

Verification and certification report form

Complete this form in accordance with the instructions attached at the end of this form.

BASIC INFORMATION

Title and GS reference number of the project activity	National Biodigester Programme, Cambodia GS reference number: 0751
Scale of the project activity	☒ Large-scale ☐ Small-scale
Version number of the verification and certification report	5
Completion date of the verification and certification report	04/09/2020
Monitoring period number and duration of this monitoring period	8 th Monitoring; 01/01/2019-31/12/2019
Version number of the monitoring report to which this report applies	1.5
Crediting period of the project activity corresponding to this monitoring period	01/01/2019 – 31/12/2025
Project participants	National Biodigester Programme (NBP)
Host Party	Cambodia
Applied methodologies and standardized baselines	Technologies and Practices to Displace Decentralized Thermal Energy Consumption version 3.1
Mandatory sectoral scopes	Scopes: 1: Energy industries (renewable - / non-renewable sources) and 13: Waste handling and disposal
Conditional sectoral scopes, if applicable	---
Estimated amount of GHG emission reductions or GHG removals for this monitoring duration in the registered PDD	SDG 2: 48,315 SDG 7: 117,838 SGD 13: 69865 tCO ₂ e
Certified amount of GHG emission reductions or GHG removals for this monitoring period	SDG 2: 17,055 SDG 7: 78,853 SDG 13: 62,440 tCO ₂ e
Name and GS reference number of the VVB	AENOR International, S.A.U (GS S.No.: 3)
Name, position and signature of the approver of the verification and certification report	José Luis Fuentes  Climate Change Manager

SECTION A. Executive summary

>>

AENOR INTERNACIONAL S.A.U (AENOR) has been contracted by National Biodigester Programme (NBP) to undertake this periodic independent verification of the registered GS programme titled "National Biodigester Programme, Cambodia" (GS reference number: 0751). The objectives of this verification are to verify and certify emission reductions reported for the programme for the monitoring period from 01/01/2019 to 31/12/2019 (first and last day included); and to verify that the data reported are complete and transparent.

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

The verification team has, based on the recommendations in the Validation and Verification Standard for project activities version 2.0 /8/ and GS requirements /23/, and employed a risk-based approach in the verification, focusing on the identification of significant risks and reliability of project monitoring and generations of GS-VERs. The verification is not meant to provide any consulting towards the client. However, stated request for clarifications and/or corrective actions may provide input for improvement of the project design.

The scope of the verification is the independent and objective review and ex-post determination of the monitored reductions in GHG emission by the programme. The verification is based on the validated project design document /1/ Version 02.1, dated 22/02/2019 (hereinafter validated or registered PDD) and previous verification report /11/. These documents were reviewed against the requirements of the Kyoto Protocol, the CDM Modalities and Procedures and related rules and guidance.

The programme is aimed to install biodigesters at household level to treat animal manure to generate biogas as cooking and lighting fuel and the bio-slurry from the systems will be used as organic fertilizer.

Animal manure is fed into the biodigester and anaerobically degraded by microbes to produce biogas. The biogas is captured in an integrated gasholder and stored for various household thermal energy services, mainly for cooking and lighting.

A typical system shall be comprised of a biodigester, an overflow pit, a biogas lamp, number of biogas stoves and the necessary piping. A toilet is connected to the biodigester is optional (recommended by the programme). The installation of a slurry compost facility for the effluent from a biodigester will further decompose the slurry under aerobic conditions. The composted slurry will be utilized as an organic fertilizer and/or fish feed.

The technology of the programme will reduce GHG emissions with (1) displacement of firewood used for cooking; (2) avoidance of methane emissions from the animal waste; and (3) displacement of chemical fertilizers.

The key parameters of the biodigesters and the number of units installed during the monitoring period are given in table below:

Size (m ³)	2	3	4	6	8	10	15	sum
Dung requirements (kg/day)	10-20	20-30	20-40	40-60	60-80	80-100	100-150	
Estimated biogas production (m³/day)	0.4-0.8	0.2-1.2	0.8-1.6	1.6-2.4	2.4-3.2	3.2-4.0	4.0-6.0	
units	55	736	16,124	9,827	879	248	111	27,980
share (%)	0.20%	2.60%	57.60%	35.10%	3.10%	0.90%	0.40%	100%

The details of the project location are given in Table below:

Description	Project Location			
Host Country	Cambodia			
Region	16 active out of 20 provinces in Cambodia			
Project location address	16 / 20 provinces in Cambodia during crediting period			
Latitude/longitude	#	Province	Latitude (xx° xx' xx" N)	Longitude (xx° xx' xx" W)
	1	Kampong Cham	11° 59' 00" N	105° 27' 00" E
	2	Kandal	11° 78' 30" N	104° 81' 70" E
	3	Svay Reang	11° 05' 00" N	105° 48' 00" E
	4	Takeo	10° 59' 00" N	104° 47' 00" E
	5	Kampong Speu	11° 27' 00" N	104° 30' 00" E
	6	Kampong Chhnang	12° 00' 00" N	104° 30' 00" E
	7	Kampot	10° 36' 00" N	104° 10' 00" E
	8	Kampong Som	10°38'00" N	103°30'00" E
	9	Kep	10°29'00" N	104°18'00" E
	10	Prey Veng	11°29' 00" N	105°19' 00" E
	11	Siem Reap	13°21'44" N	103°51'35"E
	12	Pursat	12°32'00" N	103°55'00" E
	13	Battambang	13°06'00" N	103°12'00" E
	14	Kampong Thom	12°42'00" N	104°53'00" E
	15	Tbong khmum	11°54'34"N	105°38'49"E
	16	Phnom Penh	11°33'43" N	104°53'18" E

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

The verification team, based on the remote interviews and document review, was able to conclude that the programme has been commissioned and implemented as per the PDD. The start date of this monitoring period is 01/01/2019 and by considering the end date of the previous monitoring period, the verification team has accepted the same.

The monitoring report for this monitoring period is in compliance with the monitoring plan /2/ of the registered PDD. The programme was registered by applying the GS methodology /16/ Technologies and Practices to Displace Decentralized Thermal Energy Consumption version 3.1 and the verification was carried out in accordance with the applied methodology. It was confirmed that the programme during the current verification is in accordance with the applicability criteria of the methodology.

It is the responsibility of AENOR to express an independent GHG verification opinion on the GHG emissions reductions and on the calculation of GHG emission reductions from the project for this monitoring period based on the reported emission reduction in the monitoring Report.

AENOR's verification approach was based on the requirements as defined under the Kyoto Protocol, Marrakech accord, as well as those defined by the CDM Executive board and Gold Standard Foundation (GS4GG). AENOR's approach was risk-based, drawing on an understanding of the risks associated with reported GHG emissions data and the controls in place to mitigate these. The examination includes assessment of evidence relevant to the amounts and disclosures in relation to the project's GHG emission reductions for this monitoring period.

The verification team has planned and performed the work to obtain the information and explanations that is considered necessary to provide sufficient evidence for it to give reasonable

assurance that the amount of calculated GHG emission reductions for this monitoring period were fairly stated.

SECTION B. Verification team, technical reviewer and approver

B.1. Verification team member

No.	Role	Type of resource	Last name	First name	Affiliation (e.g. name of central or other office of DOE or outsourced entity)	Involvement in			
						Desk/document review	On-site inspection	Interviews	Verification findings
1.	Team Leader	IR	Arribas Alonso	Luis Javier	AENOR	Yes	No	Yes	Yes

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

No.	Role	Type of resource	Last name	First name	Affiliation (e.g. name of central or other office of DOE or outsourced entity)
1.	Technical reviewer	IR	Gonzales Toledo	Richard Daniel	AENOR
2.	Approver	IR	Fuentes Pérez	José Luis	AENOR

SECTION C. Means of verification

C.1. Desk/document review

>>

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

The initial version of the monitoring report /3/ version 1.0 submitted by the project participant and additional background documents related to the emission reductions are reviewed as an initial step of the verification process. The subsequent step involved the identification of corrective action requests and clarification requests (CAR and CR) which are presented in Appendix 4 of this report. In response, PP has submitted MR /4/ version 1.4. A complete list of all documents and records reviewed is as attached in Appendix 3 of this report.

C.2. On-site inspection

in the case of this verification process of the programme, in accordance with the RULE UPDATE: COVID 19: INTERIM MEASURES published on 06/04/2020 and valid up to 01/09/2020, based on the alternative measures proposed in paragraph 4.1.1. b), the on-site visit has been replaced by a remote audit as a means of verification, due to the extraordinary world situation as consequence of the Corona virus.

Besides AENOR has considered additional circumstances to justify that the onsite visit to the programme during this verification process is not required, as we detail below:

- a) It is not an initial verification;
- b) The previous verification was carried out recently, less than a year, and in that verification the onsite visit was carried out in April 2019.
- d) There has been no significant change in the design of the project, scope, boundary of reporting or any other issue affects the estimated emission reductions since the previous verified statement;
- (f) The GHG emission reductions achieved by the programme are lower than the estimated in the registered PD and the last verification when an on-site inspection was conducted.

Due to the circumstances and the reasons explained above, the verification team of AENOR considers that alternative means of audit indicated in paragraph 4.2.2. of the Rule (i.e. document review of project documentation and remote interviews (by telephone, email, online communication systems, etc) will be enough for the purpose of verification of the compliance of the project with GS rules, and thus a site visit is not necessary.

Duration of on-site inspection: --/--/---- to --/--/----				
No.	Activity performed on-site	Site location	Date	Team member
--	---	---	--/--/----	----

C.3. Interviews

No.	Interviewee			Date	Subject	Team member
	Last name	First name	Affiliation			
1.	Buyzman	Eric	Carbon Consultant	27-30/04/2020	Verify the correct implementation of the project and the monitoring plan.	Luis Javier ARRIBAS ALONSO
2.	Nimol	Im	NBP / Database Officer			
3.	Savoeun	Kim	NBP / Programme Manager			
4.	Sambath	Him	NBP / Technical Manager			

C.4. Sampling approach

>>

The CMS sampling plan is developed using guidance of the applied GS methodology and the registered PDD.

The surveys are conducted on a sample size estimated by using the "General Guidelines for Sampling and Surveys for Small-scale CDM Project Activities" (CDM EB 69 Annex 5) which prescribes a 90% confidence interval with a 10 % error margin.

The CMS sample size is 165 households, which is divided between the number of clusters calculated.

A cluster is a district, and there are 129 districts in NBP. The calculated number of clusters is then 8. As per PDD, the number of clusters is at least k, or 8 in this case, but preferably more. Therefore, the PP defines for this MP, like all other MP's in CP11, this number was set at 15. The cluster size is consequently 165/15, it means 11 household per cluster or district.

The verification team has checked on the sampling plan and considered appropriate.

According to the Standard for sampling and surveys for CDM project activities and programme of activities, version 08.0 the verification team determined the following sample size for the remote check:

- AQL of 1%
- UQL of 20%
- Producer Risk of 5%
- Consumer Risk of 5%

Therefore, according to the sampling guidelines, 22 surveyed householders are required to be checked by the VVB and the acceptance number is 1, which means that number of discrepancies between VVB check and PP result must not exceed.

The selected households were interviewed by telephone/skype and in case of low coverage or reliable internet connection, NBP officers recorded the interview to the householder and sent it to the verification team, including the interview reports with the answers of the householder.

List of randomly selected 24 households for interview are included below:

Biodigester size	Biodigester code	Household Name (NBP database)	Province	District	Commune	Village
4	0505142117	Maen Pom Ngea	Kampong Spue	Odong	Phnom Touch	Roung Damrei
4	0505121638	Vong Saroeun	Kampong Spue	Odong	Chan Saen	Pal Hal
4	0505121743	Suon Kim	Kampong Spue	Odong	Preah Srae	Tuol Pongro
4	0505172907	Hay Mao	Kampong Spue	Odong	Damnak Reang	Pou
4	0505172904	Loek Heang	Kampong Spue	Odong	Prey Krasang	Kandak
3	0703184481	Chhin Nup	Kampot	Chhouk	Lbaeuk	Trapeang Thma
4	0703112337	Sea Sarem	Kampot	Chhouk	Baniev	Ta Mom
6	0703080068	Sem Theng	Kampot	Chhouk	Satv Pong	Trapeang Andoung
4	0703174323	Un Mao	Kampot	Chhouk	Mean Chey	Tul
4	0703112207	Kaeb Thou	Kampot	Chhouk	Krang Snay	Touch
4	0703133425	Heng Mee	Kampot	Chhouk	Mean Chey	Tul
4	0703164048	Huot Kim	Kampot	Chhouk	Trapeang Bei	Trapeang Bei
4	0703122966	Sok Un	Kampot	Chhouk	Tramaeng	Ang Khley
4	0704143617	Pich Oean	Kampot	Chum Kiri	Srae Samraong	Trapeang Prei
4	0704194573	Khem Cheap	Kampot	Chum Kiri	Tropaeng Reang	Ou
4	0704122862	Pov Phary	Kampot	Chum Kiri	Chres	Thmea
6	0704123057	Mum Tam	Kampot	Chum Kiri	Srae Knong	Damnak Chhnuol
6	0704123308	Long Seun	Kampot	Chum Kiri	Srae Knong	Tbaeng Pok

6	0706101 355	Koe Thon	Kampot	Kampong Trach	Damnak Kantuot Khang Tboung	Damnak Kantuot
6	0706133 404	Ngeth Houen	Kampot	Kampong Trach	Russey Srok Khang Kaeut	Ruessei Srok
6	0706123 023	Khan Khaem	Kampot	Kampong Trach	Boeng Sala Khang Tboung	Chres
6	0706101 475	Oun Phat	Kampot	Kampong Trach	Phnom Prasat	Spean Thom
6	0706123 018	Ing Seamhour	Kampot	Kampong Trach	Ang Sophy	Boeng Thum Khang Kaeut
8	0706133 324	Ing Sray	Kampot	Kampong Trach	Russey Srok Khang Lech	Lok

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

Areas of verification findings	No. of CL	No. of CAR	No. of FAR
Compliance of the monitoring report with the monitoring report form	---	CAR 3 CAR 4 CAR 5	---
Compliance of the project implementation and operation with the registered PDD	---	---	---
Post-registration changes	---	---	---
Compliance of the registered monitoring plan with the methodologies including applicable tools and standardized baselines	---	---	---
Compliance of monitoring activities with the registered monitoring plan	---	CAR 1 CAR 2	---
Compliance with the calibration frequency requirements for measuring instruments	CL 2	---	---
Assessment of data and calculation of emission reductions or net removals	---	---	---
Assessment of reported sustainable development co-benefits	---	---	---
Global stakeholder consultation	CL 1	---	---
Others	---	---	---
Total	2	5	0

SECTION D. Verification findings

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

Means of verification	As per para 352 and 353 of VVS /8/ for project activities version 2.0, the verification team has determined whether the monitoring report was completed using the valid version of the applicable monitoring report form /14/. The verification team has checked whether all the sections of the monitoring report follow the guidelines provided in the template itself.
Findings	CAR 3, CAR 4 and CAR 5 were raised. Appendix 4 summarizes the findings from the desk review of the Monitoring Report, the calculation spreadsheets /5/6/, the Monitoring Plan and other supporting documents as well as findings from the interviews.
Conclusion	PP has used the valid version of the MR template prescribed by GS which is current and active one. The monitoring report has been prepared as per the instructions provided in the GS and UNFCCC requirements. The verification team has concluded that the monitoring report was completed using the valid version of the applicable monitoring report form and is followed the guidelines given in the template.

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

>>

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

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

Means of verification	The compliance of the project implementation with the registered project design document was verified through the interviews and desk-review of documents provided by the project participants (All revised documents are listed in Appendix 3). The audit team reviewed the main technical features of the programme, including landfill, flaring, gas engines and other equipment are operational as per specifications mentioned in the PDD. Also an overview diagram of the facilities was provided to the audit team. The audit team verified the correct operation of the programme by reviewing different technical documentation and Operation registers. Project participants has provided all necessary information and documentation to demonstrate compliance of the implemented registered programme and monitored GHG emission with all applicable requirements to the Standard and applicable CDM rules
Findings	No finding was raised regarding this issue.
Conclusion	According to paragraph 356 of VVS, AENOR verification team confirms that: • The implementation status and equipment installation of the Project are consistent with the registered PDD. • The actual operation of the Project is as per the registered PDD. • Information (data and variables) provided in the monitoring report is in accordance with that stated in the registered PDD. • The actual GHG emission reductions achieved by the programme in the current monitoring period that have been reported in the monitoring report are lower than the estimated for the same monitoring period in the PDD.

D.4. Post-registration changes**D.4.1. Temporary deviations from the registered monitoring plan, applied methodologies, standardized baselines or other methodological regulatory documents¹**

>>

There is no temporary deviation for this monitoring period from the registered PDD.

D.4.2. Corrections

>>

Two corrections have been applied, the first one has been applied to project information and the second one has been applied to parameters fixed at validation, as it is detailed below:

1. The NBP project representative has changed, and the current contact person is Mr. Kim Savoeun.
2. The BFT scenario B3 is fixed for CPIII as per PDD, however was calculated incorrectly. The LPG data was obtained from the baseline survey data executed for CPIII. The LPG consumption calculated however was the average over the whole population irrespective of the baseline fuel use scenario of the sampled household. Thus, it includes households that did not have LPG as their main fuel which is not correct.
In this MR, the LPG consumption of B3 scenario was recalculated by extracting the data of the households that indicated that LPG is their main fuel.

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

>>

There is no change to the start date of the crediting period in this monitoring period.

D.4.4. Inclusion of a monitoring plan

>>

Not applicable

D.4.5. Permanent changes from registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines or other methodological regulatory documents

>>

Not applicable

D.4.6. Changes to the project design

>>

There is no such change.

D.4.7. Changes specific to afforestation and reforestation project activities

>>

Not applicable as the project does not involve afforestation and reforestation activity.

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

Means of verification	The compliance of monitoring plan with the monitoring methodology was verified by reviewing whether the GS programme was in accordance with the applied methodology and if any other monitoring aspect of the programme that is not specified in the methodology was established. During the desk review, the audit team was able to review different records and whether the monitoring methodology has been adequately considered and documented. The audit team verified the monitoring of reductions in GHG emissions to result from the proposed GS programme and whether it was implemented in accordance with the registered PDD and the project participant is recording the data and parameters following the monitoring methodology applied. Regarding this issue, the verification team reviewed: • The monitoring of reductions in GHG emissions to result from the proposed GS programme was implemented in accordance with the Monitoring Plan. • The monitoring plan and the applied methodology had been properly implemented and followed by the project participant. • All parameters stated in the monitoring plan, the applied methodology and other requirements have been sufficiently monitored and updated. • The responsibilities and authorities for monitoring and reporting were in accordance with the responsibilities and authorities stated in the monitoring plan. The audit team has verified that the monitoring of reductions in GHG emissions to result from the proposed GS programme is implemented in accordance with the monitoring plan.
Findings	No finding was raised regarding this issue.
Conclusion	The verification team reviewed whether the monitoring plan was in accordance with the applied methodology and any other monitoring aspect of the programme that is not specified in the methodology was established. The verification team confirms that the monitoring plan is in accordance with the applied methodology Technologies and Practices to Displace Decentralized Thermal Energy Consumption version 3.1 /16/ based on the following reasons: • During the desk review monitoring parameters included in the applied methodology were compared with the ones included in the Monitoring plan of the registered PDD, and they were found consistent. • The monitoring plan perfectly fulfils the criteria stated in the monitoring methodology.

- No other relevant aspects for monitoring not included in the methodology were identified.
- Therefore, AENOR, according to paragraph 357 of the VVS, confirms that the monitoring plan is in compliance with the approved methodology applied by the GS programme and applicable tool.

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

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

Means of verification	Data and parameters fixed ex ante were verified through desk-review of final version of monitoring report, registered PDD and methodology applied. The fixed parameters used for calculating the emission reduction have been indicated and verified as follows:		
	Relevant SDG indicator	13.2.1 “Number of countries that have communicated the establishment or operationalisation of an integrated policy/strategy/plan which increases their ability to adapt to the adverse impacts of climate change, and foster climate resilience and low greenhouse gas emissions development in a manner that does not threaten food production	
	Data / Parameter:	EF _{CO2}	
	Unit	kgCO ₂ /TJ fuel	
	Description:	CO ₂ emission factor arising from use of fuels in the baseline scenario and continued use of baseline fuels in the project scenario	
	Source of data	2006 IPCC Guidelines defaults, see chapter 2 Stationary Combustion: http://www.ipcc-nggip.iges.or.jp/public/2006gl/vol2.html	
	Value(s) applied	Fuel <i>b</i>	EF _{CO2} , (kg/TJ)
		LPG	63100
		Charcoal in wood eq	112000
		Firewood	112000
	Relevant SDG indicator	13.2.1 “Number of countries that have communicated the establishment or operationalisation of an integrated policy/strategy/plan which increases their ability to adapt to the adverse impacts of climate change, and foster climate resilience and low greenhouse gas emissions development in a manner that does not threaten food production	
	Data / Parameter:	EF _{CH4}	
	Unit	kgCH ₄ /TJ fuel	
	Description:	CH ₄ emission factor arising from use of fuels in the baseline scenario and continued use of baseline fuels in the project scenario	
	Source of data	2006 IPCC Guidelines defaults see chapter 2 Stationary Combustion: http://www.ipcc-nggip.iges.or.jp/public/2006gl/vol2.html , table 2.9	
Value(s) applied	Fuel <i>i</i>	EF _{CH4} , (kg/TJ)	
	LPG	11.95	
	Charcoal in wood equivalent	1224	
	Firewood	1224	
Relevant SDG indicator	13.2.1 “Number of countries that have communicated the establishment or operationalisation of an integrated policy/strategy/plan which increases their ability to adapt to the adverse impacts of climate change, and foster climate resilience and low greenhouse gas emissions development in a manner that does not threaten food production		
Data / Parameter:	EF _{i,N2O}		

Unit	kgN ₂ O/TJ fuel								
Description:	N ₂ O emission factor arising from use of fuels in the baseline scenario								
Source of data	2006 IPCC Guidelines defaults, see chapter 2 Stationary Combustion, table 2.9 http://www.ipcc-nggip.iges.or.jp/public/2006gl/vol2.html								
Value(s) applied	<table border="1"> <thead> <tr> <th>Fuel <i>i</i></th><th>EF_{N2O}, (kg/TJ)</th></tr> </thead> <tbody> <tr> <td>LPG</td><td>2.1</td></tr> <tr> <td>Charcoal in wood equivalent</td><td>11.25</td></tr> <tr> <td>Firewood</td><td>11.25</td></tr> </tbody> </table>	Fuel <i>i</i>	EF _{N2O} , (kg/TJ)	LPG	2.1	Charcoal in wood equivalent	11.25	Firewood	11.25
Fuel <i>i</i>	EF _{N2O} , (kg/TJ)								
LPG	2.1								
Charcoal in wood equivalent	11.25								
Firewood	11.25								

Relevant SDG indicator	13.2.1 “Number of countries that have communicated the establishment or operationalisation of an integrated policy/strategy/plan which increases their ability to adapt to the adverse impacts of climate change, and foster climate resilience and low greenhouse gas emissions development in a manner that does not threaten food production								
Data / Parameter:	NCV _{<i>i</i>}								
Unit	TJ/Gg								
Description:	Net calorific value of the fuel <i>i</i> used in the baseline								
Source of data	2006 IPCC Guidelines defaults, see chapter 1 Energy table 1.2 http://www.ipcc-nggip.iges.or.jp/public/2006gl/vol2.html								
Value(s) applied	<table border="1"> <thead> <tr> <th>Fuel <i>i</i></th><th>NCV_{<i>i</i>} (TJ/Gg)</th></tr> </thead> <tbody> <tr> <td>LPG</td><td>47.3</td></tr> <tr> <td>Charcoal in wood equivalent</td><td>15.6</td></tr> <tr> <td>Firewood</td><td>15.6</td></tr> </tbody> </table>	Fuel <i>i</i>	NCV _{<i>i</i>} (TJ/Gg)	LPG	47.3	Charcoal in wood equivalent	15.6	Firewood	15.6
Fuel <i>i</i>	NCV _{<i>i</i>} (TJ/Gg)								
LPG	47.3								
Charcoal in wood equivalent	15.6								
Firewood	15.6								

Relevant SDG indicator	13.2.1 “Number of countries that have communicated the establishment or operationalisation of an integrated policy/strategy/plan which increases their ability to adapt to the adverse impacts of climate change, and foster climate resilience and low greenhouse gas emissions development in a manner that does not threaten food production
Data/Parameter	B _{b1,wood}
Unit	Tonnes/year
Description	Amount of woody biomass used in the baseline scenario b1
Source of data	According to the registered PDD, this parameter had to be established once during MPI CPIII. Therefore, it has been determined with a kitchen Performance Test as per the requirements of the TPDDTEC mythology. As it is shown in BFT study MPI – file CPIII MPI spreadsheet.
Value(s) applied	1.145815

Relevant SDG indicator	13.2.1 “Number of countries that have communicated the establishment or operationalisation of an integrated policy/strategy/plan which increases their ability to adapt to the adverse impacts of climate change, and foster climate resilience and low greenhouse gas emissions development in a manner that does not threaten food production
Data/Parameter	B _{b2,charcoal}
Unit	Tonnes/year
Description	Amount of charcoal (in fuel-wood equivalents) used in the baseline scenario b2
Source of data	According to the registered PDD, this parameter had to be established once during MPI CPIII. it is shown in BFT study MPI – file CPIII MPI spreadsheet.

Value(s) applied	3.6685 (expressed in wood equivalents)
Relevant SDG indicator	13.2.1 "Number of countries that have communicated the establishment or operationalisation of an integrated policy/strategy/plan which increases their ability to adapt to the adverse impacts of climate change, and foster climate resilience and low greenhouse gas emissions development in a manner that does not threaten food production"
Data/Parameter	Bb3,LPG
Unit	Tonnes/year
Description	Amount of LPG used in the baseline scenario b3
Source of data	Although this parameter was fixed in the registered PDD for CPIII, as it has been explained in section D.4.2. of this report, it was calculated incorrectly, and for this reason, the correct calculation has been carried out in this MPI, in the spreadsheet ER database tab BFT_LPG, and it is fixed for the following monitoring period during the CPIII.
Value(s) applied	0.07993
Relevant SDG indicator	13.2.1 "Number of countries that have communicated the establishment or operationalisation of an integrated policy/strategy/plan which increases their ability to adapt to the adverse impacts of climate change, and foster climate resilience and low greenhouse gas emissions development in a manner that does not threaten food production"
Data / Parameter:	Charcoal to wood ratio
Unit	[]
Description:	Charcoal to wood conversion ratio
Source of data	SAR IPCC
Value (s) Applied	1:6
Relevant SDG indicator	13.2.1 "Number of countries that have communicated the establishment or operationalization of an integrated policy/strategy/plan which increases their ability to adapt to the adverse impacts of climate change, and foster climate resilience and low greenhouse gas emissions development in a manner that does not threaten food production"
Data / Parameter:	GWP _{CH4}
Unit	tCO ₂ e per tCH ₄
Description:	Global Warming Potential (GWP) of methane
Source of data	AR IPCC
Value (s) applied	25
Relevant SDG indicator	13.2.1 "Number of countries that have communicated the establishment or operationalisation of an integrated policy/strategy/plan which increases their ability to adapt to the adverse impacts of climate change, and foster climate resilience and low greenhouse gas emissions development in a manner that does not threaten food production"
Data / Parameter:	GWP _{N2O}
Unit	tCO ₂ e per tN ₂ O
Description:	Global Warming Potential (GWP) of nitrous oxide
Source of data	AR IPCC
Value (s) applied	298
Relevant SDG indicator	13.2.1 "Number of countries that have communicated the establishment or operationalisation of an integrated policy/strategy/plan which increases their ability to adapt to the adverse impacts of climate change, and foster climate resilience and low greenhouse gas emissions development in a manner that

	does not threaten food production		
Data / Parameter:	VS _(T)		
Unit	kg dry matter per animal per day		
Description:	Daily volatile solid excreted for livestock category T		
Source of data	Volume 4 of the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, chapter 10 (online: http://www.ipcc-nggip.iges.or.jp/public/2006gl/vol4.html)		
Value (s) applied	Animal	kgVS/day	
	Pig	0.3	
	Buffalo	3.9	
	Cow	2.3	

Relevant SDG indicator	13.2.1 "Number of countries that have communicated the establishment or operationalisation of an integrated policy/strategy/plan which increases their ability to adapt to the adverse impacts of climate change, and foster climate resilience and low greenhouse gas emissions development in a manner that does not threaten food production"		
Data / Parameter:	Bo _(T)		
Unit	m ³ CH ₄ per kg of VS excreted		
Description:	Maximum methane production capacity for manure produced by livestock category T		
Source of data	Volume 4 of the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, chapter 10 (online: http://www.ipcc-nggip.iges.or.jp/public/2006gl/vol4.html)		
Value (s) applied	Animal T	Bo _(T) m ³ CH ₄ /kgVS	
	Pig	0.29	
	Buffalo	0.10	
	Cattle	0.10	

Relevant SDG indicator	13.2.1 “Number of countries that have communicated the establishment or operationalisation of an integrated policy/strategy/plan which increases their ability to adapt to the adverse impacts of climate change, and foster climate resilience and low greenhouse gas emissions development in a manner that does not threaten food production																				
Data / Parameter	MCF(k)																				
Unit	%																				
Description	Methane conversion factors for each manure management system by climate region k (Cambodia 27.7 C)																				
Source of data	IPCC default values for the region Asia from volume 4 of the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, chapter 10 (online: http://www.ipcc-nggip.iges.or.jp/public/2006gl/vol4.html)																				
Value(s) applied	<table><tr><th>Anaero bic lagoon</th><th>Slur ry</th><th>Dry lot</th><th>Daily sprea d</th><th>Solid storag e</th><th>Other</th><th>Pasture</th></tr><tr><td>80%</td><td>78 %</td><td>2%</td><td>1.0%</td><td>5%</td><td>1%</td><td>2%</td></tr></table>							Anaero bic lagoon	Slur ry	Dry lot	Daily sprea d	Solid storag e	Other	Pasture	80%	78 %	2%	1.0%	5%	1%	2%
Anaero bic lagoon	Slur ry	Dry lot	Daily sprea d	Solid storag e	Other	Pasture															
80%	78 %	2%	1.0%	5%	1%	2%															

Relevant SDG indicator	13.2.1 "Number of countries that have communicated the establishment or operationalisation of an integrated policy/strategy/plan which increases their ability to adapt to the adverse impacts of climate change, and foster climate resilience and low greenhouse gas emissions development in a manner that does not threaten food production"		
Data / Parameter:	LE _{p,y}		

	Unit	tCO ₂ e/year	
	Description:	Leakage in project scenario during year y	
	Source of data	N/A	
	Value (s) applied	0	
	Relevant SDG indicator	13.2.1 "Number of countries that have communicated the establishment or operationalisation of an integrated policy/strategy/plan which increases their ability to adapt to the adverse impacts of climate change, and foster climate resilience and low greenhouse gas emissions development in a manner that does not threaten food production"	
	Data / Parameter:	EF _{awms,T}	
	Unit	kgCH ₄ per animal per year for livestock type T in the project	
	Description:	Animal waste methane emission factor by average temperature	
	Source of data	Baseline survey and data from IPCC default values for the region Asia from volume 4 of the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, chapter 10 (online: http://www.ipcc-nggip.iges.or.jp/public/2006gl/vol4.html)	
	Value (s) applied	Animal T	Value
		Cow	5.952
		Pig	14.928
		Buffalo	14.266
	Relevant SDG indicator	13.2.1 "Number of countries that have communicated the establishment or operationalisation of an integrated policy/strategy/plan which increases their ability to adapt to the adverse impacts of climate change, and foster climate resilience and low greenhouse gas emissions development in a manner that does not threaten food production"	
	Data / Parameter:	η _{biogasstove}	
Unit	[-]%		
Description:	Combustion efficiency of the biogas stove		
Source of data	Centre for Energy Studies, Institute of Engineering for the Nepal Biogas Support Programme		
Value (s) applied	99.4%		
Verification of data generation, aggregation and recording in this case is not applicable since they are fixed parameters from the registered PDD. The value for the fixed parameters in the registered PDD has been correctly used in calculation and reporting of emissions reductions for the monitoring period verified.			
Findings	No finding was raised regarding this issue.		
Conclusion	Data parameters fixed at validation, used for calculating the emission reduction, are in accordance with registered PDD, methodology and other requirements. All data sources and assumptions are appropriate, and calculations are correct as applicable to the proposed programme.		

D.6.2. Data and parameters monitored

Means of verification	The audit team carried out a review of information flows for generating, aggregating and reporting the monitoring parameters to assess a completeness of monitoring in line with the monitoring plan and the applied methodology, including: • The measurement/determination method used. • Relevant monitoring equipment, their features and the control and calibration procedures. • Significant inaccuracies occurred in case of measured or estimated values of some parameters.
------------------------------	--

- Measuring, reading and/or recording frequency.
- QA/QC procedures applied to prevent or identify and correct any errors or omissions in the reported monitoring parameters.

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

-

All data and supporting evidences were verified and found consistent and correct, which are detailed in the appendix 3 of this report.

Relevant SDG indicator	13.2.1 Number of countries that have communicated the establishment or operationalisation of an integrated policy/strategy/plan which increases their ability to adapt to the adverse impacts of climate change, and foster climate resilience and low greenhouse gas emissions development in a manner that does not threaten food production
Data / Parameter:	$f_{NRB,y}$
Unit	Fraction of Non-Renewable Biomass
Description:	Non-renewability status of woody biomass fuel in scenario i during year y
Measured/calculated /default	UNFCCC default value
Source of data	CDM SSC WG43 and accepted in EB meeting 77. The latest approved f_{NRB} figure by the Cambodia DNA
Value(s) of monitored parameter	77%

Relevant SDG Indicator	SDG 7.2.1: Proportion of population with primary reliance on clean fuels and technology
Data / Parameter	$B_{daily,y}$
Unit	percentage
Description	Share of biogas users that uses biogas at least once per day for cooking in year y
Measured/calculated /default	Measured using survey methods
Source of data	Excel file CPIII MPI spreadsheet SDG2&7 calculation
Value(s) of monitored parameter	96%
Measuring/reading/recording frequency:	Annual

Relevant SDG Indicator	SDG 7.2.1: Proportion of population with primary reliance on clean fuels and technology
Data/parameter:	$H_{s,y}$
Unit	Household size
Description	Number of family members permanent residing in the household in year y
Measured/calculated/default	Determined using survey methods

	Source of data	Excel file CPIII MPI spreadsheet SDG2&7 calculation
	Value(s) of monitored parameter	4.59
	Measuring/reading/recording frequency:	Annual
	Relevant SDG Indicator	Indicator 2.4.1 “Proportion of agricultural area under productive and sustainable agriculture
	Data/parameter:	%BS_y
	Unit	percentage
	Description	Share of households that uses bio-slurry for crop production in year y
	Measured/calculated/default	Determined using survey methods
	Source of data	Excel file CPIII MPI spreadsheet SDG2&7 calculation
	Value(s) of monitored parameter	96%
	Measuring/reading/recording frequency:	Annual
	Relevant SDG Indicator	Indicator 2.4.1 “Proportion of agricultural area under productive and sustainable agriculture
	Data/parameter:	%BS_y
	Unit	percentage
	Description	Share of households that uses bio-slurry for crop production in year y
	Measured/calculated/default	Determined using survey methods
	Source of data	Excel file CPIII MPI spreadsheet SDG2&7 calculation
	Value(s) of monitored parameter	96%
	Measuring/reading/recording frequency:	Annual
	QA/QC procedures:	Transparent data analysis and reporting
	Relevant SDG Indicator	Indicator 2.4.1 “Proportion of agricultural area under productive and sustainable agriculture
Data/parameter:	Abs_h	
Unit	hectare	
Description	Total area on which bio-slurry is applied	
Measured/calculated/default	Determined using survey methods	
Source of data	Excel file CPIII MPI spreadsheet SDG2&7 calculation	
Value(s) of monitored parameter	0.99	
Measuring/reading/recording frequency:	Annual	

	Relevant SDG Indicator	13.2.1 “Number of countries that have communicated the establishment or operationalisation of an integrated policy/strategy/plan which increases their ability to adapt to the adverse impacts of climate change, and foster climate resilience and low greenhouse gas emissions development in a manner that does not threaten food production							
	Data/parameter:	B_{p,y}							
	Unit	kg/ project household-year							
	Description	Quantity of biomass fuel that is consumed in the project scenario in year y							
	Measured/calculated/default	Determined using survey methods,							
	Source of data	Excel file CPIII MPI spreadsheet ER_fuel							
	Value(s) of monitored parameter	<table border="1"> <tr> <th>Fuel</th> <th>Average per household (kg/year)</th> </tr> <tr> <td>Charcoal in wood eq</td> <td>4.186</td> </tr> <tr> <td>Firewood</td> <td>69.466</td> </tr> </table>		Fuel	Average per household (kg/year)	Charcoal in wood eq	4.186	Firewood	69.466
	Fuel	Average per household (kg/year)							
	Charcoal in wood eq	4.186							
	Firewood	69.466							
	Monitoring equipment	newton scale							
	Measuring/reading/recording frequency:	Biennial, starting from MPI							
	Relevant SDG Indicator	13.2.1 “Number of countries that have communicated the establishment or operationalisation of an integrated policy/strategy/plan which increases their ability to adapt to the adverse impacts of climate change, and foster climate resilience and low greenhouse gas emissions development in a manner that does not threaten food production							
	Data/parameter:	B_{p,LPG}							
	Unit	kg/ project household-year							
	Description	Amount of LPG used in the project scenario							
	Measured/calculated/default	Determined using survey methods							
	Source of data	Excel file CPIII MPI spreadsheet ER_fuel							
	Value(s) of monitored parameter	16.423							
Monitoring equipment	Determined using survey methods, newton scale								
Measuring/reading/recording frequency:	Measured								
Calculation method (if applicable):	It is not practical to establish LPG consumption using the KPT for reasons of safety. Instead, households were be asked how often they buy a bottle and the bottle size will be recorded. Annual consumption was be calculated as: $\text{Annual LPG consumption } \left(\frac{\text{kg}}{\text{year}} \right) = \frac{\text{Bottle size (kg)}}{\text{Usage period (days)}} \times 365$								

	Relevant SDG Indicator	13.2.1 “Number of countries that have communicated the establishment or operationalisation of an integrated policy/strategy/plan which increases their ability to adapt to the adverse impacts of climate change, and foster climate resilience and low greenhouse gas emissions development in a manner that does not threaten food production																	
	Data/parameter:	B_{b,ratio}																	
	Unit	%																	
	Description	Baseline scenario ratios																	
	Measured/calculated/default	Measured																	
	Source of data	Excel file CPIII MPI spreadsheet ER_fuel																	
	Value(s) of monitored parameter	<table border="1"> <thead> <tr> <th>Baseline scenario</th><th colspan="2">% of users</th></tr> </thead> <tbody> <tr> <td>Households with main fuel wood</td><td>Bb1,ratio</td><td>91.5%</td></tr> <tr> <td>Households with main fuel charcoal</td><td>Bb2,ratio</td><td>1.2%</td></tr> <tr> <td>Household with main fuel LPG</td><td>Bb3,ratio</td><td>6.1%</td></tr> <tr> <td>Households using other fuels</td><td>n/a</td><td>1.2%</td></tr> </tbody> </table>			Baseline scenario	% of users		Households with main fuel wood	Bb1,ratio	91.5%	Households with main fuel charcoal	Bb2,ratio	1.2%	Household with main fuel LPG	Bb3,ratio	6.1%	Households using other fuels	n/a	1.2%
	Baseline scenario	% of users																	
	Households with main fuel wood	Bb1,ratio	91.5%																
	Households with main fuel charcoal	Bb2,ratio	1.2%																
	Household with main fuel LPG	Bb3,ratio	6.1%																
	Households using other fuels	n/a	1.2%																
	Monitoring equipment	Determined using survey methods																	
	Measuring/reading/recording frequency:	Annual																	
Calculation method (if applicable):	Households will be asked which baseline scenario they fell into before receiving a biogas digester. The four baseline scenarios are defined by asking the households “what is your primary fuel source for cooking purposes?”. The purpose of this question is to allocate a household to a baseline scenario, whereby ‘primary’ fuel consumption is defined as that fuel meeting more than 50% of their fuel needs for cooking purposes. The households that respond “firewood”, for example, are subsequently allocated to the baseline scenario b1. This means that households in, for example, baseline scenario b1 may also use small amounts of fossil fuels (i.e. secondary and tertiary fuels) for cooking, which will be included in the baseline emissions.																		
Relevant SDG Indicator	Indicator 2.4.1 “Proportion of agricultural area under productive and sustainable agriculture SDG 7.2.1: Proportion of population with primary reliance on clean fuels and technology 13.2.1 “Number of countries that have communicated the establishment or operationalisation of an integrated policy/strategy/plan which increases their ability to adapt to the adverse impacts of climate change, and foster climate resilience and low greenhouse gas emissions development in a manner that does not threaten food production																		

	Data/parameter:	$U_{p,y}$													
	Unit	Percentage													
	Description	Percentage of bio-digesters in use in monitoring period y													
	Measured/calculated/default	Calculated													
	Source of data	Usage survey spreadsheet USAGE_sampling and analysis sheet 'analysis'													
	Value(s) of monitored parameter	64.402%													
	Monitoring equipment	Determined using survey methods													
	Measuring/reading/recording frequency:	Annual													
	Calculation method (if applicable):	An assessment of the drop-off rate of usage requires that digesters of different age groups are assessed. Monitoring shall be carried out on a random sample of digesters of different ages. The minimum total sample size is 100, with at least 30 samples for biogas digesters of each age bracket (measured in annual increments) being surveyed. The usage rate of thermal applications will be monitored annually using survey methods to satisfy the requirements put forth by the methodology 'Technologies and practices to displace decentralized thermal energy consumption' V3 1 Up will be calculated as follows: $U_p = U_{us} \times UP_{us} \times C_y$ Where <table border="1"> <tr> <td>Up</td> <td>=</td> <td>Percentage of biodigesters in use</td> </tr> <tr> <td>Uus</td> <td>=</td> <td>Percentage of biodigesters in use during the usage survey</td> </tr> <tr> <td>UPus</td> <td>=</td> <td>Fraction of the year that digesters were temporarily out of use due to repairs or sale of animals on average in the MP</td> </tr> <tr> <td>Cy</td> <td>=</td> <td>Correction factor of the number of days out of operation biodigesters were in operation during monitoring year y. Calculated as</td> </tr> </table> $C_y = 1 - \frac{OUT_y}{TOT_y}$ Where, OUTy = cumulative plant years in operation of plants that went out of operation during in year y ((Total number of plants out of operation in the respective monitoring period* days in operation) / 365) TOTy= Plant-year of all plants in operation in year y (plants in operation x years in monitoring period, e.g. times 1 year during annual monitoring)		Up	=	Percentage of biodigesters in use	Uus	=	Percentage of biodigesters in use during the usage survey	UPus	=	Fraction of the year that digesters were temporarily out of use due to repairs or sale of animals on average in the MP	Cy	=	Correction factor of the number of days out of operation biodigesters were in operation during monitoring year y. Calculated as
	Up	=	Percentage of biodigesters in use												
Uus	=	Percentage of biodigesters in use during the usage survey													
UPus	=	Fraction of the year that digesters were temporarily out of use due to repairs or sale of animals on average in the MP													
Cy	=	Correction factor of the number of days out of operation biodigesters were in operation during monitoring year y. Calculated as													

	Relevant SDG Indicator	Indicator 2.4.1 “Proportion of agricultural area under productive and sustainable agriculture SDG 7.2.1: Proportion of population with primary reliance on clean fuels and technology 13.2.1 “Number of countries that have communicated the establishment or operationalisation of an integrated policy/strategy/plan which increases their ability to adapt to the adverse impacts of climate change, and foster climate resilience and low greenhouse gas emissions development in a manner that does not threaten food production								
	Data/parameter:	$N_{b,y}$								
	Unit	units								
	Description	Number of biogas plants commissioned								
	Measured/calculated/default	Measured								
	Source of data	CPIII MPI ER spreadsheet tab 'GEN_analysis cell D30								
	Value(s) of monitored parameter	27,980								
	Measuring/reading/recording frequency:	Continuous								
	QA/QC procedures:	100% of all plants are checked after completion of the construction by the PBP technician or by the BCAs. The results of the commissioning check are recorded. Only when the register is approved by NBP, data is entered into the central database. All Form 3, the hard copies, are stored at NBP.								
	Relevant SDG Indicator	13.2.1 “Number of countries that have communicated the establishment or operationalisation of an integrated policy/strategy/plan which increases their ability to adapt to the adverse impacts of climate change, and foster climate resilience and low greenhouse gas emissions development in a manner that does not threaten food production								
	Data/parameter:	$MS_{(T,S,k)}$								
	Unit	[-] %								
	Description	Fraction of livestock category T's manure fed into the bio-digester, S in climate region k								
	Measured/calculated/default	Measured								
	Source of data	Excel file CPIII MPI spreadsheet MS AWMS								
	Value(s) of monitored parameter	<table border="1"> <thead> <tr> <th>Livestock</th> <th>% fed into Biodigester</th> </tr> </thead> <tbody> <tr> <td>cow</td> <td>59.60%</td> </tr> <tr> <td>Pig</td> <td>39.78%</td> </tr> <tr> <td>Buffalo</td> <td>56.72%</td> </tr> </tbody> </table>		Livestock	% fed into Biodigester	cow	59.60%	Pig	39.78%	Buffalo
Livestock	% fed into Biodigester									
cow	59.60%									
Pig	39.78%									
Buffalo	56.72%									
Monitoring equipment	Determined using survey methods									
Measuring/reading/recording frequency:	Annual									

	Relevant SDG Indicator	13.2.1 “Number of countries that have communicated the establishment or operationalisation of an integrated policy/strategy/plan which increases their ability to adapt to the adverse impacts of climate change, and foster climate resilience and low greenhouse gas emissions development in a manner that does not threaten food production																																
	Data/parameter:	MS_(P,S,K)																																
	Unit	[-]																																
	Description	Fraction of livestock category T's manure not fed in the biodigester ,S in climate region k																																
	Measured/calculated/default	Measured and calculated																																
	Source of data	Excel file CPIII MPI spreadsheet MS AWMS																																
	Value(s) of monitored parameter	The MS of all the AWMS systems is shown below. The share not fed, is the sum of the non-biodigester AWMS systems: <table border="1"> <thead> <tr> <th></th> <th>slurry</th> <th>An lagoon</th> <th>Dry lot</th> <th>Daily spread</th> <th>Solid storage</th> <th>Other</th> <th>Pasture</th> </tr> </thead> <tbody> <tr> <td>Cow</td> <td>0.04%</td> <td>0.00%</td> <td>0.44%</td> <td>0.95%</td> <td>10.44%</td> <td>4.44%</td> <td>24.10%</td> </tr> <tr> <td>Pig</td> <td>2.34%</td> <td>13.70%</td> <td>1.48%</td> <td>2.75%</td> <td>20.61%</td> <td>15.50%</td> <td>3.84%</td> </tr> <tr> <td>Buffalo</td> <td>0.00%</td> <td>0.00%</td> <td>2.43%</td> <td>0.17%</td> <td>12.18%</td> <td>1.38%</td> <td>27.12%</td> </tr> </tbody> </table>		slurry	An lagoon	Dry lot	Daily spread	Solid storage	Other	Pasture	Cow	0.04%	0.00%	0.44%	0.95%	10.44%	4.44%	24.10%	Pig	2.34%	13.70%	1.48%	2.75%	20.61%	15.50%	3.84%	Buffalo	0.00%	0.00%	2.43%	0.17%	12.18%	1.38%	27.12%
		slurry	An lagoon	Dry lot	Daily spread	Solid storage	Other	Pasture																										
	Cow	0.04%	0.00%	0.44%	0.95%	10.44%	4.44%	24.10%																										
	Pig	2.34%	13.70%	1.48%	2.75%	20.61%	15.50%	3.84%																										
Buffalo	0.00%	0.00%	2.43%	0.17%	12.18%	1.38%	27.12%																											
Monitoring equipment	Determined using survey methods																																	
Measuring/reading/recording frequency:	Annual																																	
Additional comments:	The sum of the MS in the table in values applied is MS_{notfed}. The PP applies IPCC Tier 2 approach and will monitor the AWMS of the MS not fed into the digester. There is only one climate region k in Cambodia. Assumed is that manure excretion is on constant during the day and night on average and that the ratio of time not stabled is MS pasture. Thus if 8 hours are spent not stabled, the MS pasture is 8/24/100 = 30%																																	

	Relevant SDG Indicator	13.2.1 “Number of countries that have communicated the establishment or operationalisation of an integrated policy/strategy/plan which increases their ability to adapt to the adverse impacts of climate change, and foster climate resilience and low greenhouse gas emissions development in a manner that does not threaten food production								
	Data/parameter:	N_(T)								
	Unit	[-]								
	Description	Number of animals of livestock category T								
	Measured/calculated/default	Measured								
	Source of data	Excel file CPIII MPI spreadsheet ER_AWMS								
	Value(s) of monitored parameter	<table border="1"> <thead> <tr> <th>Animal (T)</th> <th>N_{(T),h}</th> </tr> </thead> <tbody> <tr> <td>Cow</td> <td>4.785</td> </tr> <tr> <td>Pig</td> <td>1.989</td> </tr> <tr> <td>Buffalo</td> <td>0.534</td> </tr> </tbody> </table>	Animal (T)	N _{(T),h}	Cow	4.785	Pig	1.989	Buffalo	0.534
	Animal (T)	N _{(T),h}								
Cow	4.785									
Pig	1.989									
Buffalo	0.534									
Monitoring equipment	Determined using survey methods									

	Measuring/reading/recording frequency:	Annual
	Relevant SDG Indicator	13.2.1 “Number of countries that have communicated the establishment or operationalisation of an integrated policy/strategy/plan which increases their ability to adapt to the adverse impacts of climate change, and foster climate resilience and low greenhouse gas emissions development in a manner that does not threaten food production
	Data/parameter:	PL
	Unit	%
	Description	Physical leakage of the biodigester
	Measured/calculated/default	Measured
	Source of data	Excel file CPIII MPI spreadsheet ER_AWMS
	Value(s) of monitored parameter	0.8%
	Monitoring equipment	Determined using survey methods
	Measuring/reading/recording frequency:	Annual
	Calculation method (if applicable):	The PP may opt to calculate the percentage of leakage as per section A6.3 of the applied methodology. On page 68 of section A.6.3 it is stated: <i>Where project participants use lower values or percentage of physical leakage, they should provide measurements proving that this lower value is appropriate for the project activity.</i> The measurement is as follows: In case households report that their digester leak, in case there is an obvious biogas smell, or when there is visible leakage, i.e. bubbling, it is assumed that the biodigester leaks. PL is therefore calculated as: $PL = 10\% * \%BDleak$ where $\%BDleak$ = the share of households with a leaking biodigester and 10% is the IPCC default value for physical leakage. In case the PP does not measure the leakage, $\%BDleak$ is 100% meaning that all plants are assumed to leak as per IPCC estimate.
	Relevant SDG Indicator	13.2.1 “Number of countries that have communicated the establishment or operationalisation of an integrated policy/strategy/plan which increases their ability to adapt to the adverse impacts of climate change, and foster climate resilience and low greenhouse gas emissions development in a manner that does not threaten food production
	Data/parameter:	$W_{(site)}$
	Unit	(kg)
	Description	Average pig weight at the project site (kg)
	Measured/calculated/default	Determined using survey methods
	Source of data	Excel file CPIII MPI spreadsheet ER_AWMS

	Value(s) of monitored parameter	52.75
	Measuring/reading/recording frequency:	Annual
	Calculation method (if applicable):	The weight of fattening pigs and piglets is the average between the weight entering the farm and leaving the farms. Pigs that stay for a long time at the farm, which are sows and boars, will be determined using credible methods from the literature as described in section E. In section E it is described how based on the girth and the length of the pig the weight can be determined reliably ² .
	QA/QC procedures:	At least 25% of all sows shall be measured. Boars are relatively rare and in case less than 5 boars can be measured the average sow weight will be adopted as boar weight. This is conservative as male pigs attain higher weights than female pigs
Findings	No finding was raised regarding this issue.	
Conclusion	According to paragraphs 360 and 361 of VVS, AENOR verification team confirms that: • The monitoring has been carried out in accordance with the monitoring plan in the registered PDD. • All parameters required by the monitoring plan have been measured / determined without material misstatements and in line with all applicable standards and relevant requirements. • The registered monitoring plan has been properly implemented and followed by the project participants; • All parameters stated in the registered monitoring plan and relevant Board decisions have been monitored and updated as applicable • The equipment used for monitoring is controlled and calibrated in accordance with the registered monitoring plan, the applied methodology and the national standard. • Monitoring results are consistently recorded as per the approved frequency; • Quality assurance and quality control procedures have been applied in accordance with the registered monitoring plan.	

D.6.3. Implementation of sampling plan

Means of verification	The verification team has been checked whether the PP has applied a sampling approach to determine the monitored values. Further it has been checked whether the PP has correctly applied the implemented sampling plan including (i) description of the implemented sampling design (ii) collected data (iii) analysis of collected data (iv) demonstration on whether the required confidence/precision has been met.
Findings	No finding was raised regarding this issue.
Conclusion	The sampling results must meet the 90% confidence and 10% precision limit. This analysis was carried out using sample size calculator tool provided as appendix 6 to Guidelines to sampling and surveys for CDM project activities and programme of

² As per the method described on this website <http://www.thepigsite.com/articles/541/weighing-a-pig-without-a-scale/>

	activities, Version 04.0 The PP demonstrates, by means of the sample size calculator tool provided as appendix 6 /30/ to Guidelines to sampling and surveys for CDM project activities and programme of activities, version 04.0 /30/ that the 90/10 confidence/precision is achieved so the estimated values are considered correct and no need for additional sampling efforts is required.
--	---

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

Means of verification	AENOR has verified the information stated in all the calibration certificates of the different equipment installed in the project and also their technical specifications from manufacturers in the current verification process.
Findings	CL2 was raised during the verification process and have been closed. Appendix 4 summarizes the findings from the desk review of the Monitoring Report, the calculation spreadsheets, the Monitoring Plan and other supporting documents as well as findings from the interviews.
Conclusion	According to paragraphs 365 and 371 of VVS, AENOR verification team confirms that the calibration is conducted at the frequency specified by the methodology and the registered monitoring plan.

D.8. Assessment of data and calculation of emission reductions or net removals

D.8.1. Calculation of baseline GHG emissions or baseline net GHG removals by sinks

Means of verification	Regarding to the Goal 2 contribution (SDG 2.4.1: Proportion of agricultural area under productive and sustainable agriculture) and Goal 7 contribution (SDG 7.2.1: Proportion of population with primary reliance on clean fuels and technology), the baseline outcome benefit is zero in both cases. SDG 13: Baseline estimate/ emission reductions According to the applied methodology the baseline emissions involve emission from use of fossil fuel and non-renewable biomass for cooking and heating, and emissions from the handling of animal waste in the baseline situation. BE_y = 65,915 t_{CO2e} Baseline emission from the thermal energy demand (BE_{th}) These emissions are the comparing of fuel consumption in a project scenario to the baseline scenario according to the approved revised GSPDD. In the baseline scenario the fossil fuel is LPG whilst the non-renewable fuel is firewood and charcoal. The equation applied: $BE_{b,y} = B_{p,y} \times ((fNRBy \times EF_{b,fuel,CO2}) + EF_{b,fuel,CO2}) \times NCV_{b,fuel}$ Baseline emissions of methane from the SWDS (BE_{awms,h}) The emissions from the animal waste management system of the baseline are determined using the IPCC 2006 Tier 2 approach. This approach is applicable for households with distinctive animal waste management system, where the majority of the waste is collected and where the animals are kept near the houses. The following formulas are used to estimate the animal waste management emissions. $BE_{awms,h} = GWP_{CH4} \times \sum_T (EF_{awms}(T) \times N(T), h)$ Where
------------------------------	--

	$BE_{awms,h}$ = The baseline emission from handling of animal waste in for premise h (tCO_{2e} per year) $N(T),h$ = Number of animals of livestock category T in premise h $EF_{awms,(T)}$ = Emission factor for the defined livestock category T, (tonCH₄ per animal per year) GWP_{CH_4} = Global warming potential of methane (tCO_{2e} per tCH₄): 25 for the second commitment period. It shall be updated to any future COP/MOP decision The emission factor ($EF_{awms(T)}$) for tier 2 approach is calculated as follows (equation 16 of the applied methodology), $EF_{awms(T)} = (VS_T \times 365) \times \left[Bo_T \times \frac{0.67kg}{m^3} \times \sum_k \frac{MCF_{T,k}}{100} \times MS_{(T,k)} \right]$ Where: $EF_{awms(T)}$ = CH₄ emission factor for livestock category T, (tCH₄ per animal per year) $VS_{(T)}$ = Daily volatile solid excreted for livestock category T, kg VS.animal⁻¹ 365 = Basis for calculating annual VS production, days yr⁻¹ Bo_T = Maximum methane producing capacity for manure produced by animal T m³ CH₄ kg⁻¹ of VS 0.67 = Conversion factor of m³ methane to kg methane $MCF_{T,k}$ = Methane conversion factors for the animal waste handling system from livestock category T of MS system k $MS_{T,k}$ = Fraction of livestock category T's manure in the animal waste management system k
Findings	No finding was raised regarding this issue.
Conclusion	According to paragraph 373 of VVS, AENOR verification team confirms that: • A complete set of data for the monitoring period is available. • Information on the baseline GHG emission calculation provided in the monitoring report has been cross-checked with other sources. • Calculations of baseline emissions have been carried out in accordance with the formulae and methods described in the monitoring plan and the applied methodology. • There are no assumptions in emission calculations. • Appropriate emission factor, IPCC default values and other reference values have been correctly applied. • No errors, miscalculations, omissions, misstatements or incomplete information has been identified.

D.8.2. Calculation of project GHG emissions or actual net anthropogenic GHG removals by sinks

Means of verification	The project emission for the goal 2 contribution (SDG 2.4.1: Proportion of agricultural area under productive and sustainable agriculture) are calculated, considering the households that reply on bio-slurry as sustainable organic fertilizer, with the following formulae: $A_{bs,y} = N_{b,y} \times U_y \times \%BS_y \times A_{bs,h,y}$ The project emission for the goal 7 contribution (SDG 7.2.1: Proportion of population with primary reliance on clean fuels and technology), are calculated, considering the households that reply on bio-slurry as sustainable organic fertilizer, with the following formulae: $P_{clean,y} = N_{b,y} \times U_y \times B_{daily} \times H_{s,y}$
------------------------------	---

	As per PDD, only the following project emissions are calculated as project emissions for SDG 13: 1. Continued use of baselines fuels in the project scenario 2. Emissions attributed to AWMS in the project scenario, incomplete combustion and physical leakage 1. Continued use of baselines fuels in the project scenario The project scenario is defined by the fuel consumption of end users within the targeted population that adopts the biodigester technology. This formula calculates the project emissions per household (as per equation 5 of TPDDTEC v3.1) $PE_{p,y} = B_{p,y} * ((f_{NRB, y} * EF_{p,fuel, CO2}) + EF_{p,fuel, nonCO2}) * NCV_{p, fuel}$ Where: $PE_{p,y}$ Emissions for project scenario p during year y in tCO₂e $B_{p,y}$ Quantity of fuel consumed in project scenario p during year y, in tons, and as derived from the statistical analysis conducted on the data collected during the project performance field tests (cases when no baseline performance field test is performed, e.g. by-default baseline factors) $f_{NRB, y}$ Fraction of biomass used during year y that can be established as nonrenewable biomass (drop this term from the equation when using a fossil fuel baseline scenario) $NCV_{p,fuel}$ Net calorific value of the project fuel (IPCC default for wood fuel, 0.015 TJ/ton). This is equal to the baseline fuel NCV in projects which use the same fuel. $EF_{p,fuel,CO2}$ CO₂ emission factor of the project fuel. This is equal to the baseline fuel EF in projects which use the same fuel, 112 tCO₂/TJ for Wood/Wood Waste, or the IPCC default value of other relevant fuel $EF_{p,fuel,nonCO2}$ Non-CO₂ emission factor of the project fuel. This is equal to the baseline fuel EF in projects which use the same fuel. 2. Emissions attributed to AWMS in the project scenario, incomplete combustion and physical leakage The project emissions involve emissions from the bio-digester, which include physical leakage and incomplete combustion of biogas, as well as emissions from the animal waste not treated in the bio-digester. The EF_{AWMS} in the project scenario has been calculated using the IPCC Tier 2 approach using default values for the maximum methane potential (Bo), volatile solids excretion (VS) and methane density and the manure management category biodigester. $PE_y = 3,474 \text{ tCO}_2\text{e}$
Findings	No finding was raised regarding this issue.
Conclusion	According to paragraph 373 of VVS, AENOR verification team confirms that: - A complete set of data for the monitoring period is available. - Information on the baseline GHG emission calculation provided in the monitoring report has been cross-checked with other sources. - Calculations of project emissions have been carried out in accordance with the formulae and methods described in the monitoring plan and the applied methodology. - There are no assumptions in emission calculations. - Appropriate emission factor, IPCC default values and other reference values have been correctly applied. - No errors, miscalculations, omissions, misstatements or incomplete information has been identified. In AENOR's opinion, monitoring practices are deemed appropriate and consistent with the monitoring plan and the relevant guidance provided by the CDM Executive

Board.

D.8.3. Calculation of leakage GHG emissions

Means of verification	Most household keep their baseline stove for logical reasons, a small percentage give their stove away which does not lead to additional fuel usage. This result supports the PDD argument that leakage is negligible and can be ignored in this CPIII as it was in CPI and CPII ($L_y=0$).
Findings	N/A
Conclusion	N/A

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

Means of verification	According to the methodology Technologies and Practices to Displace Decentralized Thermal Energy Consumption version 3.1, the emissions reductions due to the SDG 13 are calculated as follows:																							
	$ER_{y,h} = U_{y,h} \times (BE_{y,h} - PE_{y,h}) \times N_{p,y}$																							
	Where:																							
	$ER_{y,h}$	=	Annual average emission reductions in year y																					
	$U_{y,h}$	=	Cumulative usage rate for technologies in project scenario p in year y, based on cumulative adoption rate and drop off rate revealed by usage surveys																					
	$BE_{y,h}$	=	Annual average baseline emissions per household in year y																					
	$PE_{y,h}$	=	Annual average project activity emissions per household in year y																					
	$N_{p,y}$	=	Total number of biogas units commissioned as of year y																					
	The project participant has provided the verification team with all data (spreadsheets) corresponding to the monitoring period verified. Conservative assumptions have been taken by the project participant when incidents happened. AENOR has verified that data in ER spreadsheets are consistent with sources.																							
	Based on the above description, the emission reductions have been conservatively calculated to be 62,440 tCO ₂ e.																							
The net benefits due to the SDG2 and SDG 7 are the same as the project value.																								
The summary of ex-post values of each SDG outcome for the current monitoring period is indicated below:																								
<table><tr><th>SDG</th><th>Unit</th><th>Baseline estimate</th><th>Project estimate</th><th>Net benefit</th></tr><tr><td>SDG2</td><td>Hectares on which bio-slurry is applied</td><td>0</td><td>17,055</td><td>17,055</td></tr><tr><td>SDG7</td><td>Total number of households using primarily biogas</td><td>0</td><td>78,853</td><td>78,853</td></tr><tr><td>SDG13</td><td>tCO2</td><td>65,915</td><td>3,474</td><td>62,440</td></tr></table>					SDG	Unit	Baseline estimate	Project estimate	Net benefit	SDG2	Hectares on which bio-slurry is applied	0	17,055	17,055	SDG7	Total number of households using primarily biogas	0	78,853	78,853	SDG13	tCO2	65,915	3,474	62,440
SDG	Unit	Baseline estimate	Project estimate	Net benefit																				
SDG2	Hectares on which bio-slurry is applied	0	17,055	17,055																				
SDG7	Total number of households using primarily biogas	0	78,853	78,853																				
SDG13	tCO2	65,915	3,474	62,440																				
Findings	No finding was raised regarding this issue.																							
Conclusion	According to paragraph 373 of VVS, AENOR verification team confirms that: - A complete set of data for the monitoring period is available. - Information provided in the monitoring report has been cross-checked with other sources. - A complete set of data for the monitoring period is available. - Information on the baseline GHG emission calculation provided in the monitoring report has been cross-checked with other sources.																							

	- Calculations of project emissions have been carried out in accordance with the formulae and methods described in the monitoring plan and the applied methodology. - There are no assumptions in emission calculations. - Appropriate emission factor, IPCC default values and other reference values have been correctly applied. - No errors, miscalculations, omissions, misstatements or incomplete information has been identified. Calculations of baseline emissions, and programme emissions and leakage, as appropriate, have been carried out in accordance with the formulae and methods described in the monitoring plan and the applied methodology.
--	--

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

Means of verification	The actual values achieved during the current monitoring period are lower than the values stated in the registered PDD, due to a reduction in the usage rate and a smaller than average area on which bio-slurry is applied.		
	Item	Values estimated in ex ante calculation of approved PDD	Actual values achieved during this monitoring period
	SDG 2	42,829	17,055
	SDG 7	104,458	78,853
	SDG 13	69,865	62,440
Findings	No finding was raised regarding this issue.		
Conclusion	AENOR verification team confirms that: A comparison of actual GHG emission reductions or net anthropogenic GHG removal of the programme achieved during this monitoring period with the estimates in the registered PDD has been provided. The verification team considers that the calculation of the comparison is correct.		

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

Means of verification	The actual emission reductions achieved during the current monitoring period are lower than the emission reductions stated in the registered PDD.
Findings	No CARs/CLs/FARs raised in this section.
Conclusion	The comparison of emission reductions is transparently included in the Monitoring report. It is not necessary to provide a justification because the emission reductions achieved during the current monitoring period are lower than the emission reductions stated in the registered PDD, therefore, it is in accordance with CDM Project Standard /12/ for project activities.

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

Means of verification	The verification team has checked section E.4 of the MR and the ER calculation
------------------------------	--

	Spreadsheet, and could states that the GHG emission reductions have completely been generated from 1 January 2013 onwards, because the monitoring period correspond to 2019.
Findings	No CARs/CLs/FARs raised in this section.
Conclusion	AENOR confirms the emission reductions achieved during this monitoring period were generated from 1 January 2013 onwards.

D.9. Local stakeholder consultation process

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

Moreover, the audit team verified for 2019 the external communication record where all the input/grievances received are registered and the evidence of some answer delivered due to the input/grievances received. Hence accepted by the verification team /21/.

CL 1 was raised regarding the information recorded about the input/grievances received and it was clarified and closed.

Appendix 4 summarizes the findings from the desk review of the Monitoring Report, the calculation spreadsheets /5/6/, the Monitoring Plan and other supporting documents as well as findings from the interviews.

D.10. Double counting of emissions reductions

According to the rules stated by Gold Standard to assure that no double counting could happen, AENOR has verified during the desk review and the interviews that all biogas obtained from the programme is registered and used by the GS project and no other carbon project exist close that can used the same biogas or installations.

Furthermore, AENOR has checked the following registries/platforms in order to verify that they do not hold RECs from this project:

- UNFCCC Clean Development Mechanism (<https://cdm.unfccc.int/Projects/projsearch.html>).

Only 10 projects are registered and 4 are biogas projects: 3 projects consist in biogas plants installed in industrial factories to use the wastewater generated by an existing ethanol manufacturing plant, wastewater generated as consequence of the processing of the cassava root to produce tapioca starch. One of the registered projects recovers the methane generated from the wastewater of Samrong Thom Animal Husbandry (STAH) piggery farm in Kien Svay district, Kandal province, Cambodia.

- Verified Carbon Standard. No similar projects to the programme are registered.
- HIS Markit registry
- APX registry.

AENOR confirms that there is no evidence of a possible double counting of emissions reductions during the current monitoring period

SECTION E. Internal quality control

>>

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

SECTION F. Verification opinion

>>

AENOR has performed the verification of the emission reductions of the “National Biodigester Programme, Cambodia” for the period from 01/01/2019-31/12/2019.

The verification approach was based on the requirements as defined under the Kyoto Protocol, Marrakech accord, Montreal COP/MOP 1, Nairobi COP/MOP 2 as well as those defined by the CDM Executive Board.

AENOR planned and performed the verification to obtain the information, explanations and evidence that we considered necessary to provide sufficient evidence for us to give reasonable assurance that the amount of GHG emission reductions for the reporting period, prepared on the basis of both the registered monitoring plan and the final monitoring report, are fairly stated. AENOR conducted the verification with regard to the monitoring plan included in the registered Project Design Document, and the applied methodology as registered for the project. This assessment included:

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

AENOR has verified whether the information included in the final monitoring report is correct and that the emissions reductions achieved have been determined correctly.

In AENOR's opinion, GHG emissions reported for the project in the final monitoring report are fairly stated.

The GHG emission reductions were calculated without material errors, omissions or misstatements in a conservative and appropriate manner according to the approved methodology “Technologies and Practices to Displace Decentralized Thermal Energy Consumption” version 3.1 and the monitoring plan and formulae provided in the registered PDD.

SECTION G. Certification statement

>>

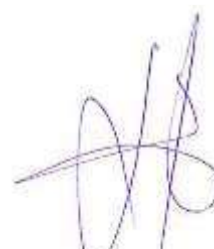
AENOR is able to certify that the results achieved by the “National Biodigester Programme, Cambodia” for the period from 01/01/2019-31/12/2019 amount to 62,440 GSVERs.

SDG	Unit	Net benefit
SDG2	Hectares on which bio-slurry is applied	17,055
SDG7	Total number of households using primarily biogas	78,853
SDG13	tCOe2	62,440

Madrid, September 4th, 2020.



Luis Javier Arribas Alonso
Team Leader



José Luis Fuentes
Climate Change Manager

Appendix 1. Abbreviations

Abbreviations	Full texts
AENOR	AENOR INTERNACIONAL S.A.U.
TPDDTECConsumption	Technologies and Practices to Displace Decentralized Thermal Energy Consumption version 3.1
CAR	Corrective action request
CDM	Clean Development Mechanism
CEF	Carbon Emission Factor
VER	Verified Emission Reduction(s)
CL	Clarification request
CH ₄	Methane
CO ₂	Carbon Dioxide
CO ₂ e	Carbon dioxide equivalent
NBP	National Biodigester Programme
VVB	Verification and Validation Bodies
FAR	Forward action request
GHG	Greenhouse Gases
GWP	Global Warming Potential
IPCC	Intergovernmental Panel on Climate Change
MP	Monitoring Plan
MR	Monitoring Report
PDD	Project Design Document
PP	Project Participant
tC	Carbon tonnes
tCO ₂ e	Carbon dioxide equivalent tonnes
TJ	Tera Joules
UNFCCC	United Nations Framework Convention on Climate Change
VVS	CDM validation and verification standard for project activities (version 02.0)

PCP	CDM project cycle procedure for project activities (Version 02.0)
PS	CDM project standard for project activities (Version 02.0)

Appendix 2. Competence of team members and technical reviewers

CERTIFICATE OF QUALIFICATION

Subject: Verification and Technical Review Team for “National Biodigester Programme, Cambodia”

Madrid, 04/09/2020

Hereby I confirm the following records of qualification, according with AENOR internal instruction “Validation, Verification and Certification of Clean Development Mechanism (CDM) project activities” IE-DTC-039, and in relation with the verification process of the above mentioned programme:

Name: Luis Javier ARRIBAS ALONSO

CDM Team Leader: Yes

CDM Validator: N/A

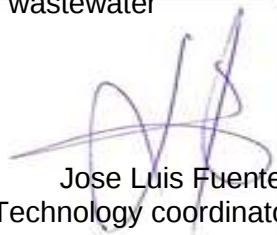
CDM Verifier: Yes

CDM Technical Reviewer: N/A

External Technical Expert: N/A

Technical areas related with the programme: TA 1.2. Renewables

TA 13.1. Solid waste and wastewater



Jose Luis Fuentes
Technology coordinator

CERTIFICATE OF QUALIFICATION

Subject: Verification and Technical Review Team for "National Biodigester Programme, Cambodia"

Madrid, 04/09/2020

Hereby I confirm the following records of qualification, according with AENOR internal instruction "Validation, Verification and Certification of Clean Development Mechanism (CDM) project activities" IE-DTC-039, and in relation with the verification process of the above mentioned programme:

Name: Richard Daniel GONZALES TOLEDO

CDM Team Leader: No

CDM Validator: N/A

CDM Verifier: Yes

CDM Technical Reviewer: N/A

External Technical Expert: N/A

Technical areas related with the programme: TA 1.2. Renewables
TA 13.1. Solid waste and wastewater

A handwritten signature in blue ink, appearing to read 'JL Fuentes', is written over a faint, light blue circular stamp or watermark.

Jose Luis Fuentes
Technology coordinator

Appendix 3. Documents reviewed or referenced

No.	Author	Title	References to the document	Provider
1	PP	Registered GS PDD, version 2.1	22/02/2019	GS Website
2	PP	Monitoring plan registered	22/02/2019	GS Website
3	PP	Monitoring report, version 01	26/03/2020	PP
4	PP	Monitoring report, version 1.5	31/08/2020	PP
5	PP	16MAR20_NBP_CPIII_MPI_ER_spreadsheet		PP
6	PP	29June20_NBP_CPIII_MPI_ER_spreadsheet		PP
7	AENOR	Validation, Verification and Certification of Clean Development Mechanism (CDM) Project Activities	IE/DTC/039	AENOR
8	UNFCCC	CDM Validation and Verification Standard for project activities	Version 02.0	UNFCCC Website
9		Daily scale check	2019	PP
10	TUV NORD	Validation report form for renewal of crediting period for CDM PA (CPIII)	22/02/2019	GS web site
11	TUV NORD	GS Verification and Certification report -7 th periodic	13/06/209	GS web site
12	UNFCCC	CDM project standard for project activities	Version 02.0	UNFCCC Website
13	UNFCCC	CDM project cycle procedure for project activities	Version 02.0	UNFCCC Website
14	GS	Gold standard for the global goals Monitoring report	Version 01.0	GS Website
15		Biodigester sales contracts		PP
16	GS4GG	Technologies and Practices to Displace Decentralized Thermal Energy Consumption"	version 3.1	GS4GG
17	IPCC	2006 IPCC Guidelines on National GHG Inventories	2006	IPCC
18		Remote interview questioners	04/2019	PP
19		Remote interview videos	04/2019	PP

20		17MAR20_CPI_MPI_USAGE_sampling and analysis		PP
21		NBP CPIII MPI 2019 Grievance list		PP
22		13FEB20 CPIII MPI CMS hh list extra hh v2		PP
23	GS	Gold Standard for The Global Goals Principles & Requirements	Version 1.2	GS website
24		Training Report on Usage Survey Training	16/01/2020	PP
25		Training on Carbon Data Collection MRI CPIII	31/01/2020	PP
29	GS	SAFEGUARDING PRINCIPLES & REQUIREMENTS	Version 1.2	GS website
30	UNFCCC	Guideline: Sampling and surveys for CDM project activities and programmes of activities	Version 04.0	UNFCCC
31	UNFCCC	Standard Sampling and surveys for CDM project activities and programmes of activities	Version 08.0	UNFCCC

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

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

FAR ID	Section no.	Date:
Description of CL		
NA		
Project participant response		Date:
Documentation provided by project participant		
DOE assessment		Date:

Table 2. CL from this verification

CL ID	CL 1	Section no.	F.1	Date: 25/05/2020
Description of CL				
In the excel file "2019 Feedback input" provided as evidence of the grievances received, there are 2 technical issues that are considered as "repaired" in the monitoring report but appear as blank in the excel file. Please clarify.				
Project participant response				Date: 03/06/2020
This was a mistake in the MR. This is now made consistent with the excel file				
Documentation provided by project participant				
MR V1.2				

VVB assessment	Date: 26/06/2020
The information of the MR is still inconsistent because the 12 cases repaired and the 4 cases pending do not sum the 18 inputs with technical issues. The PP shall clarify the information about the status of the 2 inputs that appear as blank in the excel file.	
Project participant response	Date: 26/06/2020
NBP followed up on HH71 and 72 and the status is repaired now. Out of the 18 issues, 14 are repaired, 4 not yet	
Documentation provided by project participant	
NBP CPIII MPI 2019 Grievance list updated MR version 1.3.	
VVB assessment	Date: 14/07/2020
Now, the information included in the excel file "NBP CPIII MPI 2019 Grievance list updated" is consistent with the information of the updated MR, version 1.4. Therefore, the CL is closed.	

CL ID	CL 2	Section no.	D.7.	Date: 26/06/2020
Description of CL				
The PP shall clarify the calibration frequency of the weight stones and provide the latest calibration certificates.				
Project participant response				Date: 26/06/2020
Technically a calibration weight or test Weight is a Mass rather than a Weight. Weight is the force applied by a Mass when gravity is acting upon it and this is the force measured by a weighing scale or balance. The mass of the weight stone does not change over time unless they are rusted, which is not the case. Therefore, we can use the weight stone (mass) without recalibration. A document is included on this in the reply package The weight stones were made and calibrated in 2016. The certificate is now included in section D.3 of the MR.				
Documentation provided by project participant				
MR v1.3 and Calibration_weights.pdf				
VVB assessment				Date: 14/07/2020
The information provided in the updated MR is consistent with the information of the MR of the previous monitoring period verified and the registered PDD for the CPIII. However, according to the registered PDD, the Newton scales that were sometimes used to assist the surveyor with determining the fraction of manure that flows in to the different manure management systems are checked if they are working correctly every year with five calibrated weights. Therefore, the audit team requests to the PP clarify the number of newton scales available and evidences of their checking with the weight stones (registers of conformity).				
Project participant response				Date: 16/07/2020
The 5 calibrated weights were borrowed by the survey company from NBP. The daily scale check using the weight stones are attached as evidence.				
Documentation provided by project participant				
Daily scale check_scanned.pdf				
VVB assessment				Date: 17/07/2020
The calibration information provided on the weight stones and the newton scales is considered adequate. Therefore, the CL is closed.				

Table 3. CAR from this verification

CAR ID	CAR 1	Section no.	D.6.1	Date: 25/05/2020
Description of CAR				
According to the registered PDD and applicable methodology the parameters B _{b1,wood} , B _{b2,charcoal} , B _{b3,LPG} are parameters fixed ex-ante, however in the current MR they appear under section of Monitored parameters (D.2)				
Project participant response				Date: 03/06/2020
That is correct, however these scenario's are established during this MP. The relevant tables are now moved to the section not monitored				
Documentation provided by project participant				
MR V1.2				
VVB assessment				Date: 26/06/2020
The values applied to these parameters is very different to the ex-ante value estimated in the PDD and the value of the spreadsheet. The PDD indicates that the parameter B _{b3,LPG} is fixed for CPIII, however, the value used to the monitoring period is not the value applied in the PDD.				
Additionally, the values of the amount of LPG and wood used to households and included as additional comments are not consistent with the values of the spreadsheet.				
Project participant response				Date: 30/06/2020
- The values are not different, there was some apparent difference as in the excel it was reported in kg while in the MR in ton. See the clarifications in the comment boxes of the fuels and those in the comment boxes - The ex-ante value is very different because in CPII there was only 1 fuel scenario, while there are 3 now. Zooming in on, say households that use, mostly charcoal will result in a very different value compared to the households in CPII which used mostly wood and some charcoal. Thus, you cannot compare those values as these are different scenario's. Secondly, in 7 years' time, the energy landscape is vastly different now, for example LPG is now available in rural areas. - Yes, B3, LPG remains fixed, but was wrongly calculated, and now corrected. We will seek TAC approval in case we want to redo the B3				
Documentation provided by project participant				
MR v1.3				
VVB assessment				Date: 14/07/2020
The MR indicates that for the parameter B _{b2,charcoal} , households also used 29,701 kg LPG and 24,277 kg wood on average per year whereas Cells BG43 and BE43 indicate values of 29.701 kg LPG and 24.277 kg (Please, check the symbol used to separate the decimals).				
The value of 0.07993 tonnes/year indicated in the MR for the parameter B _{b3,LPG} is not consistent with the value indicated in the spreadsheet of 70.993 kg/year (0.070993 Tonnes/year).				
Project participant response				Date: 16/07/2020
The MR now contains dots instead of comma's in the values				
The LPG value is now updated in the MR				
Documentation provided by project participant				
MR 1.4 section D2				
VVB assessment				Date: 17/07/2020
The information included in the updated MR is considered correct now.				
Therefore, the CAR is closed.				

CAR ID	CAR 2	Section no.	D.6.2	Date: 25/05/2020
Description of CAR				

According to the registered PDD and the applicable methodology the parameter fNRB shall be monitored. Current MR does not include this parameter.

Project participant response**Date:** 03/06/2020

The fNRB is fixed for this MP as per Annex 3 of the PDD. A correction is added in B2.2 and the parameter is moved to not monitored

Documentation provided by project participant**VVB assessment****Date:** 26/06/2020

The correction on the fNRB value indicated in the section B.2.2. is not consistent with the requirement of the approved PDD and the methodology applied, and it is a permanent change to the monitoring plan instead of a correction.

Project participant response**Date:** 26/06/2020

The fNRB value was valid at the start of this MP and adopted. In the next MP we will calculate the fNRB value as the default is expired by then.

Documentation provided by project participant

MR v1.3

VVB assessment**Date:** 14/07/2020

The updated version of the MR includes correctly the parameter fNRB,y in the section D.2. as Data and parameter monitored, and the value applied in the calculation of the emission reductions is consistent with the default value approved by the UNFCCC in the EB meeting 77 celebrated in February 2014, which was already valid in 2019.

Therefore, the CAR is closed.

CAR ID	CAR 3	Section no.	D.1	Date: 20/04/2020
Description of CAR				
The fields of the tables of section D.2. of the MR don't match with the tables of the GS4GG MR form version 1.				
Project participant response				Date: 03/06/2020
The fields match with the registered PDD. As that document was approved, our understanding is that we should follow that document				
Documentation provided by project participant				
N/A				
VVB assessment				Date: 26/06/2020
The original template of the GS4GG MR form version 1 shall be used to complete the monitoring information without changing.				
Project participant response				Date: 26/6/2020
This is now updated and made consistent				
Documentation provided by project participant				
MR v1.3				
VVB assessment				Date: 14/07/2020
The fields of "Calculation method (if applicable) and "QA/QC procedures" included in the tables of section D.2. of the MR template are not included in the tables of the parameters fNRB,y and Bdaily,y of the updated MR.				
Project participant response				Date: 16/07/2020
The table is now updated and made consistent				
Documentation provided by project participant				

MR V1.4	
VVB assessment	Date: 17/07/2020
The fields of the tables of section D.2. of the updated MR matches with the tables of the GS4GG MR form version 1.	
Therefore, the CAR is closed.	

CAR ID	CAR 4	Section no.	D.1.	Date: 26/06/2020
Description of CAR				
Several sections of the MR do not include the information required by the instructions of the template, such as section A.1.				
Project participant response				Date: 26/06/2020
Section A.1 is now updated as do the fixed and monitoring tables.				
Documentation provided by project participant				
MR v.1.3				
VVB assessment				Date: 14/07/2020
All sections of the updated MR include the information required by the instructions of the template, including section A.1.				
Therefore, the CAR 4 is closed.				

CAR ID	CAR 5	Section no.	D.1.	Date: 26/06/2020
Description of CAR				
The temporary deviations described in the section B.2.1. shall indicate the duration for which the deviation is applicable and justification on the conservativeness of the approach. Also indicate if prior approval from GS-TAC have been sought on the deviation.				
Project participant response				Date: 26/06/2020
The section is moved to B2.2, it is a correction and not a deviation. The value was simply wrongly calculated.				
The conservativeness argument is that it excludes wood and charcoal which households will consume next to LPG. TAC approval is not required as it is a recalculation of an existing data set which was wrongly calculated. The GS will give their opinion on this during the review				
Documentation provided by project participant				
MR v.1.3				
VVB assessment				Date: 14/07/2020
The information updated in sections B.2.1. and B.2.2. of the final version of the MR is considered consistent with the requirements of the instruction for completing the template.				
Therefore, the CAR is closed.				

Table 4. FAR from this verification

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

- - - - -

Document information

<i>Version</i>	<i>Date</i>	<i>Description</i>
03.0	31 May 2019	Revision to: • Ensure consistency with version 02.0 of the “CDM validation and verification standard for project activities” (CDM-EB93-A05-STAN); • Make structural and editorial improvements.
02.1	11 January 2018	Editorial revision to correct the numbering of appendices in the instructions.
02.0	31 October 2017	Revision to align with the requirements of the “CDM validation and verification standard for project activities” (version 01.0).
01.0	23 March 2015	Initial publication.
Decision Class: Regulatory Document Type: Form Business Function: Issuance Keywords: project activities, verifying and certifying		