheet "Drop-off"
[94] Table 1.2. at https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf
[95] 20240705 KPT December 2023_YRE1 |Sheet" 90-30 test" | Cell W100
[96] See 20230308 BUS_2022_Tabulation , Tab "Drop-off", Cell I30

$f_{NRB,bio,y}$ = 9%[97]

$PE_{bio\ ,y}$ = 365 x 0.899 x 0.0012 x 0.09 = **0.036**

The Project emission from thermal application (tons per household per year) is:

$PE_{TA,y}$ = $PE_{fuel\ 1\ ,y} + PE_{fuel\ 2\ ,y} + PE_{bio\ ,y}$

Hence:

$PE_{TA,y}$ = 0.382 + 0.019 + 0.036 = **0.437**

Calculating total project emissions:

Total project Emissions (tons per household per year)
= $PE_{TA,y} + PE_{AWMS,y}$ = 0.437 + 1.30**= 1.735**

Accounting for leakage emissions from thermal application in project following method 1 or IPCC Tier 1 approach

The methodology provides two options to account for leakage emissions from thermal application in the project scenario.

Option 1 - Apply a default adjustment factor of 0.95 to the emission reductions to approximate leakage emissions for thermal application. This equals to deducting 5% (as leakage emissions) from emission reductions from thermal application.

Option 2 - The project developer must evaluate the following potential sources of leakage and provide an evidence-based description and preliminary quantification of each potential source and its relevance for the project.

[97] UNFCCC (2025) Default values for common parameters. Table 3. Default values for frction of fRNB at national level. Retrieved from: https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-33-v3.pdf

For the ex-ante calculations, a 5% leakage emission from thermal application is applied to the project emissions from thermal application.

$$LE_{p,y} = PE_{TA,y} \times 0.05$$

$LE_{p,y}$ = Leakage emission from project in year y

$PE_{TA,y}$ = Project emission from thermal application

Hence:

$LE_{p,y} = PE_{TA,y} \times 0.05$ = 0.437 × 0.05 = **0.0218**

Emission reductions from VPA-1

The emission reductions for each of the two components (AWMS and thermal energy) are calculated separately as follows:

$$ER_y = BE_y - PE_y - LE_y$$

Where:

ER_y = Emission reductions in year y (t CO_2e/yr)

BE_y = Baseline emissions in year y (t CO_2e/yr)

PE_y = Project emissions in year y (t CO_2e/yr)

LE_y = Leakage emissions in year y (t CO_2e/yr)

Hence, the total emission reduction from project activity is:

ER_y = **4.295** − 1.735 **-** 0.0218 = **2.538** tons per household

B.6.4. Summary of ex ante estimates of each SDG outcome

SDG 1 (no poverty) outcome[98]

An average household saves ±3 million Indonesian Rupiah per year from reduced fuel usage (LPG + wood). Below is a summary of ex-ante estimates of total household costs and savings (in billions of Indonesian Rupiah) by all biodigester users in VPA 1:

YEAR	BASELINE ESTIMATE	PROJECT ESTIMATE	NET BENEFIT
1	125.4	65.3	60.1
2	125.4	65.3	60.1
3	125.4	65.3	60.1
4	125.4	65.3	60.1
5	125.4	65.3	60.1
6	125.4	65.3	60.1
7	125.4	65.3	60.1
TOTAL	**877.7**	**457.1**	**420.6**
Total number of crediting years	**7**	**7**	**7**
Annual average over the crediting period	**125.4**	**65.3**	**60.1**

SDG 2 (Zero Hunger) outcome[99]

Below is a summary of ex-ante estimates of food production area (hectares) applied with bioslurry by all biodigester users in VPA 1:

YEAR	BASELINE ESTIMATE	PROJECT ESTIMATE	NET BENEFIT
1	0	7,326.95	7,326.95

[98] 20250226 SDG outcomes- Sheet "SDG 1"|Rows 20-29
[99] GS-13 calculation 2023_ver1 |Sheet "Analysis"| Rows 33-43

2	0	7,326.95	7,326.95
3	0	7,326.95	7,326.95
4	0	7,326.95	7,326.95
5	0	7,326.95	7,326.95
6	0	7,326.95	7,326.95
7	0	7,326.95	7,326.95
TOTAL	**0**	51288.7	51288.7
Total number of crediting years	**7**	**7**	**7**
Annual average over the crediting period	**0**	**7,326.95**	**7,326.95**

SDG 5 (gender equality) outcome[100]

Below is a summary of ex-ante estimates of annual time (hours per year) spent for collecting wood in the baseline, time spent by biodigester users for collecting wood plus operating digester and net benefit (time saved) by biodigester users.

YEAR	BASELINE ESTIMATE	PROJECT ESTIMATE	NET BENEFIT
1	8,870,376	2,365,434	6,504,942
2	8,870,376	2,365,434	6,504,942
3	8,870,376	2,365,434	6,504,942
4	8,870,376	2,365,434	6,504,942
5	8,870,376	2,365,434	6,504,942
6	8,870,376	2,365,434	6,504,942
7	8,870,376	2,365,434	6,504,942

[100] See 20250226 SDG outcomes |sheet SDG 5|Rows 20-28

TOTAL	62,092,632	16,558,035	45,534,597
Total number of crediting years	**7**	**7**	**7**
Annual average over the crediting period	**8,870,376**	**2,365,434**	**6,504,942**

SDG 5 (gender equality) outcome[101]

Below is a summary of ex-ante estimates of number of women in management position.

YEAR	BASELINE ESTIMATE	PROJECT ESTIMATE	NET BENEFIT
1	0	2	2
2	0	2	2
3	0	2	2
4	0	2	2
5	0	2	2
6	0	2	2
7	9	2	2
TOTAL	0	14	14
Total number of crediting years	**7**	**7**	**7**
Annual average over the crediting period	**8,870,376**	**2,365,434**	**6,504,942**

[101] See 430_V1.1_IQ_SDG-Impact-tool|sheet Impact Assessment|Columns AE-AG

SDG 7 (clean energy)[102]

Below is a summary of ex-ante estimates of annual average energy (giga joule) available from all biodigesters installed under the VPA 1:

YEAR	BASELINE ESTIMATE	PROJECT ESTIMATE	NET BENEFIT
1	0	139.7	139.7
2	0	139.7	139.7
3	0	139.7	139.7
4	0	139.7	139.7
5	0	139.7	139.7
6	0	139.7	139.7
7	0	139.7	139.7
TOTAL	**0**	**978**	**978**
Total number of crediting years	**7**	**7**	**7**
Annual average over the crediting period	**0**	**139.7**	**139.7**

SDG 7 (clean energy)[103]

Below is a summary of ex-ante estimates of annual number of beneficiary households with access to clean energy from all biodigesters installed under the VPA 1:

YEAR	BASELINE ESTIMATE	PROJECT ESTIMATE	NET BENEFIT
1	0	20252	20252
2	0	20252	20252
3	0	20252	20252

[102] 20230910 SDG outcomes | Sheet "SDG 7"
[103] See 430_V1.1_IQ_SDG-Impact-tool|sheet Impact Assessment|Columns K-M

4	0	20252	20252
5	0	20252	20252
6	0	20252	20252
7	0	20252	20252
TOTAL	**0**	**141764**	**141764**
Total number of crediting years	**7**	**7**	**7**
Annual average over the crediting period	**0**	**20252**	**20252**

SDG 8 (Decent work and economic growth)

Below is a summary of ex-ante estimates of total annual number of jobs under VPA-1[104]:

YEAR	BASELINE ESTIMATE	PROJECT ESTIMATE	NET BENEFIT
1	0	6	6
2	0	6	6
3	0	6	6
4	0	6	6
5	0	6	6
6	0	6	6
7	0	6	6
TOTAL	0	42	42
Total number of crediting years	**0**	**7**	**7**

[104] 20231006 - IDBP Employee List | Tab Employee Records | Cell G17

Annual average over the crediting period	**0**	**6**	**6**

SDG 13 (climate action)

Below is a summary of ex-ante estimates of total annual average emission and emission reductions (CO_2 tons) under VPA-1:[105]

YEAR	BASELINE ESTIMATE	PROJECT ESTIMATE	NET BENEFIT
1	86,981	35,589	51,393
2	86,981	35,589	51,393
3	86,981	35,589	51,393
4	86,981	35,589	51,393
5	86,981	35,589	51,393
6	86,981	35,589	51,393
7	86,981	35,589	51,393
TOTAL	608,869	249,120	359,749
Total number of crediting years	**7**	**7**	**7**
Annual average over the crediting period	**86,981**	**35,589**	**51,393**

B.7. Monitoring plan

B.7.1. Data and parameters to be monitored

SDG 13

[105] VPA 1 ER calculation CP renewal_fNRB changed.xlsx | Sheet "EX-ante 2025" | Cells H119:K129

Data / Parameter	Avoidance of double counting or double claiming among project technology end users
Unit	N/A
Description	Evidence of avoidance of double counting or double claiming with project technology end users
Source of data	IDBP database,Tab MASTER VPA1, Column A
Value(s) applied	-
Measurement methods and procedures	Double counting is avoided through recording the unique serial number of each biodigester in a centralised database system operated by the CME. Participating users will confirm that they are not taking part in other registered PoAs through signing of a Household Agreement for each biodigester
Monitoring frequency	Monitored whenever project technology is sold or otherwise disseminated
QA/QC procedures	Cross check using general internet search and search of public records of Gold Standard and other voluntary market and UNFCCC mechanisms
Purpose of data	To avoid double counting or double claiming
Additional comment	

Data / Parameter	$U_{p,y}$
Unit	Percentage
Description	Average usage rate in project scenario p during year y
Source of data	Collected through the annual Biogas User Survey: See Drop_off_BUS2023_rev Tab " Drop-off_2023", Cell I30
Value(s) applied	0.899
Measurement methods and procedures	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

Monitoring frequency	Annual
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)
Purpose of data	Emission reduction calculation
Additional comment	

Data / Parameter	$N_{LT,y}$
Unit	numbers
Description	Annual average number of animals of type *LT* in year *y*
Source of data	Collected through the annual Biogas User Survey (ER spreadsheet " VPA 1 ER calculation CP renewal_fNRB changed.xlsx", tab "EX-ante 2025", cellE11, through "Baseline_QNaire_2023_ver_4 | sheet Data"| Cells AZ135 and BO128 ")
Value(s) applied	3.61
Measurement methods and procedures	A baseline survey covering the target household population was conducted in April 2023. Calculated based on $N_{LT,y}$ and $n_{d,y}$
Monitoring frequency	Annual
QA/QC procedures	-
Purpose of data	Calculation of baseline emissions
Additional comment	-

Data / Parameter	nd_y
Unit	Days
Description	Number of days the treatment plant was operational in year *y*.
Source of data	IDBP database

Value(s) applied	365
Measurement methods and procedures	The actual cumulative number of biodigester non-operational days will be confirmed upon verification. The equation to calculate this is (nd_y = 365 – non-operational days)
Monitoring frequency	Annual
QA/QC procedures	As per procedures of the IDBP database
Purpose of data	Emission reduction calculation
Additional comment	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.

Data / Parameter	$N_{da,y}$
Unit	numbers
Description	Number of days the animal is alive in the farm in the year *y*
Source of data	Baseline survey. Baseline_QNaire_2023_ver_4, Tab Data, Cell BO128
Value(s) applied	298.37
Measurement methods and procedures	A baseline survey covering the target household population was conducted in April 2023. A total of 125 end users without project technologies representative of the end users targeted in the VPA were surveyed nationwide. Respondents were asked to clarify how many days their animals were alive in the preceding year. The households reported their dairy cows were alive on average 298.37 days in the preceding 365 days and their pigs were alive 333 days on average in the preceding 365 days.
Monitoring frequency	Annual, ex-post value to be derived from the Biogas User Survey

QA/QC procedures	-
Purpose of data	Calculation of baseline emissions
Additional comment	

Data / Parameter	$N_{p,y}$
Unit	Numbers
Description	Annual average number of animals of type *LT* for the year *y*
Source of data	Baseline survey, 2023. See: "Baseline_QNaire_2023_ver_4|Sheet 'Data'|Cell AZ135
Value(s) applied	Dairy cows = 4.408
Measurement methods and procedures	A baseline survey covering the target household population was conducted in April 2023. A total of 125 end users without project technologies representative of the end users targeted in the VPA were surveyed nationwide. Respondents were asked to clarify what types and how many animals they are keeping. In total, 89.6% of the households reported to keep dairy cows (average of 4.9 heads). This means that total average of animals kept per household averages ((0.896*4.9) = 4.408.
Monitoring frequency	Annual
QA/QC procedures	-
Purpose of data	Emission reduction calculation
Additional comment	-

Data / Parameter	TAM_{LT}
Unit	kg/animal
Description	Typical animal mass for livestock LT
Source of data	Table 10A.5 (title: default values for live weights for animal categories), page 117 of Chapter 10 of chapter 'Emissions from Livestock and Manure Management' under the volume 'Agriculture, Forestry and other Land

	use' of the 2019 IPCC Guidelines for National Greenhouse Gas Inventories.[106]
Value(s) applied	386 kg per dairy cow for Asian continent
Measurement methods and procedures	Fixed parameter
Monitoring frequency	Annual
QA/QC procedures	-
Purpose of data	ER calculations
Additional comment	-

Data / Parameter	$MS\%_{i,y}$
Unit	%
Description	Fraction of manure handled in project animal manure management system i
Source of data	Annual Biogas Users Survey that will collect data from users on the amount of manure fed into biodigester.
Value(s) applied	1
Measurement methods and procedures	Biogas users will be asked about the fraction of manure fed into the biodigesters. If animal manure is treated in different treatment systems manure weight delivered to each system shall be directly measured or alternatively manure volume can be measured together with the density determined from representative sample (90/10 precision). The quantity of animal manure from different farms and different animal types shall be recorded separately for cross-check. Recording of the baseline animal manure management system where the animal manure would have been treated anaerobically is also required.
Monitoring frequency	Annual

[106] See https://www.ipcc-nggip.iges.or.jp/public/2019rf/pdf/4_Volume4/19R_V4_Ch10_Livestock.pdf

QA/QC procedures	-
Purpose of data	Calculating emission reduction
Additional comment	Applicable to method 2

Parameters related to Thermal energy application

Data / Parameter	$N_{b,p,y}$
Unit	Number of days
Description	Number of project technology-days included in the project database for each project scenario in year y
Source of data	IDBP Database. Calculated from the Project database (see section 4.1.3 | Project database) as the sum of the number of installed project technology units times the calendar days during the year y that they were used at the end user locations.
Value(s) applied	365
Measurement methods and procedures	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)
Monitoring frequency	Continuous
QA/QC procedures	As per procedures of the IDBP database. Results will be cross-checked with the contents of the project database to confirm whether the project technology units surveyed are present at end user locations as expected, or not.
Purpose of data	Emission reduction calculation
Additional comment	-

Data / Parameter	$LE_{p,y}$
Unit	tCO_2e per year
Description	Leakage in project scenario p during year y

Source of data	Methodology default (section 3.7)
Value(s) applied	Apply a default adjustment factor of 0.95 to the emission reductions to approximate leakage emissions for thermal application.
Measurement methods and procedures	Methodology default
Monitoring frequency	Every two years, or default discount value of 0.95 applied to emission reductions
QA/QC procedures	Compliance with the general requirements for sampling (Section 4.4) and general requirements for QA/QC (Section 4.5)
Purpose of data	Calculation of leakage emissions
Additional comment	

Data / Parameter	$fNRB_{,i,y}$
Unit	Percentage
Description	Fractional non-renewability status of woody biomass fuel during year *y*, in case the baseline fuel is biomass or charcoal.
Source of data	Retrieved from CDM TOOL33 Table 3[107]
Value(s) applied	9
Measurement methods and procedures	CDM TOOL33
Monitoring frequency	Determined ex-ante and fixed for a given crediting period. See "data and parameters fixed ex ante" section of the PDD).
QA/QC procedures	CDM TOOl 33
Purpose of data	Emission reduction calculation

[107] UNFCCC (2025) Default values for common parameters. Table 3. Default values for frction of fRNB at national level. Retrieved from: https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-33-v3.pdf

Additional comment	-

Data / Parameter	$P_{p,i,y}$
Unit	tonnes/household/year
Description	Quantity of fuel that is consumed in project scenario p during year y.
Source of data	20240705 KPT December 2023_YRE1 | Sheet "90-30 test" Cells W99, Z99 and AC99 applied according to the "Project performance field tests as per the methodology". See section 4.1 of the methodology.
Value(s) applied	Biomass: 0.252 Kerosene: 0.068 LPG: 0.143
Measurement methods and procedures	-
Monitoring frequency	Updated every two years, or more frequently. The KPT values are valid for two years and may be applied for before or after period.
QA/QC procedures	Compliance with the general requirements for sampling (Section 4.4 |), general requirements for QA/QC (Section 4.5 |) and Annex 2: COMPLEMENTARY GUIDELINES FOR KITCHEN PERFORMANCE TESTING
Purpose of data	ER calculations
Additional comment	Applicable for Thermal application method 1

SDG 1 – No poverty: GSDM-I1.1.1

Data / Parameter	$T_{s,y}$
Unit	Indonesian Rupiah
Description	Total costs savings from reduced fuel consumption and biodigester use
Source of data	Collected through the annual Biogas User Survey, KPT and calculated: "20250226 SDG outcomes", tab SDG 1, cell D16
Value(s) applied	2,966,733.17
Measurement methods and procedures	Calculated
Monitoring frequency	Annual

QA/QC procedures	This will be monitored through sampling to satisfy the requirements put forth by the methodology
Purpose of data	To calculate financial savings
Additional comment	

Data / Parameter	$C_{m,p,y}$
Unit	Indonesian Rupiah
Description	Total cost of maintenance of biodigesters in year
Source of data	Collected through the annual Biogas User Survey: "BUS_2023_Tabulation_15072024", tab Tabulasi, cell Z2064
Value(s) applied	118,688.08
Measurement methods and procedures	Conduct a survey to collect data on household expenditure among a representative group of households participating in the project
Monitoring frequency	Annual
QA/QC procedures	This will be monitored through sampling to satisfy the requirements put forth by the methodology
Purpose of data	To calculate financial savings
Additional comment	

SDG 2 – Zero hunger: GSDM-I2.4.7

Data / Parameter	$TL_{bio,y}$
Unit	ha
Description	Total land area in hectares applied with bioslurry
Source of data	Collected through the annual Biogas User Survey.
Value(s) applied	7,326.95
Measurement methods and procedures	Calculated. See GS-13 calculation 2023_ver1. Sheet 'Analysis', Cell I42
Monitoring frequency	Annual
QA/QC procedures	This will be monitored through sampling to satisfy the requirements put forth by the methodology
Purpose of data	To calculate soil quality improvement
Additional comment	

SDG 5 – Gender equality: GSDMI5.4.1

Data / Parameter	Number of women serving in managerial/ leadership /ownership role

Unit	Number
Description	Refers to number of female management employees (managers) (full - time) at the organization as of the end of the reporting period
Source of data	IDBP. See IDBP Employee List, sheet Employee Records, cell G13
Value(s) applied	2
Measurement methods and procedures	Head count of female employees by the IDBP
Monitoring frequency	Annual
QA/QC procedures	This will be monitored through sampling to satisfy the requirements put forth by the methodology
Purpose of data	To calculate women empowerment and gender equality
Additional comment	

Data / Parameter	$T_{p,y}$
Unit	hrs/year per household
Description	Time saved on collecting fuel and cooking and cleaning per household per day in project (hours)
Source of data	Collected through the annual Biogas User Survey and calculated in: 20250226 SDG outcomes, Sheet 'SDG5', Cell B11
Value(s) applied	0.88
Measurement methods and procedures	Sample surveys in representative households
Monitoring frequency	Annual
QA/QC procedures	This will be monitored through sampling to satisfy the requirements put forth by the methodology
Purpose of data	To calculate women empowerment and gender equality
Additional comment	

SDG 7 - Affordable and clean energy: GSDM-I7.1.1

Data / Parameter	Number of households benefitting from the project in year y
Unit	Number of households

Description	Refers to number of unique households that were provided access to clean fuels and technologies for domestic cooking, heating and lighting they were unable to access prior to project activity. For example, total number of households project provided access to Safe water, biogas digesters, solar home systems, etc.
Source of data	Project database and SDG Outcomes excel file | Sheet 'SDG 7' Cell C3
Value(s) applied	20,252
Measurement methods and procedures	The cumulative number of households benefiting from access to affordable and clean energy equal to number of households provided with a biodigester which is collected and stored in the project database.
Monitoring frequency	Annual
QA/QC procedures	This will be monitored through sampling to satisfy the requirements put forth by the methodology
Purpose of data	To calculate increased household access to energy
Additional comment	

SDG 8 – Decent work and economic growth: GSDM-I8.3.1

Data / Parameter	Number of jobs
Unit	Number of jobs
Description	Refers to the number of contractual jobs the project under VPA1 provides to technicians for maintenance of biodigesters during a monitoring period.
Source of data	Project database: "2024_IDBP_Database_VPA1", tab "PLANT MAINTENANCE", cell I43056
Value(s) applied	11
Measurement methods and procedures	The IDBP database will provide number of technicians hired to conduct maintenance work during a monitoring period.
Monitoring frequency	Annual
QA/QC procedures	This will be monitored through sampling to satisfy the requirements put forth by the methodology
Purpose of data	To calculate improved access to finance
Additional comment	

B.7.2. Sampling plan

All monitoring is coordinated by YRE, the implementer of VPA-1. The sampling plan of this VPA is in line with EB65 annex 2 Appendix 3 as outlined below.

Sampling Design

Objectives and reliability requirements

The objective of the sampling effort is to meet the monitoring requirements set forth in the 'Methodology For Animal Waste Management And Biogas Application v.1' (19/10/2022) as detailed in section D.7.1 above. In accordance with the requirements set forth in the methodology, the sample size will be selected following a 90% confidence interval and a 10% margin of error (90/10), where applicable. Multi-stage sampling[108] will be applied, where clusters consisted of geographical areas and subunits. It is considered more cost-effective to treat several respondents within a local area as a cluster. In order to account that not all the geographical clusters are the same size, sampling will be employed proportionate to cluster size. Clusters will be selected with a probability proportionate to the size of the target population within each cluster such that larger clusters have a greater probability of selection, and smaller clusters a lower probability. This helps to ensure that sampling remains representative of the entire population. Sampling shall be done per user group (i.e. households, SMEs, communities) and shall differentiate between small-scale digesters (defined as capacity up to 12m3) and medium-scale digesters (defined as capacities larger than $12m^3$).

As the PoA progresses and the number of VPAs increases, this VPA may also fall under a single monitoring plan that can be applied as outlined in Section of E.7.2 of the PoA-DD, covering several VPAs, adopting a confidence/precision level of 95/10 according

[108] As defined by the General Guidelines for Sampling and Surveys for Small-Scale CDM project activities, EB 50 Annex 30

paragraph 20 of the "Standard for sampling and surveys for CDM project activities and programme of activities" (Version 9.0). This option can be applied to a group of similar VPAs.

Target population and sampling frame

The monitoring survey is only conducted with end users representative of the project scenario using the biodigester at the time of the survey. There are three distinct target populations for the application of monitoring procedure (households, local communities, and SMEs with installed biodigesters), as identified through the centralised record-keeping database managed by the CME.

Sampling method and sample size

The CME is responsible for the production of periodical monitoring reports for the VPA-1, following the criteria outlined in below. The minimum total sample size is 100, with at least 30 samples for project technologies of each age being credited.[109] Sampling shall be performed separately per target population (households, communities, SMEs). A usage parameter must be established to account for the drop off rates as project technologies age and are replaced. This parameter shall be representative of the quantity of project technologies of each age being credited in the project scenario.

Implementation

All sampling efforts will be conducted by qualified personnel who have undergone training as part of the VPA. This training will cover information on the project background and basic functioning of the biogas systems, as well as the data collection process, including the format in which data should be collected. The personnel will be issued with a certificate confirming their attendance at relevant trainings and their qualification to complete the monitoring. A paper copy of the certificate will also be kept by the CME. Surveyor staff will be required to speak the native language (Bahasa Indonesia) in which biogas systems have been implemented, allowing for full understanding of any responses given by users, and any questions therein.

[109] 'Methodology For Animal Waste Management and Biogas Application v.1' (19/10/2022). P. 54

Baseline scenario data collection

Baseline emissions for AWMS was calculated using data from baseline data established *ex-ante* for households through the IDBP Baseline Survey implemented in April 2023. This survey was prepared in accordance with the Gold Standard guidelines with the aim to source critical information on the target population characteristics and the applicable baseline scenario of the VPA. The questionnaire included sections to capture information regarding the socio-economic profile of the respondent, its historical fuel use, and the development of indicators on forest degradation. The survey targeted a sample of households in the target population of the programme which resided in Indonesia and were using biomass and/or fossil fuel for cooking purposes and owned a minimum of two dairy cows or buffalo, ten pigs or 200 chickens. The surveyors were asked to only approach the head of each household who was aware of the household's fuel use habits and manure handling practices.

A total of 125 respondents were surveyed nationwide, exceeding the minimum sample size of 100 required by the applicable Gold Standard methodology to ensure compliance with the 90/10 confidence/precision level. The households were selected using simple random sampling applied cross all nine provinces where VPA-1 is being implemented. To increase the representativeness of the sample population, more populated provinces were surveyed in multiple districts and sub-districts. The final list of target households therefore offers a randomly selected sample group representative for the target population, accounting for population size differences through determining the sampling frequency proportionally to the target cluster size.

Baseline emissions relating to use of biomass and fossil fuel were calculated using data from the Kitchen Performance Test. The KPT was executed in December 2023. A day prior to the KPT, target respondents were visited to answer a set of screening questions[110], and asking their willingness to participate to the survey. In total, 89

[110] Determining their eligibility to take part in the KPT. For instance no changes in the number of family members at the selected households, or no event or any other festive ceremonies scheduled during the test period.

households participated in the PFT testing. Another 53 samples of non-biogas households residing close to the biogas household participants were also chosen for becoming comparison sample used for the baseline KPT. Care was taken that these households were similar in nature (household size, number of cattle, similar socio-economic conditions) as their neighbours with the biodigester.

The KPT was executed across 9 provinces: Bali, West Java, East Java, Central Java, Lampung, West Nusa Tenggara, East Nusa Tenggara, South Sulawesi and Yogyakarta. All surveyed data were checked and processed by PT. RASA, and then reported to head office in Jakarta (NBPSO).

Project scenario data collection
Project emissions relating to continued use of biomass and fossil fuel are confirmed ex-post through the Project Performance Field tests (PFTs) of fuel consumption, as described in Section 4 of the methodology.

All personnel conducting the Project Performance Field tests and annual monitoring of the VPA-1, will receive training on the procedures to be used for data collection, including the format in which data should be collected, project background, basic functioning of the biogas systems, training given to users on the application of slurry to soil and record-keeping system for the quantity of manure fed into the system and any other relevant project background. Response rates will be maximised by contacting all randomly-selected biogas system users beforehand to arrange a practical site visit date and sampling over the minimum required number to compensate for any non-responses. The programme database will have a provision for recording any monitoring carried out in reference to the serial number of the installed system. The CME will explain that monitoring is part of the requirements of the general programme and try to arrange an alternative date for a site visit, or carryout monitoring with another member of the households. In cases where participants refuse to participate in the monitoring, the reason shall be documented in the CME's programme database. For conservativeness, the biodigesters represented by households that do not agree to participate in the monitoring will be excluded from the ER calculation. Their record will be moved to "deleted users" in the IDBP database.

Quality control procedures include training of all surveyors to ensure streamlined data collection procedures, a system for filing all completed paper surveys by the VPA and serial number, and for ensuring that all monitored data is complete. The name, date and contact details of the surveyor will be detailed on all completed monitoring surveys, therefore allowing for the follow-up of all incomplete data.

The KPT was executed in December 2023. A day prior to the KPT, target respondents were visited to answer a set of screening questions[111], and asking their willingness to participate to the survey. In total, 89 households participated in the PFT testing. Another 39 samples of non-biogas households residing close to the biogas household participants were also chosen for becoming comparison sample used for the baseline KPT. Care was taken that these households were similar in nature (household size, number of cattle, similar socio-economic conditions) as their neighbours with the biodigester. Note that a smaller number of households for the BFT applied as the BFT results are only applicable to VPA-2, while the PFT to both VPA-1 and VPA-2.

B.7.3. Other elements of monitoring plan

Coordination of user surveys

All monitoring will be coordinated by PT. BKN. PT. BKN plans to appoint a consultant to conduct the annual Biogas User Survey, which serves as the monitoring survey under the VPA-2. The survey will be designed and implemented by the requirements outlined in the methodology, whereby the selected sample size follows at least a 90% confidence interval and a 10% margin of error (90/10) requirements. Mr. Szymon Mikolajczyk and Mr. Haseeb Bakhtary from Climate Focus will be placed in charge of advising the survey consultant on the VPA specific monitoring procedures. All surveyors as part of the monitoring plan will receive training on survey and data

[111] Determining their eligibility to take part in the KPT. For instance no changes in the number of family members at the selected households, or no event or any other festive ceremonies scheduled during the test period.

collection techniques and will be supervised by the Project Leader during survey implementation.

In addition, PT. BKN will internally design and implement the KPT under the supervision of Ms. Chabi Romzini and supported by carbon consultants. Data collection for the KPT will be conducted by a survey consultant of, employing an experienced team of surveyors.

In terms of data monitoring, IDBP has one dedicated staff to monitor all data into the IDBP Database that is submitted to the National Office.[112] The Programme Assistant of IDBP takes charge in ensuring the data are complete and correct from all CPOs. Recently in 2019 IDBP has improved its data efficiency management by applying Kobo Collect App where all CPOs submit their data through this application, then using 3G connection the app will send the data to the main server in Jakarta. The Programme Assistant regularly checks and verifies all submissions before submitting confirmation to Finance for any payment release. Quality Inspectors in the provinces also have access to Kobo to monitor their CPO's progress.[113]

PT. BKN, based on the hard copies of the Household Agreement, is responsible for entering data into the centralised record-keeping database. It is PT. BKN's responsibility to ensure that data is entered correctly and to follow-up with CPOs where errors or missing data appeared.

Description of human resources

Chabi B. Romzini: Chabi is a Director of PT. BKN. Chabi is in charge of supervise IDBP Program Officer who coordinates with Field Officer as Biodigester quality

112 The national office relates to the head quarter of IDBP located in Jakarta. From this office, all payments to CPOs for the confirmed biodigester constructions (as confirmed by the quality inspectors) are processed. These payments relate to the subsidy payments that CPOs receive for completed works.
113 Quality inspector is permanent staff of IDBP (2 staffs). CPOs send completion reports to the database input. The database people coordinate with the finance department to release the payments to CPOs. Quality inspectors they verify that corrects inputs in database have been made.

instectors on daily basis to provide updates about any occuring issues, implementation progress and working relations with partners.
Danastri W. : Danastri works as IDBP Program Officer in YRE. Danastrii was responsible for the preparation of the Baseline survey that was implemented in April 2023. Danastri also responsible for overseeing all data entry process into the IDBP database. This includes updating implementation figures on a monthly basis, tracking the operational rate of installed biodigesters and tracking CPO and user trainings, among others.

Alfat Naufin : Alfat is the IDBP Programme Assistant in YRE. Alfat is responsible in managing the IDBP database, which includes data entry process and data verification for subsidy disbursement. Alfat also responsible in assisting the Programme Officer regarding IDBP on the daily basis.

SECTION C. DURATION AND CREDITING PERIOD

C.1. Duration of project

C.1.1. Start date of VPA

31/05/2011

C.1.2. Expected operational lifetime of VPA

31/05/2011 31/12/2038, 27 years or 319 months
The expected operational lifetime of the VPA is 27 years.

C.2. Crediting period of project

C.2.1. Start date of crediting period

01/06/2025 – 31/05/2032 (including both days).

C.2.2. Total length of crediting period

7 years

SECTION D. SUMMARY OF SAFEGUARDING PRINCIPLES AND GENDER SENSITIVE ASSESSMENT

D.1. Safeguarding Principles that will be monitored

A completed Safeguarding Principles Assessment is in Appendix 1, ongoing monitoring is summarised below.

PRINCIPLES	MITIGATION MEASURES ADDED TO THE MONITORING PLAN
P.1 |Human Rights	The project takes a human rights-based approach to implementing project activities and enhances the availability, accessibility and quality of benefits and services for women consistent with the non-discrimination and equality human rights principle. The project will monitor the benefits for women including their time saved from collecting firewood for cooking in the baseline scenario and health and socio-economic benefits such as time spent on other productive activities.[114] The project will also monitor the number of women employed by the project in managerial positions.
	The project activities do not have any potential risks of adverse impacts on women. On the contrary, the project improves the wellbeing of women as the distribution of biodigesters and use of clean cooking appliances saves time spent by women in collecting wood and cooking and improves the quality of cooked food.[115]
P.2 |Gender Equality and Women's Empowerment	The project does not involve any activities that have risks identified on community health and safety.

[114] BUS_2023_Tabulation_15072024 |*Sheet 'Tabulasi'* | *Cells AE3203*
[115] See BUS_2023_Tabulation_15072024 |Sheet 'Tabulasi' | Cells AE3203

	The project does not involve any activities that have risk identified on Cultural Heritage, Indigenous People, Displacement and Resettlement.
P.3 |Community Health AND Safety	The project does not involve any activities that have risk identified on corruption.
	A grievance mechanism is in place for employees. YRE works in accordance with the legal basis in force in Indonesia to have procedures in place for handling safety and security in both internal and external environments. Furthermore, page 25 of the SOP/foundation regulation outlines the foundation's responsibility in terms of preventing harassment and discrimination of any kind. YRE is also responsible to provide fair and equal treatment as well as encourage employee in self-development opportunities.
P.4 |Cultural Heritage, Indigenous People, Displacement and Resettlement	The project does not involve any activities that have risk identified on climate and energy.
	The project does not affect water bodies as the project activities take place at the household level and do not involve use of water. On the contrary, the collection and use of animal waste for biodigesters prevents/reduces the potential risk of erosion of land and ground water due to run-off of animal waste.
P.5 |Corruption	There is potential leakage of CO_2 in the project scenario. This has been included in the ex-ante emission reduction calculation of the project and will be monitoried. And If not for the project and distributed technology, other types of more polluting fossil fuels would be used and that the project finally reduces CO_2e into the atmosphere.

D.2. Assessment that project complies with GS4GG Gender Sensitive requirements

Question 1 - Explain how the project reflects the key issues and requirements of Gender Sensitive design and implementation as outlined in the Gender Policy?	The VPA shall help to promote gender equality through the active employment of women. This will also benefit the programme as a whole since women, as the primary users of cooking fuels, will be more effective at marketing the biogas installations, and associated cook stoves, to other women. The VPA shall also benefit the quality of life of the poor, particularly women and children, through improved health (less smoke inhalation), less time spent on cleaning soot from the user, collecting fuel and cooking. This will free up time for other activities. The VPA shall offer vocational training to engaged staff on the marketing, installation and maintenance of the biodigesters. Women will be especially encouraged to take up roles in marketing, where their experiential expertise will be particularly beneficial to the success of the programme as a whole. Women, as the primary users of the technology, will be more effective at marketing the product to other women. Less time spent on firewood collection, user cleaning and cooking will also allow more time to be available for other activities, such as greater school attendance due to the reduced domestic responsibility of children.

Question 2 - Explain how the project aligns with existing country policies, strategies and best practices	By promoting gender equality and greater support to women in the project area, the project aligns with national policies on gender including the National Gender Mainstreaming Policy enacted in 2000 (through The Presidential Decree in) guides the National Long-term Development Plan (RPJPN) 2005-2025 which confirms the Indonesian government's commitment to gender equality with specific laws in place and aligning the National Development Agenda with 17 Sustainable Development Goal (SDG) #5 Gender Equality.
Question 3 - Is an Expert required for the Gender Safeguarding Principles & Requirements?	N/A
Question 4 - Is an Expert required to assist with Gender issues at the Stakeholder Consultation?	N/A

SECTION E. SUMMARY OF LOCAL STAKEHOLDER CONSULTATION

This information is provided at the PoA level. Please refer to Section D of the GS-PoA-PDD for a detailed overview of all comments received and how these have been accounted for.

There are four reasons why the stakeholder consultation was performed at the PoA level instead of the project activity level:

- *Identical geographical boundary:* Each VPA under the programme may include biodigesters which are implemented anywhere within the national boundaries of the Republic of Indonesia;
- *Identical technology:* All of the project activities implemented under the programme will implement a biodigester system. The particular size of the biodigester system will be determined on the user level and is contingent upon the user size and number of animals kept. This is independent from VPAs,

which are implemented nationwide and need to adhere to the small- scale thresholds set forth by the CDM;

- *Similar time frame:* VPAs will be included consecutively given the programme anticipated implementation schedule;
- *Similar socio-economic situation:* The programme targets users that breed cattle or other farm animals and act as individual farmers form part of a cooperative (local community), or run SMEs. The users are in a similar socio-economic situation and can be classified as belonging to the low income class, typically residing in rural areas.

The below is a summary of the 2 step GS4GG Consultation for monitoring purposes.

E.1. Summary of stakeholder mitigation measures

This information is provided at the PoA level. Please refer to Section D of the GS-PoA-PDD.

Table 15. Summary of the stakeholder consultation

Stakeholder comment	Yes/ No?	Explanation (Why? How?)
Q1: *How long is the period during which a user is required to repay the biodigester purchase? What does the subsidy mechanism look like? When does the user get the return of investment, in terms of fishery and agricultural benefits?*	Yes	**A1:** The benefits of biogas may not be apparent immediately for the user, because the user must invest a considerable amount of money upfront, and not every user is ready to do this. For instance, a user who is ready to invest in a biodigester through credit will need to spend IDR 150,000 (around EUR 12.00) as a monthly instalment for three years. The user usually repays the instalment to their cooperative in cash, or in the form of milk price deduction that is paid by the cooperative to the user.
Q2: *The biogas development is currently implemented in some parts of Indonesia only. Can it be implemented nationwide? From the side of the government, the need for new renewable energy is*	Yes	**A2:** The target for biogas implementation is not limited to the initial set of provinces only, but all of Indonesia. However, as this is only the initial stage of the biogas programme and the responsibility to implement biogas programme does not

increasing. Unfortunately, inadequate action is occurring on this front.		solely rely on the central government. That is why provincial governments are invited to this kind of meetings, so that they can share the result of the meetings to the other local authorities. The provincial government can allocate a part of their budget for biogas development. IDBP expects to expand into Sumatra island, because it has a lot of potential. At this stage, the Millenium Challenge Corporation (MCC) also already stated that they are interested to do a pilot project in Jambi, therefore IDBP will also explore about the next working areas with MCC. It is expected that in the future there will be increasingly more provinces where biogas is implemented.
Q3: *In Central Java, the electrification ratio is 76.63%. Many hamlets still do not have access to electricity. The awareness meetings about biogas benefits are really needed. The level of awareness of the people is still low; therefore collaboration between the provincial and the central government as well as Hivos is necessary.*	Yes	**A3:** Technically, it is possible to convert biogas into electricity, but it requires high biogas input. It should also be remembered that the gas quality from biogas – in unprocessed conditions - contains a high level of sulphur and water particles thus making it corrosive to the appliances.
Q4: *Can IDBP build bigger size bio-digesters, such as 20 m3, and make it not limited to cattle manure but also use it for tempeh waste? There are demo plots done by other stakeholders in some areas in Central Java that make use of tempeh waste.*	Yes	**A4:** IDBP has been thinking about bigger biogas digester, and there is a possibility of building bigger biodigester systems in 2012 (between 20 m3 and 50 m3). Currently, IDBP still focuses on domestic biogas, which is for the household. IDBP will consider it again, as it is also related with the interest of the programme and SNV as the technical

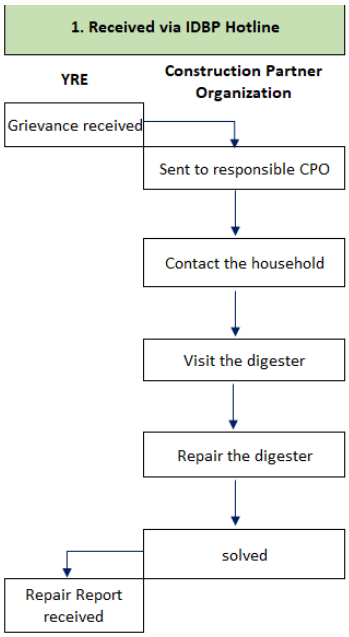
		partner. IDBP will keep tracking biogas technology developments.
Q5: *Can the level of IDBP subsidy rate be increased? For instance, the subsidy for small size biodigester is IDR 2 million (around EUR 170), but can bigger sized biodigesters qualify for a higher subsidy rate?*	Yes	**A5:** IDBP does not intend to change the subsidy rate because the digester size should match with the user's need for biogas. For instance, a user who has 4 to 5 family members and owns 10 cows could build but does not need a 8 m3 biodigester, because the energy need for the whole family will be met with a 6 m3 digester. By providing a flat subsidy rate, IDBP encourages people to use the energy as efficient as possible.
Q6: *There are 1,500 dairy farmers in Tandangsari, Sumedang, West Java. Only 40 of them have biogas. At the moment, the dairy cow market is not good. The fodder price is increasing, living cost is also increasing and the economy in general is not good. How can we increase the dairy cow market like in Malaysia?*	No	**A6**: Irrelevant to IDBP.
Q7: *In 2005, the Indonesian government adopted a target to increase the use of new renewable energy up to 17%. In Buru Island, Maluku, cattle rearing is done extensively, and the cattle are kept in a communal stable. Can we extend the IDBP programme to Maluku?* *Furthermore, If we want to promote biogas, how can we explain to the farmers to make use of the manure (that can be used as biogas and bio-slurry)? Because*	Yes	**A7:** Communal stable for cattle is a common practice. In the case of Buru Island, the energy access can be integrated with that agricultural system. It is in the best interest of IDBP to ensure that the users can get optimum benefits from biogas. Therefore, although it is known that communal systems often do not work very well due to social factors (technically it is feasible), the IDBP is considering building a number of communal plants, so manure of these communities can be used for biogas and eventually for fertiliser. As for centralised biogas, it depends on the

often the farmers bring the manure to the field, mix it with hay and then burn it. Is it possible to build a centralised biogas plant there?		distance between the stable and the houses. In principle, a biogas digester can be built up to 100 meters from the house(s). Maluku may be considered in the later stage of the programme if adequate funding is available.
***Q8**: Biogas is already present in South Sulawesi. The IDBP is very good there. In South Sulawesi, the electrification rate is 85%, therefore biogas is needed. There are 1 million cattle in South Sulawesi. The target is to increase the number up to 2 million. However, the achievement to build biogas is still difficult because there is no credit access. So it is suggested that:* *The subsidy should be given from the government (from the provincial budget);* *The number of trainings for biogas should be increased as well. The provincial government could finance this;* *Biogas appliances should only be obtained locally, from Indonesia.*	Yes	**A8:** There are many other sources of energy that can increase the electrification level, such as micro hydro, solar, geothermal. Biogas is certainly only one of them. The provincial government is welcome to use their own budget to develop the biogas sector employing the concept of IDBP, with a focus on strengthening biogas service providers through training. Credit access is one of IDBP's biggest challenges. Local governments are welcome to play a role in enhancing access to credit. As for locally made biogas appliances, it should be remembered that it is crucial to maintain the quality of the biodigesters. Until now, all but one of the appliances are already made locally. The local main gas valve does still not meet IDBP quality standards. IDBP keeps on looking for local manufacturers, including local workshops and technical schools. Until there is a good quality of locally-made appliances, IDBP will only use imported ones to maintain the quality.
Q9: *What does the carbon trade look like? What will happen with the carbon credit?*	Yes	**A9:** The carbon trade is aimed at obtaining revenues, which are subsequently pumped back into the programme. BKN will have the responsibility to ensure that the programme's carbon credits are sold on the carbon market and will also have the responsibility to meet monitoring demands resulting from the carbon mechanism under

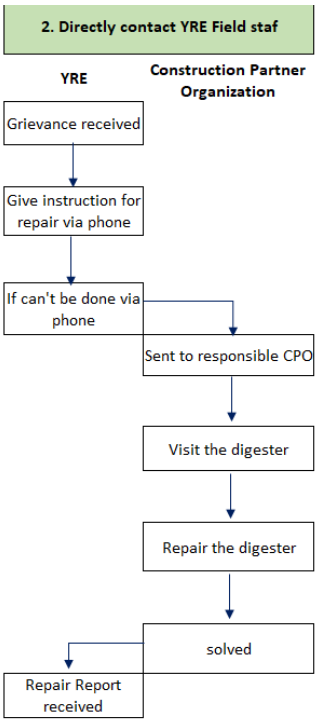
		the Gold Standard. BKN has initiated the development of the mechanism as it sees IDBP as a long-term programme which will in the long run result in considerable carbon emission reductions, which will support the programme financially and make it self-reliant, reducing the need of external funding.
Q10: *The central government is actively promoting the biogas programme, but there is a lack of coordination with the provincial government. Not to mention that there is still a programme that builds biogas by using grants (fully-subsidized biodigesters). The grant system is ruining the market. The central and provincial government must have one policy only. The collaboration must be intensified. What will the central government do post-2012 in this respect?*	Yes	**A10:** It is true that there still exist communication problems between the provincial and central government. This is because the provincial government has the freedom to make their own plans. However, the central government always tries to coordinate in relation to biogas development with the provincial government. At the moment the central government intends to work on a regulation framework in the form of a Ministerial Decree so that the National Budget can be used for subsidy.
Q11: *What can be done to ensure that there is no problem in operation and maintenance of a communal biodigester?*	Yes	**A11:** The owners of IDBP biodigesters are thoroughly trained, ensuring that they understand how to handle their plant, but they will also get after sales services to ensure that the systems are kept operational. In the case of communal systems this will also be done and the communal aspects will be given special attention to make sure that the group manages their plant jointly in the right way.
Q12. *Some farmers still dispose bio-slurry to the gutter and river thereby polluting the water and destroying the environment. Does IDBP have any training to provide to biodigester users so that they know the advantages of the bio-slurry?*	Yes	**A13.** As part of the IDBP programme, biogas users are entitled to receive knowledge on the advantages of bio-slurry. The programme intensively cooperate with its business partner, herein KPSP Setia

		Kawan, to ensure that all users should receive the training accordingly.

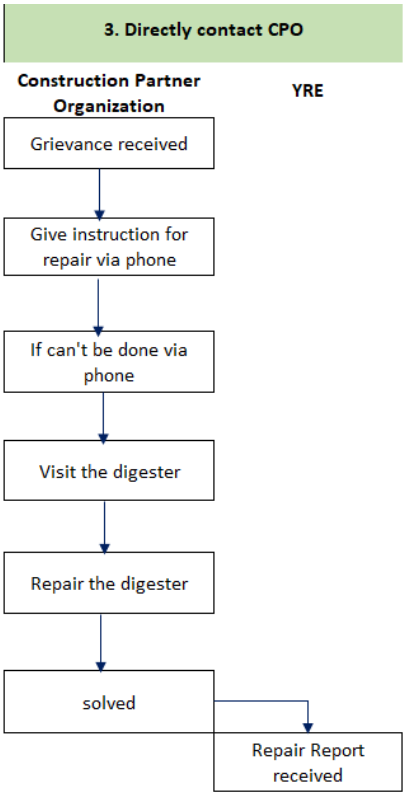
E.2. Final continuous input / grievance mechanism

METHOD	INCLUDE ALL DETAILS OF CHOSEN METHOD (S) SO THAT THEY MAY BE UNDERSTOOD AND, WHERE RELEVANT, USED BY READERS.
Continuous Input / Grievance Expression Process Book (mandatory)	Complaints or any other concerns can be stated and will be filed directly at the head office of PT. BKN or YRE. For users of biodigesters, the grievances are received, responded, and addressed through 1. IDBP Hotline, 2. Directly contact YRE Field officer, and 3. Directly contact the CPO. 1. IDBP Hotline: IDBP has one Hotline with active phone number and WhatsApp. Grievances might be received through messages and/or phone calls to the Hotline from households. YRE will assign responsible CPO to follow up the grievance. CPO will contact the household directly to confirm the grievance and to determine visit date for repairment/service. 

2. Grievances might be received through messages and/or phone calls by the Field Officer from households.



3. Household might deliver their grievances directly to CPO through messages and/or phone calls.



GS Contact (mandatory)	help@goldstandard.org
Other	YRE/PT.BKN: Phone: +62812-6779-5000 Email: info@birukarbon.id

SECTION F. Eligibility and inclusion criteria for VPAs inclusion

Table 16. Eligibility for VPA inclusion as per PoA requirements

NO.	ELIGIBILITY CRITERION	DESCRIPTION/ REQUIRED CONDITION	DESCRIPTION OF THE VPA IN RELATION TO THE CRITERIA, MEANS OF VERIFICATION AND SUPPORTING EVIDENCE FOR INCLUSION
1	**Types of Projects:** Eligible projects shall include physical action/implementation on the ground. Pre-identified eligible project types are identified in the Eligibility Principles and Requirements section.	Project is pre-identified as eligible by being referenced in Gold Standard Activity Requirements. According to the activity requirements, paragraph 3.1.1: "Methane recovery project activities shall be eligible for emission reductions from both methane avoidance (including from the flared biogas fraction) and non-renewable fuel substitution as long as evidence is provided on time for validation to	The VPA consists of physical action through the installation and maintenance of the biodigesters in households. Verifiable evidence: IDBP Database that gives details of user households, location, dates of installation, description of each installed digester, and others which can be independently verified.

		demonstrate that the system was designed in a way to at least make use of some of the biogas recovered for the delivery of energy services (e.g. electricity, heat)"	
2	**Location of Project:** Projects may be located in any part of the world	All biogas systems listed in a VPA are installed within the geographical boundaries of Indonesia. Each biodigester in a VPA has a unique serial number that is recorded in the User's Manual and/or engraved or permanently attached as a nameplate which confirms the location of the biodigester. The serial numbers are listed in the IDBP database.	The VPA is developed in Indonesia. See section A.2 of this PDD. Each installed biodigester's details including locations are recorded in a database that can be verified. Verifiable evidence: • IDBP Database; • Completion Report; • Household Agreement; • User's Manual.
3	**Project Area, Project Boundary and Scale:** The Project Area and Project Boundary shall be defined. Projects may be developed at any scale although certain rules, requirements and limitations may apply under specific Activity Requirements, Impact	All biogas systems listed in a VPA are installed within the geographical boundaries of Indonesia. The biodigesters are uniquely identified and defined in an unambiguous manner by providing the serial number of the systems installed. The serial	The location of project where biodigesters are installed is described in section A.2. on pages 14-15 of this PDD. By 2023, 20,252 biodigesters were installed under VPA-1 reaching its boundary. The capacity of the biodigesters ranges from 2 m^3 to (and including)

	Quantification Methodologies and Products Requirements. In order to avoid double counting the Project shall not be included in any other voluntary or compliance standards programme unless approved by Gold Standard (for example through dual certification). Also, if the Project Area overlaps with that of another Gold Standard or other voluntary or compliance standard programme of a similar nature, the project shall demonstrate that there is no double counting of impacts at design and performance certification (for example use of similar technology or practices through which the potential arises for double counting or misestimation of impacts amongst projects)	numbers are listed in the IDBP database. It avoids double counting. Participating users must confirm that they are not taking part in other registered PoAs through signing of a Household Agreement for each biodigester. VPAs must be registered in the National Registration System of Indonesia (SRN) as per Presidential Regulation 98/2021. IDBP has already registered in the Gold Standard, thus registration in the SRN is through mutual recognition process with corresponding adjustment to prevent double counting of impacts. Double counting has been included as part of the monitoring plan (see B.7.1).	12 m^3. As a small-scale project, VPA-1 is subject to the thresholds of 45 MWth for the renewable energy component and an emissions cap of 60,000 tCO_2e for the methane avoidance component. The VPA does not exceed this threshold as shown in Table 7 on page 18 of this PDD. The total installed 20,000 units under the VPA-1 cumulates to 38.742 MW_{th}, which is below the 45 MW_{th} threshold. Verifiable evidence: • IDBP Database; • Completion Report; or • Household Agreement
4	**Host Country Requirements:** Projects shall be in compliance with applicable Host	All VPAs under the IDBP shall comply with: • Indonesian Law 6/2023 regarding	The VPA complies with all the listed regulations, t ensure this, the IDBP team participated in a

Country's legal, environmental, ecological and social regulations.	environmental management • Regulation of the Minister of Agriculture of Indonesia No. 1011/Permentan/OT.140/7/2014 that regulates waste processing units for farmers to produce biogas and organic fertilizer. • Regulation of the Minister of Energy and Mineral Resources (MEMR) of Indonesia No. 36/2018 which regulates the design, capacity, and construction of household-scale biodigester. • Presidential Decree No. 98/2021 regarding climate change mitigation and actions project registration. • Regulation of the Minister of Environment and	workshop of developing biogas sector in Indonesia organized by the Directorate General of New, Renewable Energy and Energy Conservation of the Indonesian Ministry of Energy and Mineral Resources. Furthermore, IDBP has been engaging with a wide range of stakeholders in developing the biogas sector in the country.[116] This evidence that the project complies with the regulatory framework of Indonesia. Verifiable evidence: See section B.6.2 of this VPA-DD

[116] See section 4.3.1. Policy – Stakeholder Engagement of 'Indonesia Domestic Biogas Program 2022 Annual Report'

		Forestry (MoEF) of Indonesia No. 21/2022 concerning the implementation of carbon economic value through carbon trading activities.	
5	**Contact Details:** As part of the Project Documentation the Project Developer shall provide (i) name and (ii) contact details of all Project Participants; AND in case of an organisation (iii) the legal registration details and (iv) documentation by the governing jurisdiction that proves that the entity is in good standing (defined as being a legal or other appropriate entity registered in or allowed to operate within the required jurisdiction and with no evidence of insolvency or legal/criminal notices placed against it or any of its Directors). Gold Standard retains the right (at its own discretion) to refuse use of the	Contacts of each VPA Project Developer will be included in each VPA-DD.	This VPA PDD and each Monitoring Report include contact details of PD. Verifiable evidence: • Legal documents showing registration, address and other details • PoA-DD

	Standard where reputational concerns are highlighted		
6	**Legal Ownership:** Full and uncontested legal ownership of any Products that are generated under Gold Standard Certification, (for example carbon credits) shall be demonstrated. Where such ownership is transferred from project beneficiaries this must be demonstrated transparently and with full, prior and informed consent (FPIC). Note that for certain Project types there is a requirement for full and uncontested legal land title/tenure to be demonstrated. These are contained within specific Activity or Product Requirements. All projects shall immediately report to Gold Standard any land title/tenure disputes arising.	The individuals responsible for the biodigesters are individual users of the biogas equipment. Each biodigester user as IDBP's beneficiary agrees by a 'Household Agreement' to transfer the ownership title of the generated emission reductions to the project developer, which is PT. Biru Karbon Nusantara. Each biodigester user will be asked to read and sign a contract stating that they ask a construction partner to build them biodigester in compliance with the IDBP technology design, both biodigester user and the construction partner agree to transfer the ownership rights of the emission reductions generated by the biodigester technology to PT. Biru Karbon Nusantara, as well as allow PT. Biru Karbon	The VPA obtained legal ownership of the emissions through the household agreement. See section B.6.2. Verifiable evidence: Household Agreement

		Nusantara to act on their behalf in receiving emission reduction rights and the carbon fund generated. Copies of these signed contracts will be kept by the project developer. Hence, the project developer is the sole legal owner of the carbon rights.	
7	**Other Rights:** As well as legal title and ownership, the Project Developer shall also demonstrate where required uncontested legal rights and/or permissions concerning changes in use of other resources required to service the Project (for example, access rights, water rights etc.). Any known disputes or contested rights must be declared immediately to Gold Standard by the Project Developer and resolved prior to further project implementation in affected areas.	Not Applicable	Not Applicable

Table 17. Eligibility criteria as per Community Services Activity Requirements

No.	ELIGIBILITY CRITERION	DESCRIPTION/ REQUIRED CONDITION	DESCRIPTION OF THE VPA IN RELATION TO THE CRITERIA, MEANS OF VERIFICATION AND SUPPORTING EVIDENCE FOR INCLUSION
1	**Types of Projects:** Pre-identified CSA project types are noted below. Project Developers may submit new project types to Gold Standard for approval following the Principles & Requirements	Project is pre-identified as eligible by being referenced in Gold Standard Community Services Activity Requirements, v1.2, section 3.1.1, item (c) "Waste management and handling: All waste management activities that deliver energy or a usable product with sustainable development benefits such as composting, biogas etc."	This VPA is referenced in the Gold Standard Community Services Activity Requirements, v1.2 Verifiable evidence: • Sections B.1 and B.2 of this VPA-DD
2	**Project area, boundary and scale:** Area and Boundary shall be defined in line with the applicable Impact Quantification Methodologies and Product Requirements.	All biogas systems listed in a VPA are installed within the geographical boundaries of Indonesia. VPAs shall issue emission reductions less than or equal to 60,000 tCO_{2eq} per annum.	The project area, boundary, and scale are defined and shown Table 5, section A.4, and Figure 3. Verifiable evidence: • IDBP Database; • Completion Report; or • Household Agreement.

APPENDIX 1 - SAFEGUARDING PRINCIPLES ASSESSMENT

Complete the Assessment below and copy all Mitigation Measures for each Principle into SECTION D above. Please refer to the instructions in the Guide to Completing this Form below.

SOCIAL SAFEGUARDING PRINCIPLES		
Reference requirement	Question	Response
P.1 |HUMAN RIGHTS		
P.1.1.1 |	Does the project developer, its representatives and the Project disrespect internationally proclaimed human rights?	☐ YES ☒ NO
P.1.1.1 |	Is the project involved or complicit in violence or human rights abuses of any kind as defined in the Universal Declaration of Human Rights?	☐ YES ☒ NO
P.1.1.2 |	Have local communities or individuals raised human rights concerns regarding the project (e.g., during the stakeholder engagement process, grievance processes, public statements)?	☐ YES ☒ NO
P.1.1.3 |	Is there a risk that rights-holders (e.g., Project-affected stakeholders) do not have the capacity to claim their rights?	☐ YES ☒ NO
P.1.1.3 |	Does this project undermine national or regional measures for the realisation of the right to development?	☐ YES ☒ NO
If the answer to any of the questions above is "yes," please explain the reason and how the project will ensure compliance with applicable requirements.		
N/A		
Would the project potentially involve or lead to:		
P.1.1.1 |	adverse impacts on enjoyment of the human rights (civil, political, economic, social or cultural) of the affected population and particularly of marginalised groups?	☐ YES ☐ POTENTIALLY ☒ NO
P.1.1.2 |	inequitable or discriminatory impacts on affected populations, particularly people living in poverty or marginalised or excluded individuals or groups, including persons with disabilities?	☐ YES ☐ POTENTIALLY ☒ NO
P.1.1.3 |	restrictions in availability, quality of and/or access to resources or basic services, in particular to marginalised individuals or groups, including persons with disabilities?	☐ YES ☐ POTENTIALLY ☒ NO
P.1.1.3 |	exacerbation of conflicts among and/or the risk of violence to project-affected communities and individuals?	☐ YES ☐ POTENTIALLY

		☒ NO

Briefly describe below how the project incorporates a human rights-based approach.
For example, by describing how the project design:

- is informed by human rights analysis, including from UN human rights mechanisms (human rights treaty bodies, universal periodic review, special procedures)
- includes measures to assist the government to realise (respect, protect and fulfil) human rights under international law and to implement human rights-related standards in national law (whichever is higher)
- enhances the availability, accessibility and quality of benefits and services for potentially marginalised individuals and groups, and to increase their inclusion in decision-making processes that may impact them (consistent with the non-discrimination and equality human rights principle)
- provides reasonable accommodations to strengthen inclusivity and accessibility of project benefits and services to persons with disabilities.

Please add text here….

Project activities imrove the wellbeing of women in the project area as the distribution of biodigesters and use of clean cooking appliances saves time spent by women in collecting wood and cooking which they use for other productive activities. Use of clean energy for cooking also improves air quality in the kitchten and positivitely affecting health of women. See BUS_2023_Tabulation_15072024|Sheet 'Tabulasi' Cells AC3203 and AE3203

P.2 |GENDER EQUALITY AND WOMEN'S EMPOWERMENT

P.2.1.1 |	Have women's groups/leaders raised gender equality concerns regarding the project, (e.g., during the stakeholder engagement process, grievance processes, public statements)?	☐ YES ☒ NO
P.2.1.2 |	Does the project undermine the principles of non-discrimination, equal treatment, and equal pay for equal work?	☐ YES ☒ NO
P.2.1.2 |	Does the project prevent men and women from having equal opportunities to participate in identified tasks and activities, whether through paid work, volunteer work, or community contributions, as appropriate?	☐ YES ☒ NO
P.2.1.2 |	Does the project limit the participation of women or men based on pregnancy, maternity/paternity leave, or marital status?	☐ YES ☒ NO
P.2.1.2 |	Is information about project objectives being communicated in a way that is inappropriate for the local context and not tailored to the methods of understanding of both women and men, which could hinder their participation?	☐ YES ☒ NO
P.2.1.3 |	Has the project assessed gender risks without referencing the country's gender strategy or equivalent national commitment?	☐ YES ☒ NO

P.2.1.4 |	Has expert stakeholder(s) been involved, and has their input been requested for the project design on gender equality and women's empowerment?	☐ YES ☒ NO

If the answer to any of the questions above is "yes," please explain the reason and how the project will ensure compliance with applicable requirements.

Please add text here….

Would the project potentially involve or lead to:		
P.2.1.1 |	adverse impacts on gender equality and/or the situation of women and girls?	☐ YES ☐ POTENTIALLY ☒ NO
P.2.1.1 |	exacerbation of risks of gender-based violence? For example, through the influx of workers to a community, changes in community and household power dynamics, increased exposure to unsafe public places and/or transport, etc.	☐ YES ☐ POTENTIALLY ☒ NO
P.2.1.2 |	reproducing discriminations against women based on gender, especially regarding participation in design and implementation or access to opportunities and benefits?	☐ YES ☐ POTENTIALLY ☒ NO
P.2.1.2 |	limitations on women's ability to use, develop and protect natural resources, taking into account different roles and positions of women and men in accessing environmental goods and services? For example, activities that could lead to natural resources degradation or depletion in communities who depend on these resources for their livelihoods and well-being.	☐ YES ☐ POTENTIALLY ☒ NO

Briefly describe below how the project is addressing any identified risk to gender equality and women's empowerment.

Project activities imrove the wellbeing of women in the project area as the distribution of biodigesters and use of clean cooking appliances saves time spent by women in collecting wood and cooking which they use for other productive activities. Use of clean energy for cooking also improves air quality in the kitchten and positivitely affecting health of women. See BUS_2023_Tabulation_15072024|Sheet 'Tabulasi' Cells AC3203 and AE3203

P.3 |COMMUNITY HEALTH AND SAFETY

P.3.1.1 |	Does the project involve potential risks to the health and safety of affected communities during its life cycle?	☐ YES ☒ NO
P.3.1.2 |	Does the project involve any potential risks to the workers' safety and health?	☐ YES ☒ NO

If the answer to any of the questions above is "yes," please explain the reason and how the project will ensure compliance with applicable requirements.

Please add text here….

Would the project potentially involve or lead to:		
P.3.1.1 |	construction and/or infrastructure development (e.g., roads, buildings, dams)?	☐ YES ☒ NO
P.3.1.2 |	air pollution, noise, vibration, traffic, injuries, physical hazards, poor surface water quality due to runoff, erosion, sanitation?	☐ YES ☐ POTENTIALLY ☒ NO
P.3.1.2 |	harm or losses due to failure of structural elements of the project (e.g., collapse of buildings or infrastructure)?	☐ YES ☐ POTENTIALLY ☒ NO
P.3.1.2 |	risks of water-borne or other vector-borne diseases (e.g., temporary breeding habitats), communicable and noncommunicable diseases, nutritional disorders, mental health?	☐ YES ☐ POTENTIALLY ☒ NO
P.3.1.2 |	transport, storage, and use and/or disposal of hazardous or dangerous materials (e.g., explosives, fuel and other chemicals during construction and operation)?	☐ YES ☐ POTENTIALLY ☒ NO
P.3.1.2 |	adverse impacts on ecosystems and ecosystem services relevant to communities' health (e.g., food, surface water purification, natural buffers from flooding)?	☐ YES ☐ POTENTIALLY ☒ NO
Briefly describe below how the project is addressing any identified risk related to community health and safety.		
Please add text here….		

P.4 |CULTURAL HERITAGE, INDIGENOUS PEOPLE, DISPLACEMENT AND RESETTLEMENT

P.4.1 |Sites of Cultural and Historical Heritage

P.4.1.1 |	Does the project involve altering, damaging, or removing sites, objects, or structures of significant cultural heritage?	☐ YES ☒ NO
If the answer to question above is "yes," please explain the reason and how the project will ensure compliance with applicable requirements.		
Please add text here….		
Would the project potentially involve or lead to:		
P.4.1.1 |	activities adjacent to or within a cultural heritage site?	☐ YES ☐ POTENTIALLY ☒ NO
P.4.1.1 |	significant excavations, demolitions, movement of earth, flooding or other environmental changes?	☐ YES ☐ POTENTIALLY ☒ NO
P.4.1.1 |	alterations to landscapes and natural features with cultural significance?	☐ YES ☐ POTENTIALLY

		☒ NO
P.4.1.1 |	adverse impacts to sites, structures, or objects with historical, cultural, artistic, traditional or religious values or intangible forms of culture (e.g., knowledge, innovations, practices)? (Note: projects intended to protect and conserve Cultural Heritage may also have inadvertent adverse impacts)	☐ YES ☐ POTENTIALLY ☒ NO
P.4.1.2 |	utilisation of tangible and/or intangible forms (e.g., practices, traditional knowledge) of Cultural Heritage for commercial or other purposes?	☐ YES ☐ POTENTIALLY ☒ NO
P.4.1.2 |	If answer to question above is "YES" or "POTENTIALLY" - are the communities made aware of their right under the law, scope and nature of proposed development and its potential consequences?	☐ YES ☐ NO ☒ NA
P.4.1.3 |	If answer to question above is "YES" - does the project provide equitable sharing of benefits from commercialisation of such knowledge, innovation, or practice, consistent with their customs and traditions?	☐ YES ☐ NO ☒ NA
P.4.1.4 |	If answer to question above is "YES" - are opinions and recommendations of an Expert Stakeholder(s) not sought and demonstrated as being included in the project design?	☐ YES ☐ NO ☒ NA
P.4.1.4 |	If answer to question above is "YES", has project design been changed, modified, updated considering opinions and recommendations of an Expert Stakeholder?	☐ YES ☐ NO ☒ NA

If the answer is "yes" or "potentially" to any of the above questions, please provide a brief description of the project situation below. Also, provide justification and/or evidence as necessary to demonstrate compliance with applicable requirements.

Please add text here….

P.4.2 |*Forced Eviction and Displacement*

P.4.2.1 |	Does the project involve any risks related to involuntary relocation of people?	☐ YES ☒ NO

If the answer to question above is "yes," please explain the reason and how the project will ensure compliance with applicable requirements.

Please add text here….

Would the project potentially involve or lead to:

P.4.2.1 |	risk of forced evictions or involuntary relocation of people?	☐ YES ☐ POTENTIALLY ☒ NO
P.4.2.2 |	temporary or permanent and full or partial physical displacement (including people without legally recognisable claims to land)?	☐ YES ☐ POTENTIALLY ☒ NO

P.4.2.2 |	economic displacement (e.g., loss of assets or access to resources due to land acquisition or access restrictions – even in the absence of physical relocation)?	☐ YES ☐ POTENTIALLY ☒ NO
P.4.2.2 |	If answer to question above is "YES" or "POTENTIALLY", - has the project developed Resettlement Action Plan or Livelihood Action Plan in consultation and agreement with affected individual, group or community? - has the project integrated Resettlement Action Plan or Livelihood Action Plan into the Project design?	☐ YES ☐ NO ☒ NA
P.4.2.3 |	If answer to question above is "YES" - are opinions and recommendations of an Expert Stakeholder(s) not sought and demonstrated as being included in the project design?	☐ YES ☐ NO ☒ NA
P.4.2.3 |	If answer to question above is "YES", have project design been changed, modified, updated considering opinions and recommendations of an Expert Stakeholder?	☐ YES ☐ NO ☒ NA

If the answer is "yes" or "potentially" to any of the above questions, please provide a brief description of the project situation below. Also, provide justification and/or evidence as necessary to demonstrate compliance with applicable requirements.

Please add text here….

P.4.3 |LAND TENURE AND OTHER RIGHTS

P.4.3.1 |	Does the project involve any risks related to identifying and managing legitimate tenure rights that may be affected by the project?	☐ YES ☒ NO

If the answer to question above is "yes," please explain the reason and how the project will ensure compliance with applicable requirements.

Please add text here….

Would the project potentially involve or lead to:

P.4.3.1 |	impacts on or changes to land tenure arrangements and/or community-based property rights/customary rights to land, territories and/or resources?	☐ YES ☐ POTENTIALLY ☒ NO
P.4.3.1 |	uncertainties with regards to land tenure, access rights, usage rights or land ownership? Examples include, but are not limited to water access rights, community-based property rights and customary rights.	☐ YES ☐ POTENTIALLY ☒ NO
P.4.3.2 |	Changes in legal arrangements, if yes, are the changes done in line with relevant laws and regulations?	☐ YES ☐ NO ☒ NA
P.4.3.2 |	Changes in legal arrangements, if yes, are these changes agree with free, prior and informed consent of the involved stakeholders?	☐ YES ☐ NO ☒ NA

P.4.3.3 |	Does some other entity (other than the project developer) hold uncontested land title for the entire Project Boundary?	☐ YES ☐ NO ☒ NA
P.4.3.4 |	Are opinions and recommendations of an Expert Stakeholder(s) not sought and demonstrated as being included in the project design?	☐ YES ☐ NO ☒ NA
P.4.3.4 |	If answer to question above is "YES", have project design been changed, modified, updated considering opinions and recommendations of an Expert Stakeholder?	☐ YES ☐ NO ☒ NA
P.4.3.5 |	Have project developer in consultation with stakeholders established a functioning mechanism to receive, process, resolve, communicate and record grievances?	☐ YES ☐ NO ☒ NA

If the answer is "yes" or "potentially" to any of the above questions, please provide a brief description of the project situation below. Also, provide justification and/or evidence as necessary to demonstrate compliance with applicable requirements.

Please add text here….

P.4.4 |INDIGENOUS PEOPLES

P.4.4.1 |	Does the project involve Indigenous People within the Project area of influence who may be affected directly or indirectly by the Project?	☐ YES ☒ NO

If the answer to question above is "yes," please explain project situation and how the project will ensure compliance with applicable requirements.

Please add text here….

Would the project potentially involve or lead to:

P.4.4.1 |	affect areas where indigenous peoples are present (including project area of influence)	☐ YES ☐ POTENTIALLY ☒ NO
P.4.4.1 |	affect areas, land and territory claimed by indigenous peoples?	☐ YES ☐ POTENTIALLY ☒ NO
P.4.4.1 |	impacts (positive or negative) to the human rights, lands, natural resources, territories, and traditional livelihoods of indigenous peoples?	☐ YES ☐ POTENTIALLY ☒ NO
P.4.4.7 |	If answer to above questions is ''YES'' or "POTENTIALLY", - Is it determined that the proposed project may affect the rights, lands, resources, or territories of indigenous people? - Has an "Indigenous People Plan" (IPP) or "Indigenous People Plan Framework" been elaborated and included in the project documentation?	☐ YES ☐ NO ☒ NA

	- Was the plan developed in accordance with the effective and meaningful participation of indigenous peoples and in accordance with UNDP Guidelines?	
P.4.4.3 |	risk of forcibly removing indigenous people from their lands and territories?	☐ YES ☐ POTENTIALLY ☒ NO
P.4.4.4 |	utilisation and/or commercial development of natural resources on lands and territories claimed by indigenous peoples? Consider, and where appropriate ensure, consistency with the answers under Principle 4.1 above	☐ YES ☐ POTENTIALLY ☒ NO
P.4.4.5 | P.4.4.6 |	If answer to question above is "YES" or "POTENTIALLY" - Did the project obtain free, prior and informed consent from indigenous people before taking their cultural, intellectual, religious, and/or spiritual property? - Does the project ensure that the indigenous people receive an equitable sharing of benefits resulting from the use of their traditional knowledge and practices? ? - Does the project ensure that the sharing of benefits resulting from the use of indigenous peoples' traditional knowledge and practices is culturally appropriate and inclusive? - Does the project ensure that the provision of equitable sharing of benefits does not impede land rights or equal access to basic services including health services, clean water, energy, education, safe and decent working conditions, and housing?	☐ YES ☐ NO ☒ NA
P.4.4.8 |	Does the project lack appropriate feedback and grievance channels for Indigenous Peoples and their representatives?	☐ YES ☐ NO ☒ NA
P.4.4.8 |	Has a grievance mechanism not been established at the beginning of programme or project implementation with due consideration given to customary dispute settlement mechanisms among the Indigenous Peoples concerned and will it remain operational throughout the project cycle?	☐ YES ☐ NO ☒ NA
P.4.4.9 |	Are opinions and recommendations of an Expert Stakeholder(s) not sought and demonstrated as being included in the project design?	☐ YES ☐ NO ☒ NA

P.4.4.9 |	If answer to question above is "YES", have project design been changed, modified, updated considering opinions and recommendations of an Expert Stakeholder?	☐ YES ☐ NO ☒ NA

If the answer is "yes" or "potentially" to any of the above questions, please provide a brief description of the project situation below. Also, provide justification and/or evidence as necessary to demonstrate compliance with applicable requirements.

Please add text here….

P.5 |CORRUPTION

P.5.1.1 |	Does the project involve, or is it complicit in, contributing to or reinforcing corruption or corrupt projects?	☐ YES ☒ NO
P.5.1.1 |	Does the project have a risk of encouraging bribery, kickbacks, or other unethical behavior?	☐ YES ☒ NO

If the answer to any of the questions above is "yes," please explain project situation and how the project will ensure compliance with applicable requirements.

Please add text here….

ECONOMIC SAFEGUARDING PRINCIPLES

P.6 |ECONOMIC IMPACTS

P.6.1 |LABOUR RIGHTS AND WORKING CONDITIONS

P.6.1.1 |	Does the project involve, facilitate, or condone forced labor, or pose a potential risk of forced labor?	☐ YES ☒ NO
P.6.1.1 |	Does the project violate any labor or health and safety laws, international obligations, or ILO conventions?	☐ YES ☒ NO
P.6.1.2 |	Does the project violate the principles of equal opportunity and fair treatment in its employment decisions?	☐ YES ☒ NO
P.6.1.3 |	Does the project violate national laws, if available regarding non-discrimination in employment?	☐ YES ☒ NO
P.6.1.4 | P.6.1.5 |	Does the project allow child labor?	☐ YES ☒ NO
P.6.1.7 | P.6.1.8 |	Does the project have insufficient processes and measures in place to ensure the safety and health of project workers?	☐ YES ☒ NO
P.6.1.9 |	Does the project have insufficient measures to safeguard and support vulnerable project workers, such as women, people with disabilities, migrant workers, and young workers, and to prevent any kind of harassment, abuse, bullying, or exploitation, including gender-based violence (GBV)?	☐ YES ☒ NO
P.6.1.10 |	Does the project have no grievance mechanism available for workers to voice workplace concerns? Is information	☐ YES ☒ NO

	about this mechanism not provided to workers at the time of recruitment, or is it not easily accessible?	

If the answer to any of the questions above is "yes," please explain project situation and how the project will ensure compliance with applicable requirements.

P.6.1.10 YRE appointed operations manager who is responsible in the workers' grievances mechanism process. Grievance mechanism for workers is available in the foundation SOP/regulations page 48 - 52. All staffs have the right to express dissatisfaction with situations relating to them and should receive fair treatment. YRE provides an enabling environment for staff to raise the problem and hope for resolutions. this policy covers situations where staff are disadvantaged or dissatisfied with a problem work-related, disciplinary action or issues that may affect their work performance.Corrective action guidelines for grievances that involve staff and their direct supervisors is also available the foundation regulations. the foundation regulation is accessible and is inform to all staff.

Would the project potentially involve or lead to:
(NOTE: APPLIES TO BOTH PROJECT AND CONTRACTOR WORKERS)

P.6.1.1 |	use of forced labour?	☐ YES ☐ POTENTIALLY ☒ NO
P.6.1.1 |	working conditions that do not meet national labour laws and international commitments?	☐ YES ☐ POTENTIALLY ☒ NO
P.6.1.1 |	working conditions that may deny freedom of association and collective bargaining?	☐ YES ☐ POTENTIALLY ☒ NO
P.6.1.1 |	absence of documented working agreements with all individual workers *if such agreements do not exist, or do not address working conditions and terms of employment, the project developer shall provide reasonable working conditions and terms of employment.*	☐ YES ☐ POTENTIALLY ☒ NO
P.6.1.1 |	use of migrant workers? *if engaged, the developer shall ensure that they are engaged substantially equivalent terms and conditions to non-migrant workers carrying out similar work.*	☐ YES ☐ POTENTIALLY ☒ NO
P.6.1.1 |	having no arrangements for basic services[117] for workers?	☐ YES ☐ POTENTIALLY ☒ NO

[117] Basic services requirements refer to minimum space, supply of water, adequate sewage and garbage disposal system, appropriate protection against heat, cold, damp, noise, fire, and disease-carrying animals, adequate sanitary and washing facilities, ventilation, cooking and storage facilities and natural and artificial lighting, and in some cases basic medical services.

	the project developer shall put in place and implement policies on the quality and management of the accommodation and provision of basic services in a manner consistent with the principles of non-discrimination and equal opportunity. Workers' accommodation arrangements should not restrict workers' freedom of movement or of association	
P.6.1.2 |	any form of discrimination or harassment based on factors unrelated to job requirements, such as gender, race, nationality, ethnicity, social or indigenous origin, religion or belief, disability, age, or sexual orientation?	☐ YES ☐ POTENTIALLY ☒ NO
P.6.1.2 |	any form of discrimination in any aspect of employment, such as recruitment, compensation, working conditions, training, job assignment, promotion, termination, or discipline?	☐ YES ☐ POTENTIALLY ☒ NO
P.6.1.2 |	harassment, intimidation, and/or exploitation, especially in regard to women?	☐ YES ☐ POTENTIALLY ☒ NO
P.6.1.3 |	discriminatory working conditions and/or lack of equal opportunity where national law provides provision to address non-discrimination in employment?	☐ YES ☐ POTENTIALLY ☒ NO
P.6.1.4 |	use of child labour? (including third-party engaged workers)	☐ YES ☐ POTENTIALLY ☒ NO
P.6.1.4 |	inadequate and verifiable mechanisms for age verification?	☐ YES ☒ NO
P.6.1.7 |	no processes and measures in place for the safety and health of project workers?	☐ YES ☒ NO
P.6.1.7 |	No provision of safety and health training provisions, including on the proper use and maintenance of personal protective equipment conducted by competent persons and the maintenance of training records?	☐ YES ☒ NO
P.6.1.7 |	No provision to record and document accidents, diseases, incidents, and any resulting injuries, illnesses, or deaths?	☐ YES ☒ NO
P.6.1.8 |	occupational health and safety risks due to physical, chemical, biological and psychosocial hazards (including violence and harassment) throughout the project life-cycle?	☐ YES ☒ NO
P.6.1.9 |	No measures to protect vulnerable project workers from harassment, exploitation, and gender-based violence (GBV)? This includes women, people with disabilities, migrant workers, and young workers.	☐ YES ☒ NO
P.6.1.10 |	No grievance mechanism available for workers to voice workplace concerns.	☐ YES ☒ NO
P.6.1.11 |	No measures for due diligence and the establishment of policies and procedures to manage and monitor the performance of third-party employees in the project?	☐ YES ☒ NO

If the answer is "yes" or "potentially" to any of the above questions, please provide a brief description of the project situation below. Also, provide justification and/or evidence as necessary to demonstrate compliance with applicable requirements.

P.6.1.7 YRE is committed to creating a workplace that guarantees occupational safety, health and security. Every employee is expected to be responsive in dealing with emergencies that can threaten work safety, health and security. This includes understanding the types of hazards/disasters and procedures for handling safety and security in both the internal and external environments of the Foundation in accordance with the legal basis in force in Indonesia.SOP regarding occupational health safety is attached with title YRE HSE General Guidelines.

P.6.1.9 In the SOP/foundation regulation, YRE will prevent harassment and discrimination of any kind in employment, based on ethnic origin, nationality, race, color, sex, age or religion. It is available in page 25 where the regulation describe the foundation responsibility. As employer, YRE is also responsible to provide fair and equal treatment as well as encourage employee in self-development opportunities.

P.6.2 |NEGATIVE ECONOMIC CONSEQUENCES

P.6.2.1 |	Is there a risk of project failure during implementation or after project certification due to a lack of financial resources?	☐ YES ☒ NO
P.6.2.2 |	Does the project have potential negative impacts or pose a risk to the local economy?	☐ YES ☒ NO
P.6.2.2 |	Are there any potential risks or negative impacts this project may have on vulnerable or marginalised social groups, despite the benefits it may bring?	☐ YES ☒ NO

If the answer to any of the questions above is "yes," please explain project situation and how the project will ensure compliance with applicable requirements.

Please add text here…

Would the project involve or lead to:

P.6.2.2 |	economic impacts (negative/detrimental) to the local economy?	☐ YES ☐ POTENTIALLY ☒ NO
P.6.2.2 |	negative economic consequences during and after project implementation, e.g., for vulnerable and marginalised social groups in targeted communities?	☐ YES ☐ POTENTIALLY ☒ NO

If the answer is "yes" or "potentially" to any of the above questions, please provide a brief description of the project situation below. Also, provide justification and/or evidence as necessary to demonstrate compliance with applicable requirements.

Please add text here….

P.7 |**CLIMATE AND ENERGY**

P.7.1 |GHG EMISSIONS		
P.7.1.1 |	Does the project have a risk of increasing greenhouse gas emissions over the Baseline Scenario?	☐ YES ☒ NO
If the answer to question above is "yes," please explain project situation and how the project will ensure compliance with applicable requirements.		
Please add text here….		
Would the project involve or lead to:		
P.7.1.1 |	increase greenhouse gas emissions over the Baseline Scenario?	☐ YES ☐ POTENTIALLY ☒ NO
If the answer is "yes" or "potentially" to the above question, please provide a brief description of the project situation below. Also, provide justification and/or evidence as necessary to demonstrate compliance with applicable requirements.		
Please add text here….		

P.7.2 |ENERGY SUPPLY		
P.7.2.1 |	Does the project pose a risk to the availability and reliability of energy supply to other users?	☐ YES ☒ NO
If the answer to question above is "yes," please explain project situation and how the project will ensure compliance with applicable requirements.		
Please add text here….		
Would the project involve or lead to:		
P.7.2.1 |	negative impact on the availability and reliability of energy supply to other users?	☐ YES ☐ POTENTIALLY ☒ NO
If the answer is "yes" or "potentially" to the above question, please provide a brief description of the project situation below. Also, provide justification and/or evidence as necessary to demonstrate compliance with applicable requirements.		
Please add text here….		

P.8 |WATER		
P.8.1 |IMPACT ON NATURAL WATER PATTERNS/FLOWS		
P.8.1.1 |	Does the project increase water usage to a level that will not allow for the maintenance of environmental flows?	☐ YES ☒ NO

P.8.1.1 |	Does the project result in the discharge of wastewater that does not meet the required standard for beneficial reuse and could therefore negatively impact the environmental flow?	☐ YES ☒ NO
P.8.1.1 |	Does the project have the potential risk to exceed the rate of recharge for the groundwater source?	☐ YES ☒ NO
P.8.1.1 |	Does the project involve any processes or activities that could contaminate the groundwater and render it unsuitable for use?	☐ YES ☒ NO

If the answer to any of the questions above is "yes," please explain project situation and how the project will ensure compliance with applicable requirements.

Please add text here….

Would the project involve or lead to:

P.8.1.1 |	affect the natural or pre-existing pattern of watercourses, groundwater and/or the watershed(s) such as high seasonal flow variability, flooding potential, lack of aquatic connectivity or water scarcity?	☐ YES ☐ POTENTIALLY ☒ NO
P.8.1.1 |	Wastewater discharge of quality that does not meet the required standard for beneficial reuse?	☐ YES ☐ POTENTIALLY ☒ NO
P.8.1.1 |	significant extraction, diversion of ground water? For example, construction of dams, reservoirs, river basin developments, groundwater extraction	☐ YES ☐ POTENTIALLY ☒ NO
P.8.1.2 |	Are opinions and recommendations of an Expert Stakeholder(s) not sought and demonstrated as being included in the project design?	☐ YES ☐ NO ☒ NA

If the answer is "yes" or "potentially" to any of the above questions, please provide a brief description of the project situation below. Also, provide justification and/or evidence as necessary to demonstrate compliance with applicable requirements.

Please add text here….

P.8.2 |EROSION AND/OR WATER BODY INSTABILITY

P.8.2.1 |	Does the project have a risk of negatively impacting the catchment and has it been assessed and addressed?	☐ YES ☒ NO

If the answer to question above is "yes," please explain project situation and how the project will ensure compliance with applicable requirements.

The project does not affect water bodies as the project activities take place at the household level and do not involve use of water. On the contrary the collection and use of animal waste for biodigesters prevents/reduces the potential risk of erosion of land and ground water due to run-off of animal waste.

Would the project involve or lead to:		
P.8.2.2 | - P.8.2.5 |	negatively impact on the catchment area? *If yes, Erosion prevention measures, including soil and slope protection measures, must be implemented before project commencement. These measures should involve natural terracing, infiltration strips, permanent ground cover, hedge and tree rows, and effective slope length assessment. Regular reassessment of these measures is necessary.*	☐ YES ☐ POTENTIALLY ☒ NO
P.8.2.6 |	Are opinions and recommendations of an Expert Stakeholder(s) not sought and demonstrated as being included in the project design?	☐ YES ☐ NO ☒ NA
If the answer is "yes" or "potentially" to any of the above questions, please provide a brief description of the project situation below. Also, provide justification and/or evidence as necessary to demonstrate compliance with applicable requirements.		
Please add text here….		

P.9 |ENVIRONMENT, ECOLOGY AND LAND USE

P.9.1 |LANDSCAPE MODIFICATION AND SOIL

P.9.1.1 | - P.9.1.3 |	Is there any risk of soil resource degradation or loss of ecosystem services provided by soils in the project? *If yes, the project shall maintain healthy soils by minimising negative impacts on soil health, productivity, structure, and water retention. Steps to minimise soil degradation include crop rotation, composting, using N-fixing plants, and reducing tillage and ecologically harmful substances.*	☐ YES ☒ NO
If the answer to question above is "yes," please explain project situation and how the project will ensure compliance with applicable requirements.		
Please add text here….		
Would the project involve or lead to:		
P.9.1.4 |	production, harvesting, and/or management of living natural resources by small-scale landholders and/or local communities?	☐ YES ☐ POTENTIALLY ☒ NO
P.9.1.4 |	if answer to above question "yes" or "potentially", does project adopt appropriate and culturally sensitive sustainable resource management practices?	☐ YES ☐ NO

		☒ NA

If the answer is "yes" or "potentially" to any of the above questions, please provide a brief description of the project situation below. Also, provide justification and/or evidence as necessary to demonstrate compliance with applicable requirements.

Please add text here….

P.9.2 |VULNERABILITY TO NATURAL DISASTER

P.9.2.1 |	Does the project have any risks associated with natural or man-made hazards that could result from land use changes due to the project?	☐ YES ☒ NO

If the answer to question above is "yes," please explain project situation and how the project will ensure compliance with applicable requirements.

Please add text here….

Would the project involve or lead to:

P.9.2.2 |	any potential risks that require emergency preparedness and response planning?	☐ YES ☐ POTENTIALLY ☒ NO
P.9.2.2 |	if answer to above question "yes" or "potentially", did the project developer disclose appropriate information about emergency preparedness and response to affected communities?	☐ YES ☐ NO ☒ NA

If the answer is "yes" or "potentially" to any of the above questions, please provide a brief description of the project situation below. Also, provide justification and/or evidence as necessary to demonstrate compliance with applicable requirements.

Please add text here….

P.9.3 |BIOSAFETY AND GENETIC RESOURCES

P.9.3.1 |	Does the project involve the transfer, handling, and use of genetically modified organisms/living modified organisms that may result in adverse effects on biological diversity?	☐ YES ☒ NO

If the answer to question above is "yes," please explain project situation and how the project will ensure compliance with applicable requirements.

Please add text here….

Would the project involve or lead to:

P.9.3.1 |	the transfer, handling and use of genetically modified organisms/living modified organisms (GMOs/LMOs) that result from modern biotechnology	☐ YES ☐ POTENTIALLY ☒ NO
P.9.3.1 |	If answer to above question is "yes" has a risk assessment by a competent Expert stakeholder been carried out in	☐ YES ☐ NO

	accordance with Annex iii of the Cartagena protocol on biosafety to the convention on biological diversity?	☒ NA
P.9.3.2 |	If answer to above question is "yes" has any risks identified in the risk assessment?	☐ YES ☐ NO ☒ NA
P.9.3.3 |	Forestry (for example Afforestation/Reforestation) involving GMO planting? *Note - Forestry projects (for example Afforestation/ Reforestation) involving GMO planting are not eligible for Certification under Gold Standard for the Global Goals.*	☐ YES ☐ NO ☒ NA

If the answer is "yes" or "potentially" to any of the above questions, please provide a brief description of the project situation below. Also, provide justification and/or evidence as necessary to demonstrate compliance with applicable requirements.

Please add text here….

P.9.4 |RELEASE OF POLLUTANTS

P.9.4.1 |	Does the project have a risk of releasing pollutants to air, water, and land in routine, non-routine, or accidental circumstances?	☐ YES ☒ NO

If the answer to question above is "yes," please explain project situation and how the project will ensure compliance with applicable requirements.

Please add text here….

Would the project involve or lead to:

P.9.4.1 |	any potential risk of pollutant release that cannot be avoided?	☐ YES ☒ POTENTIALLY ☐ NO
P.9.4.3 |	If answer to above question is "Yes" or "potentially", has the project identified all potential pollution sources that may degrade the quality of soil, air, surface, and groundwater in the project area?	☒ YES ☐ NO ☐ NA
P.9.4.2 |	If answer to above question is "Yes" or "potentially", do the pollution prevention and control technologies and practices applied during the project life cycle align with national regulations or international best practices?	☒ YES ☐ NO ☐ NA
P.9.4.3 |	If answer to above question is "Yes", is there a monitoring plan to ensure that mitigation measures are implemented, and resources are protected?	☒ YES ☐ NO ☐ NA

If the answer is "yes" or "potentially" to any of the above questions, please provide a brief description of the project situation below. Also, provide justification and/or evidence as necessary to demonstrate compliance with applicable requirements.

There is potential likeage of CO_2 in the project scenario. This has been included in the ex-ante emission reduction calculation of the project and will be monitoried. And If not for the

project and distributed technology, other types of more polluting fossil fuels would be used and that the project finally reduces CO_2e into the atmosphere.

P.9.5 |HAZARDOUS AND NON-HAZARDOUS WASTE

P.9.5.1 |	Does the project involve the generation of waste materials (both hazardous and non-hazardous)?	☐ YES ☒ NO
P.9.5.3 |	Does the project involve risk of release of hazardous materials resulting from their production, transportation, handling, storage, or use?	☐ YES ☒ NO
P.9.5.5 |	Does the project involve the use of any chemicals or materials subject to international bans or phase-outs?	☐ YES ☒ NO

If the answer to any of the questions above is "yes," please explain project situation and how the project will ensure compliance with applicable requirements.

Please add text here….

Would the project involve or lead to:

P.9.5.1 |	the generation and management of waste materials?	☐ YES ☐ POTENTIALLY ☒ NO
P.9.5.1 |	treatment, destruction, or disposal of waste material?	☐ YES ☒ NO ☐ NA
P.9.5.1 |	If answer to above question is “Yes”, does the project involve an environmentally friendly method that includes appropriate control of emissions and residues resulting from the handling and processing of waste material?	☐ YES ☐ NO ☒ NA
P.9.5.3 |	risk of release of hazardous materials resulting from their production, transportation, handling, storage, or use?	☐ YES ☐ NO ☒ NA
P.9.5.3 |	If answer to above question is "yes”, does project has measures in place to address health risks?	☐ YES ☐ NO ☒ NA
P.9.5.4 |	Involve manufacture, trade, and use of chemicals and hazardous materials subject to international bans or phase-outs due to their high toxicity to living organisms, environmental persistence, potential for bioaccumulation, or potential for depletion of the ozone layer	☐ YES ☐ POTENTIALLY ☒ NO

If the answer is "yes" or "potentially" to any of the above questions, please provide a brief description of the project situation below. Also, provide justification and/or evidence as necessary to demonstrate compliance with applicable requirements.

Please add text here….

P.9.6 |PESTICIDES & FERTILISERS		
P.9.6.1 |	Does the project involve the use of chemical pesticides?	☐ YES ☒ NO
P.9.6.5 |	Does the project involve purchase, store, manufacture, trade or use products that fall in Classes IA (extremely hazardous) and IB (highly hazardous)	☐ YES ☒ NO
P.9.6.6 |	Does the project use fertilisers, and if so, are measures being taken to minimise their use and nutrient losses to the environment?	☐ YES ☒ NO
If the answer to any of the questions above is "yes," please explain project situation and how the project will ensure compliance with applicable requirements.		
Please add text here….		
Would the project involve or lead to:		
P.9.6.1 |	chemical pesticides use for pest management?	☐ YES ☐ POTENTIALLY ☒ NO
P.9.6.4 |	If answer to question above is "yes" or "potentially", does project has documented Chemical Pesticides Policy in place?	☐ YES ☐ NO ☒ NA
P.9.6.5 |	purchase, store, use, manufacture, or trade in Class II (moderately hazardous) pesticides?	☐ YES ☐ POTENTIALLY ☒ NO
P.9.6.5 |	If answer to question above is "yes" or "potentially", does project has appropriate controls on manufacture, procurement, or distribution and/or use of these chemicals?	☐ YES ☐ NO ☒ NA
If the answer is "yes" or "potentially" to any of the above questions, please provide a brief description of the project situation below. Also, provide justification and/or evidence as necessary to demonstrate compliance with applicable requirements.		
Please add text here….		
P.9.7 |HARVESTING OF FORESTS		
P.9.7.1 |	Does the project have a risk of unsustainable forest management, including timber harvesting?	☐ YES ☒ NO
P.9.7.1 |	Does the project pose a risk of depleting biodiversity and ecosystem functionality in areas where improved forest management is undertaken?	☐ YES ☒ NO
P.9.7.1 |	Does the project risk not meeting requirements for environment-friendly, socially beneficial, and economically viable plantations using native species whenever possible?	☐ YES ☒ NO
If the answer to any of the questions above is "yes," please explain project situation and how the project will ensure compliance with applicable requirements.		

Please add text here….

P.9.8 |FOOD SECURITY

P.9.8.1 |	Does the project involve the risk of negatively influencing access to and availability of food for people affected?	☐ YES ☒ NO

If the answer to the question above is "yes," please explain project situation and how the project will ensure compliance with applicable requirements.

Please add text here….

Would the project involve or lead to:

P.9.8.1 |	modification of the quantity or nutritional quality of food available such as through crop regime alteration or export or economic incentives?	☐ YES ☒ POTENTIALLY ☐ NO

If the answer is "yes" or "potentially" to the above question, please provide a brief description of the project situation below. Also, provide justification and/or evidence as necessary to demonstrate compliance with applicable requirements.

P.9.8.1. *Project activities imrove the wellbeing of women in the project area as the distribution of biodigesters and use of clean cooking appliances saves time spent by women in collecting wood and cooking which they use for other productive activities. Use of clean energy for cooking also improves air quality in the kitchten and positivitely affecting health of women. See BUS_2023_Tabulation_15072024|Sheet 'Tabulasi' Cells AC3203 and AE3203*

P.9.9 | ANIMAL WELFARE

P.9.9.1 |	Does the project involve any risks to animal welfare? Animal welfare shall be ensured by providing access to water and food, appropriate environment, humane treatment, and staff training. Evidence of mistreatment will be treated as an immediate non-conformity.	☐ YES ☒ NO
P.9.9.2 |	Does the project involve any potential risk of excessive or inadequate use of veterinary medicines?	☐ YES ☒ NO
P.9.9.4 |	Does the project involve the risk of administering synthetic growth promoters, including hormones?	☐ YES ☒ NO

If the answer to any of the questions above is "yes," please explain project situation and how the project will ensure compliance with applicable requirements.

P.9.9.1. The user survey documents how project beneficiaries house and keep their cattle. See "BUS_2023_Tabulation_15072024", Sheet " BUS_23 (comp)", Columns TQ to VE

Would the project involve or lead to:		
P.9.9.1 |	animal husbandry or harvesting of fish populations or other aquatic species?[118]	☐ YES ☒ NO ☐ NA
P.9.9.1 |	limiting access for animals to basic needs like drinking water, adequate food, daylight, appropriate shelter etc.?	☐ YES ☐ POTENTIALLY ☒ NO
P.9.9.3 |	inadequate measures to isolate sick animals and control the spread of disease, especially zoonotic diseases?	☐ YES ☐ NO ☒ NA
P.9.9.5 |	inadequate low-stress methods, equipment, and facilities that facilitate calm animal movement.	☐ YES ☐ NO ☒ NA
P.9.9.6 |	inadequate measures to ensure that animals are exposed to the least stress possible during transportation and slaughtering?	☐ YES ☐ NO ☒ NA
P.9.9.7 |	inappropriate spacing per animal and stocking rates per land unit?	☐ YES ☐ NO ☒ NA
P.9.9.8 |	inadequate measures to address the specific needs of aquatic animals?	☐ YES ☐ NO ☒ NA
P.9.9.9 | P.9.9.10 |	primary production of living natural resources such as animal husbandry, aquaculture, and fisheries? If the answer is yes, implement industry-standard sustainable management practices in line with to one or more relevant and credible standards and utilise available technologies.	☐ YES ☐ NO ☒ NA
If the answer is "yes" or "potentially" to any of the above question, please provide a brief description of the project situation below. Also, provide justification and/or evidence as necessary to demonstrate compliance with applicable requirements.		
P.9.9.3. Manual on prevention of foot and mouth disease distributed to households.		
P.9.10 |HIGH CONSERVATION VALUE AREAS AND CRITICAL HABITATS		
P.9.10.1 |	Does the project have the risk of negatively impacting HCV areas and/or critical habitats?	☐ YES

[118] 'Involve' means if the project mechanism and/or impact(s) are achieved via changing animal husbandry practices in some way.

		☒ NO
P.9.10.2 |	Does the project in the project area or area of downstream impacts have risks to the following: native tree patches, individual native trees, freshwater resources (including rivers, lakes, swamps, temporary water bodies, and wells), habitats of rare, threatened, and endangered species, and biodiversity-enhancing areas?	☐ YES ☒ NO
If the answer to any of the questions above is "yes," please explain project situation and how the project will ensure compliance with applicable requirements.		
Please add text here….		
Would the project involve or lead to:		
P.9.10.1 |	identified habitats as HCV areas and or Critical habitats?	☐ YES ☐ POTENTIALLY ☒ NO
P.9.10.1 |	If answer to above question is "yes", does the project have any risks that could negatively impact the catchment, project success, and surrounding HCV and ecological assets, as well as any measurable adverse impacts on the criteria or biodiversity values for which the critical habitat was designated, and on the ecological processes supporting that biodiversity?	☐ YES ☐ NO ☒ NA
P.9.10.1 |	If answer to above question is "yes", is a robust, appropriately designed, and long-term Habitats and Biodiversity Action Plan absent which will make the project unable to achieve net gains of those biodiversity values for which the critical habitat was designated?	☐ YES ☐ NO ☒ N/A
P.9.10.2 |	Does the project area or area of downstream impacts have native tree patches, individual native trees, freshwater resources (including rivers, lakes, swamps, temporary water bodies, and wells), habitats of rare, threatened, and endangered species, and biodiversity-enhancing areas?	☐ YES ☐ POTENTIALLY ☒ NO
P.9.10.2 |	If the answer to the above question is "yes", will the project have any adverse effects on these areas?	☐ YES ☐ No ☒ NA
P.9.10.3 |	If the answer to above question is "yes", does the project has opportunities to minimise unwarranted conversion or degradation of the habitat and to enhance the habitat as part of its development?	☐ YES ☐ No ☒ NA
P.9.10.4 |	Is the project applying Land Use & Forest Activity Requirements and managing a minimum 10% of the project area to protect or enhance the biological diversity of native ecosystems following HCV approach as per the given requirements?	☐ YES ☐ No ☒ NA
P.9.10.5 |	Are opinions and recommendations of an Expert Stakeholder(s) not sought and demonstrated as being included in the project design?	☐ YES ☐ NO ☒ NA

If the answer is "yes" or "potentially" to any of the above question, please provide a brief description of the project situation below. Also, provide justification and/or evidence as necessary to demonstrate compliance with applicable requirements.
Please add text here….

P.9.11 |ENDANGERED SPECIES

P.9.11.1 |	Does the project lead to the reduction or negative impact on any recognised Endangered, Vulnerable or Critically Endangered species?	☐ YES ☒ NO

If the answer to question above is "yes," please explain project situation and how the project will ensure compliance with applicable requirements.
Please add text here….
Would the project involve or lead to:

P.9.11.2 |	distortion of habitats of endangered species?	☐ YES ☐ POTENTIALLY ☒ NA
P.9.11.2 |	If answer to the above question is “yes”, does the project plan to protect and enhance them?	☐ YES ☐ POTENTIALLY ☐ NO ☒ N/A
P.9.11.2 |	Are opinions and recommendations of an Expert Stakeholder(s) not sought and demonstrated as being included in the project design?	☐ YES ☐ NO ☒ NA

If the answer is "yes" or "potentially" to any of the above question, please provide a brief description of the project situation below. Also, provide justification and/or evidence as necessary to demonstrate compliance with applicable requirements.
Please add text here….

P.9.12 |INVASIVE ALIEN SPECIES

P.9.12.1 |	Does project introduce any alien species (not currently established in the country or region of the project) into new environments?	☐ YES ☒ NO

If the answer to question above is "yes," please explain project situation and how the project will ensure compliance with applicable requirements.
Please add text here….
Would the project involve or lead to:

P.9.12.1 |	risk of introducing any alien species with a high risk of invasive behaviour regardless of whether such introductions are permitted under the existing regulatory framework?	☐ YES ☐ POTENTIALLY ☒ NO
P.9.12.1 |	risk of potential accidental or unintended introductions including the transportation of substrates and vectors (such as soil, ballast, and plant materials) that may harbour alien species.	☐ YES ☐ POTENTIALLY ☒ NO
P.9.12.2 |	risk of spreading alien species into areas in which they have not already been established?	☐ YES ☐ POTENTIALLY ☒ NO

If the answer is "yes" or "potentially" to any of the above question, please provide a brief description of the project situation below. Also, provide justification and/or evidence as necessary to demonstrate compliance with applicable requirements.

Please add text here….

APPENDIX 2- CONTACT INFORMATION OF VPA IMPLEMENTER

Organisation name	Yayasan Rumah Energi (YRE)
Registration number with relevant authority	4023031331103902
Street/P.O. Box	Tanjung Barat Indah JI. Teratai VIII No.2 Blok L
Building	
City	Jakarta
State/Region	
Postcode	12530
Country	Indonesia
Telephone	+62-21 782 1086
E-mail	s.tondong@rumahenergi.org
Website	www.rumahenergi.org
Contact person	Sumanda Tondang
Title	Mr.

Salutation	
Last name	Sumanda
Middle name	
First name	Tondang
Department	
Mobile	
Direct tel.	
Personal e-mail	s.tondong@rumahenergi.org

APPENDIX 3- LUF ADDITIONAL INFORMATION

Risk of change to the Project Area during Project Certification Period:	N/A
Risk of change to the Project activities during Project Certification Period:	N/A
Land-use history and current status of Project Area:	N/A
Socio-Economic history:	N/A
Forest management applied (past and future)	N/A
Forest characteristics (including main tree species planted)	N/A
Main social impacts (risks and benefits)	N/A
Main environmental impacts (risks and benefits)	N/A
Financial structure	N/A

Infrastructure (roads/houses etc):	N/A
Water bodies:	N/A
Sites with special significance for indigenous people and local communities - resulting from the Stakeholder Consultation:	N/A
Where indigenous people and local communities are situated:	N/A
Where indigenous people and local communities have legal rights, customary rights or sites with special cultural, ecological, economic, religious or spiritual significance:	N/A

APPENDIX 4 - DESIGN CHANGES

A4.1. Details of proposed or actual design change

The VPA applies only the "Methodology for Animal Manure Management and Biogas use for Thermal Energy Generation (version 1.1)" replacing the "Technologies and Practices to Displace Decentralised Thermal Energy Consumption (TPDDTEC) v4.0" methodology.

A4.2. Describe the Impacts of Design Change on the following

a. Additionality

The design change does not impact the project additionality. See section B.5.

b. Applicability of methodology and other methodological regulatory documents with which the project activity has been certified

The VPA applies only the "Methodology for Animal Manure Management and Biogas use for Thermal Energy Generation (version 1.1)". This methodology replaces the application of the "Technologies and Practices to Displace Decentralised Thermal Energy Consumption (TPDDTEC) v4.0" methodology for biogas generation and

application for thermal energy project activities, originally adopted under the IDBP PoA.

c. Compliance with the monitoring plan of the applied methodology

The design change does not impact the compliance with the monitoring plan of the applied methodology. See section B.7

d. Level of accuracy and completeness in the monitoring of the project activity compared with the requirements contained in the registered monitoring plan

The design change does not impact the level of accuracy and completeness in the monitoring of the project activity compared with the requirements contained in the registered monitoring plan. See section B.7

e. ***Scale of the project activity***

The design change does not impact the scale of the project activity. See section A.4.

f. Stakeholder consultation

The design change does not impact the stakeholder consultation. See section E.1.

g. Sustainable development criteria

The design change does not impact the sustainable development criteria. See section B.6

h. Safeguarding assessment

The design change does not impact the safeguarding assessment. See section D.1.

i. Compliance with applicable legislation

The design change does not impact the compliance with applicable legislation . See table 3 in section A.1.1.

Revision History

Version	Date	Remarks
2.3	Dd/mm/yyyy	Editorial changes in line with V2.1 of the Safeguarding Principles and Requirements
2.2	21 June 2023	Editorial changes in line with V2.0 of the Safeguarding Principles and Requirements
2.1	14 April 2023	Integrated the design change memo as annex of the document.
2.0	4 May 2022	
1.1	7 October 2020	Hyperlinked section summary to enable quick access to key sections Improved clarity on Key Project Information Inclusion criteria table added Gender sensitive requirements added Prior consideration (1 yr rule) and Ongoing Financial Need added Safeguard Principles Assessment as annex and a new section to include applicable safeguards for clarity Improved Clarity on SDG contribution/SDG Impact term used throughout Clarity on Stakeholder Consultation information required Provision of an accompanying Guide to help the user understand detailed rules and requirements
1.0	10 July 2017	Initial adoption