Gold Standard

Verification report form for GS project activities	
VERICATION REPORT	
Title of the project activity	Biogas Program for Animal Husbandry Sector of Vietnam
Reference number of the project activity	GS ID: 1083 TN P-No. : 19/095
Version number of the Verification report	~~3~~4.0
Completion date of the Verification report	~~2017~~/~~1201~~/~~20192020~~
Monitoring period number and duration of this monitoring period	MP 4th 01/01/2015-30/06/2016 (Including both days)
Version number of monitoring report to which this report applies	2.~~3~~2
Crediting period of the project activity corresponding to this monitoring period	1st renewable crediting period 28/06/2010 to 27/06/2017
Project participant(s)	Biogas Program for the Animal Husbandry Sector of Vietnam SNV Vietnam
Host Party	Vietnam
Sectoral scope(s), selected methodology(ies), and where applicable, selected standardized baseline(s)	Scope: 1&13 (TA1.1&13.1) GS Methodology: "Technologies and Practices to Displace Decentralized Thermal Energy Consumption" version 1.0
Estimated GHG emission reductions or net anthropogenic GHG removals for this monitoring period in the latest approved PDD	965,936 tCO_2e
Certified GHG emission reductions or net anthropogenic GHG removals for this monitoring period	709,192 tCO_2e
Name of VVB	TÜV NORD CERT GmbH
Name, position and signature of the approver of the Verification report	Kunal Rami Final Approver

SECTION A. Executive summary

SNV Vietnam has commissioned the TÜV NORD JI/CDM Certification Program to carry out the Gold Standard (GS) 4th periodic verification of the project:

"Biogas Program for Animal Husbandry Sector of Vietnam"

with regard to the relevant Gold Standard version 2.1 requirements. The verifiers have reviewed the implementation of the monitoring plan (MP) in the registered Gold Standard project.
GHG data as well as sustainability aspects for the monitoring period were verified in detailed manner applying the set of requirements, audit practices and principles as required under the Gold Standard requirements/GSR/ and additional Validation and Verification Standard/VVS/ of the UNFCCC.

The objective of the verification is the review and ex-post determination by an independent entity of the GHG emission reductions and the contribution to sustainable development. It includes the verification of the:

- implementation and operation of the project activity as given in the PDD and GS Passport,
- compliance of the actual monitoring system and procedures with the provisions of the monitoring plan as a part of latest approved PDD, the GS monitoring matrix and the applied approved monitoring methodology,
- data given in the monitoring report by checking the monitoring records, the emissions reduction calculation and supporting evidence,
- accuracy of the monitoring equipment,
- quality of evidence,
- significance of reporting risks and risks of material misstatements.

This verification covers the period from 01/01/2015 to 30/06/2016 (including both days).

Via on-site investigation, it is confirmed the project installs biodigesters at household level to treat animal manure to generate biogas replacing conventional fuel namely firewood, LPG and agricultural residues for cooking. The digestate (bio-slurry) from the biodigester is further exploited for use as soil conditioners to replace chemical fertilizers for crops.

The biodigesters under the program consists of two designs KT1 and KT2 which were first developed by the Institute of Energy and further streamlined with the standard issued by the Ministry of Agriculture and Rural Development, which is the sectoral standard 10TCN 497:2005 - Part 6/10TCN/. Both designs have dome capacity range from 4 – 50 m^3.

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

A typical system comprises of a hemispherical fixed dome type biodigester with two chambers, one for generation of the biogas and one for removal of the bio-slurry, a biogas stove and the necessary piping. Toilet connection to the biodigester is optional (recommended by the programme).

The slurry effluent from the biodigester will be utilized as organic fertilizer / soil conditioner.

The technology of the project activity will reduce GHG emissions with (1) avoidance of methane emissions from the animal waste; (2) displacement of non-sustainable energy sources such as firewood, charcoal, coal, LPG, kerosene, and agricultural residues, etc., used for cooking; and (3) displacement of chemical fertilizers with the bio-slurry from the biodigesters.

Biogas Program for Animal Husbandry Sector of Vietnam (BP) has introduced two types as given along with the blueprints/BKT/. PP has provided detailed designs along with Figure of biogas generation process in the MR section B.1 which is confirmed by checking the KT1 and Kt2 handbook and technical design/HTD/. The actual construction and installation is found in accordance with the blueprints provided in MR. There is no deviation / change evidenced during this monitoring period.

BP has so far installed 130,194 units of biogas plants in different provinces of two zones including warm zone and temperate zone of the host country, and 8,783 units during this monitoring period from 01/01/2015 to 30/06/2016, this is verified by checking the BPD database/BPDD/. The emission reductions over this monitoring period is 709,192 tCO_2e/XLS/.

As part of the site visit and document check the Verification Team was able to confirm that the project implementation is in accordance with the project description contained in the latest approved PDD.

The project was registered as a GS-VER project on 28/06/2012 with the registration number GS1083. According to the validation report/VAL/ and previous verification report/VER/, the project participant has adopted for the renewable crediting period of 7 years, renewable twice, with the start date of 28/06/2010.

Details of the project location are given in table A-1 below:

Table A-1: Project Location

No.	Project Location
Host Country	Vietnam
Installed Region:	55 provinces as of 2016-06-30 for this monitoring period

Latitude and Longitude of program provinces:

No.	Province	Latitude	Longitude
Warm zone			
1	An Giang	10º30'0"N	105º13'0"E
2	Bà Rịa-Vũng Tàu	10º30'0"N	107º13'0"E
3	Bạc Liêu	9º17'38"N	105º43'40"E
4	Bến Tre	10º13'59"N	106º22'59"E
5	Bình Định	14º7'59"N	108º46'59"E
6	Bình Phước	11º45'33"N	106º51'5"E
7	Cần Thơ	10º1'59"N	105º46'59"E
8	Đồng Nai	11º6'0"N	107º20'59"E
9	Đồng Tháp	10º40'05"N	105º42'05"E
10	Hậu Giang	9°47'0"N	105°28'0"E
11	Khánh Hòa	10º40'59" N	105º10'0"E
12	Kiên Giang	10º16'59"N	104º39'0"E
13	Long An	10º24'0"N	106º19'59"E
14	Phú Yên	13º07'0" N	109º48'0"E
15	Quảng Bình	17°28'9"N	106°35'59"E
16	Quảng Nam	15º53'8"N	108º15'24"E
17	Quảng Ngãi	15º7'0"N	108º47'59"E
18	Sóc Trăng	9º36'11"N	105º58'48"E
19	Tây Ninh	11º18'0"N	106º5'59"E
20	Tiền Giang	10º22'0"N	106º40'0"E
21	Trà Vinh	9º56'4"N	106º20'43"E
22	Vĩnh Long	10º15'0"N	105º58'0"E
Temperate zone			
1	Bắc Giang	21º16'23"N	106º11'40"E
2	Bắc Ninh	21º11'9"N	106º4'34"E

	3	Cao Bằng	22º42’0”,N	106º15’0”E
	4	Đắc Lắc	20º2'12"N	105º34'54"E
	5	Đăk Nông	11º59’50”N	107º40’0”E
	6	Điện Biên	21º22'59"N	103º1'0"E
	7	Gia Lai	13º58'59"N	108º0'0"E
	8	Hà Giang	22º49'59"N	104º58'59"E
	9	Hà Nam	19º19'0"N	105º47'59"E
	10	Hà Nội	21º1'59"N	105º50'59"E
	11	Hà Tây	20º50'0"N	105º40'0"E
	12	Hà Tĩnh	18º19'59"N	105º54'0"E
	13	Hải Dương	20º55'59"N	106º19'0"E
	14	Hải Phòng	20º51'21"N	106º40'55"E
	15	Hoà Bình	20º48'47"N	105º20'17"E
	16	Hưng Yên	20º38'59"N	106º4'0"E
	17	Lâm Đồng	11º55'59"N	108º25'0"E
	18	Lạng Sơn	21º49'59"N	106º43'59"E
	19	Lào Cai	22º28'59"N	103º57'0"E
	20	Nam Định	20º25'0"N	106º10'0"E
	21	Nghệ An	18º40'0"N	105º40'0"E
	22	Ninh Bình	20º15'14"N	105º58'29"E
	23	Phú Thọ	21º20'0"N	105º10'0"E
	24	Quảng Ninh	21º14'00"N	107º20'05"E
	25	Quảng Trị	16º45'0"N	107º12'0"E
	26	Sơn La	21º19'0"N	103º54'0"E
	27	Thái Bình	20º27'0"N	106º19'59"E
	28	Thái Nguyên	21º35'34"N	105º50'39"E
	29	Thanh Hoá	19º48'0"N	105º46'0"E
	30	Thừa Thiên Huế	16º28'0"N	107º35'59"E
	31	Tuyên Quang	21º49'23"N	105º13'5"E
	32	Vĩnh Phúc	21º17'59"N	105º36'00"E
	33	Yên Bái	21º42'0"N	104º52'0"E

As a result of this verification, the verifier confirms that:

- all operations of the project are implemented and installed as planned and described in the validated and latest approved PDD.
- the monitoring plan is in accordance with the applied approved GS methodology, i.e., Technologies and Practices to Displace Decentralized Thermal Energy Consumption – version 1.0.
- Installed equipments being essential for generating emission reduction run reliably.
- Equipment essential for measuring parameters required for calculating emission reductions are calibrated appropriately.
- the monitoring report is in accordance with the relevant GS requirements/GSR/.
- the sampling approaches are implemented according to the sampling plan designed in the latest approved PDD.
- the project contributes to sustainability development.
- the monitoring system is in place and functional. The project has generated GHG emission reductions.

As the result of the GS 4th periodic verification, the verifier confirms that the GHG emission reductions are calculated without material misstatements in a conservative and appropriate manner.

SECTION B. Verification team, technical reviewer and approver

B.1. Verification team member

No.	Role	Type of resource	Last name	First name	Affiliation (e.g. name of central or other office of DOE or outsourced entity)	Involvement in			
						Desk review	On-site inspection	Interview(s)	Verification findings
1.	Team Leader (also verifier)	EI	ZHAO	Xuejiao	TN China	x	x	x	x
2.	Team Member (Local Expert)	EI	Nhung	Nguyen Thi Phuong	-		x	x	

B.2. Technical reviewer and approver of the Verification 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 / Approver	IR	Kunal	Rami	TN CERT GmbH

SECTION C. Means of verification

C.1. Desk review

During the desk review all documents initially provided by the client and publicly available documents relevant for the verification were reviewed. The main documents are listed below:

- the latest approved PDD including the monitoring plan /PDD/,
- the latest approved GS Passport /GSP/,
- the latest approved GS validation report /VAL/,
- documentation of previous verification /VER/,
- the monitoring report, including the claimed emission reductions for the project during this monitoring period /MR/,
- the emission reduction calculation spreadsheet for this monitoring period /XLS/.

Other supporting documents, such as publicly available information on the Gold Standard website and background information were also reviewed.

C.2. On-site inspection

Duration of on-site inspection: 18/09/2019-21/09/2019				
No.	**Activity performed on-site**	**Site location**	**Date**	**Team member**
1.	Opening meeting	Room 104, Bldg 2G, Van Phuc Compound, 298 Kim Ma, Hanoi, Vietnam	18/09/2019	Xuejiao Zhao (Fancy), Nguyen Thi Phuong Nhung (Nhung)
2.	Documents check of Carbon and SD	Room 104, Bldg 2G, Van Phuc Compound, 298 Kim Ma, Hanoi, Vietnam	18/09/2019	Fancy, Nhung
3	On-site inspection Interview with biogas installation HH and masons	Temperate zone and warm zone, Vietnam	19/09/2019 ~21/09/2019	Fancy, Nhung
4	Finding Summary	Room 104, Bldg 2G, Van Phuc Compound, 298 Kim Ma, Hanoi, Vietnam	21/09/2019	Fancy, Nhung
5	Close Meeting	Room 104, Bldg 2G, Van Phuc Compound, 298 Kim Ma, Hanoi, Vietnam	21/09/2019	Fancy, Nhung

C.3. Interviews

No.	**Interviewee**			**Date**	**Subject**	**Team member**
	Last name	**First name**	**Affiliation**			
1.	Ha /I1/	Hoang Thanh	Nexus Carbon for Development /Technical advisor	18/09/2019-21/09/2019	- General aspects of the project - Changes since validation / previous verifications - Calibration procedures - Biogas installation and operation status - Project database - Quality control records - Quality management system - Involved personnel and responsibilities - Training and practice of	Fancy, Nhung
2	Duc /I1/	Le Anh	Biogas Program for the Animal Husbandry Sector of Vietnam/Project technician	18/09/2019		Fancy, Nhung
3	Anh /I2/	Luu Ngoc	Biogas Program for the Animal Husbandry Sector of Vietnam/	18/09/2019-21/09/2019		Fancy, Nhung

No.	Interviewee			Date	Subject	Team member
	Last name	First name	Affiliation			
			Coordinator		the operational personnel - Implementation of the monitoring plan - Sampling Plan - Sampling Method - Project survey - Baseline survey - Carbon monitoring survey - Usage survey - Monitoring data management - Data uncertainty and residual risks - Procedural aspects of the verification - Environmental aspects - Job opportunities - Livelihood of the poor - Access to energy service - Technology transfer and technological self-reliance - Monitoring plan - Monitoring training - Emission reduction calculation	
4	Khang /I2/	Hoang Van	Mason	19/09/2019	- Position - Job Description - Labor contract - Working status - Training	Fancy, Nhung
5	Hoi/I2/	Nguyen Van	Mason	19/09/2019		
6	Huyen /I2/	Duong Van	Mason	20/09/2019		
7	Trung/I2/	Luu Quang	Mason	20/09/2019		
8	Tan /I2/	Hoang Van	Mason	20/09/2019		
9	Nga /I3/	Nguyen Thi	Duoc Thuong, Soc Son – HH	19/09/2019	- General info - Region - Installation model - Persion/HH - Digester size - ID code - Warranty card - Fuel using in baseline - Manure handle in baseline - Operation started date - Quality of biogas system - Quality control - Operation status - fuel consumption in	Fancy, Nhung
10	Thuat /I3/	Ta Van	Quang Tien, Soc Son - HH	19/09/2019		
11	Hai /I3/	Sai Manh	Phu Linh, Soc Son - HH	19/09/2019		
12	Phuc /I3/	Duy Tien	Phu Linh, Soc Son - HH	19/09/2019		
13	Noi /I3/	Nguyen Van	Phu Linh, Soc Son - HH	19/09/2019		
14	Duc /I3/	Nguyen Van	Phu Linh, Soc Son - HH	19/09/2019		
15	Sang /I3/	Nguyen Van	Bac Son, Soc Son - HH	19/09/2019		
16	Hai/I3/	Nguyen Van	Hong Ky, Soc Son - HH	19/09/2019		
17	Chuong	Hoang	Hong Ky, Soc	19/09/2019		

No.	Interviewee			Date	Subject	Team member
	Last name	First name	Affiliation			
	/I3/	Van	Son - HH		project scenario	
18	Nhat /I3/	Pham Van	Hien Ninh, Soc Son - HH	19/09/2019	- Biogas utilization - Animal type - Animal alive days - Animal produced - Stop livestock status - If empty plant - Repair or maintanence - Old stove status - Bio-slurry using - After sale service - Air quality - Soil condition - Livelihood of the poor - Access to clean energy - Any commnets	
19	Toan /I3/	Pham Van	Xom Hoa, Bao Ly, Thai Nguyen - HH	19/09/2019		
20	Thanh/I3/	Duong Van	Xom Hoa, Bao Ly, Thai Nguyen - HH	19/09/2019		
21	Truong /I3/	Le Van	Xom Hoa, Bao Ly, Thai Nguyen - HH	19/09/2019		
22	Tuan /I3/	Nguyen Van	Xom Hoa, Bao Ly, Thai Nguyen - HH	19/09/2019		
23	Thai /I3/	Nguyen Thi	Xom Hoa, Bao Ly, Thai Nguyen - HH	19/09/2019		
24	Huan/I3/	Duong Dinh	Xom Trai, Nha Long, Thai Nguyen - HH	19/09/2019		
25	Chin /I3/	Duong Thi	Xom Mit, Nha Long, Thai Nguyen- HH	19/09/2019		
26	Luong /I3/	Duong Van	Tan Son, Uc Ky, Thai Nguyen - HH	19/09/2019		
27	Huong /I3/	Duong Thi	Xom Lang, Uc Ky, Thai Nguyen - HH	19/09/2019		
28	Trao /I3/	Nguyen Van	Tan Trao, Ha Chau, Thai Nguyen - HH	19/09/2019		
29	Phan /I3/	Nguyen Thi	Tan Trao, Ha Chau, Thai Nguyen - HH	19/09/2019		
30	Pha /I3/	Nguyen Thi	Xom Kem, Nga My, Thai Nguyen - HH	20/09/2019		
31	Luan /I3/	Ta Van	Xom Ken, Nga My, Thai Nguyen - HH	20/09/2019		
32	Duyen /I3/	Dang Van	Xom Ken, Nga My, Thai Nguyen - HH	20/09/2019		
33	But /I3/	Dang Van	Xom Ken, Nga My, Thai Nguyen - HH	20/09/2019		
34	Vinh /I3/	Dang Van	Xom Ken, Nga My, Thai Nguyen - HH	20/09/2019		
35	Dung /I3/	Dang Van	Xom Ken, Nga My, Thai Nguyen - HH	20/09/2019		
36	Lua /I3/	Luong Thi	Phu Linh, Soc Son - HH	20/09/2019		
37	Thanh /I3/	Nguyen Van	Phu Linh, Soc Son - HH	20/09/2019		

No.	Interviewee			Date	Subject	Team member
	Last name	First name	Affiliation			
38	Buu /I3/	Nguyen Van	Phu Linh, Soc Son - HH	20/09/2019		
39	Thu /I3/	Nguyen Thi Minh	Phu Linh, Soc Son - HH	20/09/2019		
40	Sau /I3/	Nguyen Van	Phu Linh, Soc Son - HH	20/09/2019		
41	Thanh /I3/	Tran Thi	Bac Phu, Soc Son - HH	20/09/2019		
42	Nam /I3/	Nguyen Van	Bac Phu, Soc Son - HH	20/09/2019		
43	Ly /I3/	Nghiem Thi	Bac Phu, Soc Son - HH	20/09/2019		
44	Ngat /I3/	Le Thi	Bac Phu, Soc Son - HH	20/09/2019		
45	Hoa /I3/	Do Van	Bac Phu, Soc Son - HH	20/09/2019		
46	Dua /I3/	Pham Thi	Thai Nguyen - HH	20/09/2019		
47	Hue /I3/	Ngo Thi	Thai Nguyen - HH	20/09/2019		
48	Dong /I3/	Nguyen Van	Thai Nguyen - HH	20/09/2019		
49	Ly /I3/	Vo Truc	Binh Dinh - Tay Phu - HH	21/09/2019		
50	Phuong /I3/	Pham Truc	Tien Giang - Long Binh - HH	21/09/2019		
51	Thuy /I3/	Nguyen Thi	Tien Giang - Thanh Nhut - HH	21/09/2019		
52	Hao /I3/	Nguyen Van	Binh Dinh - Tay Thuan - HH	21/09/2019		
53	Tam /I3/	Doan Thi	Ben Tre - An Dinh - HH	21/09/2019		
54	Khanh /I3/	Thach	Tra Vinh - My Chanh - HH	21/09/2019		
55	Thong /I3/	Bui Kim	Tra Vinh - Hoa Loi - HH	21/09/2019		
56	Thach /I3/	Nguyen Van	Binh Dinh - Binh Thuan - HH	21/09/2019		
57	My /I3/	Cao Thi Le	Binh Dinh - Binh Hoa - HH	21/09/2019		
58	Se /I3/	Nguyen Thi	Binh Dinh - Binh Thuan - HH	21/09/2019		
59	Ha /I3/	Nguyen Thi	Ba Ria - Vung Tau - Xuan Son - HH	21/09/2019		
60	Nguyet /I3/	Phan Thi Thu	Quang Ngai - Tinh Tho - HH	21/09/2019		
61	Tam /I3/	Le Van	Binh Dinh - Nhon My - HH	21/09/2019		
62	Phuong /I3/	Le Thi	Khanh Hoa - Cam Thanh - HH	21/09/2019		
63	Anh /I3/	Nguyen Ngoc	Quang Nam - Tam Hoa - HH	21/09/2019		

During the site visit, the verification team has randomly selected masons and people visited in households /I2/,/I3/ to confirm the correctness of the SD parameters reported by the PP.

The questions asked were basically based on requirements of the Rules and Toolkit to the Gold Standard version 2.1[/GST/]. The main topics included, but not limited to, are the followings:

For Households,

1. General information of bio-digester users
   a. Name
   b. Mobile No.
   c. Location
   d. Region
   e. Household Size
   f. Digester Size
   g. ID Code
2. Baseline info:
   h. Baseline fuel
   i. Baseline fuel quantity
3. Project info:
   j. Started using time
   k. If agree with the quality of the biogas system
   l. If received a phone call about the quality confirmation from BP
   m. If the bio-digester is under operation
   n. use biogas for
   o. Which animal used for produce biogas
   p. Animal living days and animal number
   q. Stop time if any
   r. Repair or maintain
   s. Fuel type using in project scenario
   t. Fuel quantity using in project scenario
   u. Status of old cooking stove?

For the masons,

- Job Description –Digester construction process, QC procedure, if got certificate for construction, ID code for biodigester
- Payment - Satisfied, Contract with BP
- Training – training content, period, and new APP AKVO operation

The feedback from Household interviewees are listed as below:

1. General information of sample households

   All the Household provided the general information of the digester and family.

2. Baseline Info

   All the Households confirmed using LPG or firewood or Agricultural residues as the baseline fuel, and the fuel quantity values are confirmed as consistent with the values of PP samples.

3. Project Info
    1. All the Households confirmed operated the biogas system before the verification
    2. All the Households agreed with the quality of the biogas system
    3. All the Households confirmed received a phone call about QC from the BP
    4. All the households confirmed the biogas system under well operation during the monitoring period
    5. All the households confirmed they using biogas for cooking food for human or animals.
    6. All the households confirmed they feed animals which is same to the type listed in the MR.
    7. All the households provided the information of animal living days and animal number during the monitoring period and the values are confirmed as consistent with the values of PP samples.
    8. All the households confirmed they never stoped the livestock production during the monitoring period.
    9. All the households confirmed they never repair or maintain the biogas system except one HH cost 1 million VND for repairment.
    10. All the households confirmed all the manure are fed into the digester.
    11. All the Households confirmed using LPG or firewood or Agricultural residues as the fuel at project scenario, and the fuel quantity values are confirmed as consistent with the values of PP samples.
    12. All the Households provided the status of the old stoves, including not used, give to other one, sold at lower price, back up for biogas stove.
    13. All the Households confirmed that the old stove are kept outside room.

The feedback from masons are listed as below:

All the masons gave their name, age, job description to verification team and all the masons satisfied with their payment and signed the contract voluntarily. All the masons confirmed the training are provided regarding the biogas system construction and safety.

Verification Team along with onsite interview, objective evidence collections, data generation and recording analysis also considered the views obtained in these interviews while arriving at the Verification Opinion.

C.4. Sampling approach

C.4.1 Sampling during monitoring

☐	No sampling approach has been used by the PP to determine the monitored parameters
☒	A sampling approach has been taken for the following monitored parameter(s):

Parameter	Sampling approach [1)]	Sampling Type [2)]	Population	Sample Size
$P_{bs2,y}$	CS and SiRS	PS	n.a[1]	180/BFT/
$P_{bs3,y}$	CS and SiRS	PS	n.a	180/BFT/
$P_{h,y}$	CS and SiRS	PS	130,194	100/PFT/

[1] PP conducted KPT including both project fuel test (PFT) and baseline fuel test (BFT), BFT samples were selected as the households without biodigester, thus the targered population is not a fixed data.

$U_{p,y}$	CS and SiRS	PS	130,194	350/US/
$MS_{(T,S,k)}$	CS and SiRS	PS	130,194	340/CMS/
$MS_{(P,S,k)}$	CS and SiRS	PS	130,194	340/CMS/
$N_{(T)}$	CS and SiRS	PS	130,194	340/CMS/

1) *Sampling Approaches:*

SiRS: Simple Random Sampling
StRS: Stratified Random Sampling
SS: Systematic Sampling
CS: Cluster Sampling
MSS: Multi-stage Sampling

2) *Sampling Types:*

PS: Parameter Sampling

Sampling design

The sampling design carried out by the project is demonstrated as below:

As per latest approved PDD/PDD/ BP conducted the Carbon monitoring survey/CMS/, Kitchen performance test including project fuel test/PFT/ and baseline fuel test/BFT/, Usage survey/US/ to accurately calculate the monitoring parameters outlined in the Project Design Document/PDD/.

Carbon monitoring survey (CMS)/CMS/ was executed by a selected independent consultant named EPRO consulting JSC (EPRO) from April to June 2019. Nexus selected the samplings and supply the sampling list to EPRO for execution. Via checking the "GS1083__CMS and KPT_sampling HHs_MP4"/SHH/, it is confirmed that the CMS sampling approach was designed with a confidence interval of at least 90/30 according to GS recommendation to ensure the households interviewed are representative. The sample size for the CMS is 17 households (include a 10% oversampling) from 20 clusters (10 clusters from each temperate and warm zone). The purpose of the 10% oversampling is to support any of the main selected households are not available during the survey. The total households for CMS survey are calculated as 17HH per cluster, 10 clusters per zone, thus 170 for each zone and total sample size is 340. Nexus selected clusters/districts and HH randomly and the screenshots/RSSS/ have been provided to verification team during the site, it is verified that the random selection is actual and credible.

Project fuel test/PFT/ (one of KPT) was executed by a selected independent consultant named EPRO consulting JSC (EPRO) from April to June 2019 combining with CMS. Nexus selected the samplings and supply the sampling list to EPRO for execution. Via checking the "GS1083__CMS and KPT_sampling HHs_MP4"/SHH/, it is confirmed that the sampling approach was designed with a confidence interval of at least 90/30 according to GS recommendation to ensure the households interviewed are representative. The sample size for the PFT is 5 household per districts, 20 clusters, total 100 households, 5 HH were randomly selected from each districts of CMS survey. Nexus selected clusters/districts and HH randomly and the screenshots/RSSS/ have been provided to verification team during the site, it is verified that the random selection is actual and credible.

Baseline fuel test/BFT/ (one of KPT) was executed by a selected independent consultant named EPRO consulting JSC (EPRO) from April to June 2019 combining with CMS. Nexus defined the sample size 60 for each baseline scenario in 3 baseline scenarios, total 180HH for EPRO's execution. It is confirmed that the sampling approach was designed with a confidence interval of at least 90/30 according to GS recommendation to ensure the households interviewed are representative. Via checking the "MP4-GS1083-BUS report_E_Final"/BUSR/, it is confirmed that the EPRO selected representative HHs based on the questionnaire for selecting BFT HH/QBFT/, and the HHs are selected randomly in all the HHs without the biodigester which are applicable to the requirements in the questionnaire.

Via checking the "MP4-GS1083-BUS report_E_Final"/BUSR/, it is verified that prior to the MP4 BUS & CMS survey, the Project Management Unit (PMU) provided a list of pre-selected 340

households (HHs) and 340 backup HHs with bio-digesters in 18 provinces (20 districts) for surveying and a set of criteria for selecting HHs without biodigester as control group. The proposed survey methodology and tools by the Consultant were discussed, checked and approved by the PMU before field survey. The actual field survey was carried out in 344 HHs with bio-digester that were built from January 2007 to June 2016. In addition, a Kitchen Performance Test (KPT), including Project Field Test (PFT) and Baseline Field Test (BFT) were conducted at 100/344 biogas users and 187 nonbiogas users. Thus it is confirmed that the actual samples are more than the determined value, which is more representative and conservative.

Usage survey were conducted by provincial technicians of BP from Jan 2018 to May 2019, via checking the "GS1083_Usage survey MP4_Sampling HHs"/US/, it is confirmed that the sample size determination is in line with the methodology requirement/TPDDTEC/ and GS rules/GST/, i.e. the minimum total sample size is 100, with at least 30 samples for project technologies of each age being credited. 35 units for each age group and total 350 HHs were surveyed which is confirmed more than the requirement. Nexus selected the samplings and supply the sampling list to provincial technicians of BP for execution. Nexus selected 35 HH randomly in each age group and the screenshots/RSSS/ have been provided to verification team during the site, it is verified that the random selection is actual and credible.

PP has employed a cluster-based, random sample selection method to ensure the final sample selected for each study was representative while optimizing fieldwork efficiency. The sample was clustered at the zones, districts, and households level. Via checking the sampling method as stated in the "GS1083_CMS and KPT_sampling HHs_MP4"/SHH/, "GS1083_BP_MP4 Carbon monitoring _result_V1.2_Final"/CMS,BFT,PFT/ and "MP4-GS1083-BUS report_E_Final"/BUSR/, it is verified that the sampling method is in line with the PDD sampling plan/PDD/, methodology requirement/TPDDTEC/ and GS rules/GST/.

C.4.2 Sampling approaches during verification

☐	No sampling approach has been used by the VT to verify the monitored parameters
☒	A sampling approach has been applied by the VT for the following monitored parameter(s):

Parameter	Sampling approach [1)]	Sampling Type [2)]	Population	Sample Size
$P_{bs2,y}$	SiRS	AS	180/BFT/	40
$P_{bs3,y}$	SiRS	AS	180/BFT/	40
$P_{h,y}$	SiRS	AS	100/PFT/	55
$U_{p,y}$	SiRS	AS	350/US/	40
$MS_{(T,S,k)}$	SiRS	AS	340/CMS/	55
$MS_{(P,S,k)}$	SiRS	AS	340/CMS/	55
$N_{(T)}$	SiRS	AS	340/CMS/	55
$N_{p,y}$	SiRS	AS	8,783	35

[1)] *Sampling Approaches:*
- *SiRS: Simple Random Sampling*
- *StRS: Stratified Random Sampling*
- *SS: Systematic Sampling*
- *CS: Cluster Sampling*
- *MSS: Multi-stage Sampling*

[2)] *Sampling Types:*
- *AS: Acceptance Sampling*
- *PS: Parameter Sampling*

1) Verifier's Action

Following "Sampling and Surveys for CDM Project Activities and Programme of Activities" version 07.0[/SSS/] and "Guideline of Sampling and surveys for CDM project activities and programmes of activities" version 04.0[/SSG/], the verifier conducted the verification of sampling results with the following steps:

1. For parameter $N_{p,y}$, the supporting evidence is BPD database[/BPDD/], and to verify the accuracy and correctness of monitored data, verification team cross-checked the quality control records[/QCR/] for each installed biodigester during this monitoring period, total number is 8,783. Verification team has utilized sampling approach as per the "Guideline of Sampling and surveys for CDM project activities and programmes of activities" version 04.0[/SSG/], this sampling approach found to be appropriate as the quality control records are homogenous.

As per the paragraph 12 of 2.1.1 section of the guideline states that the Sample size calculation by Simple Random Sampling can be done using following formulae:

$$n \geq \frac{1.645^2 N \times p(1-p)}{(N-1) \times 0.1^2 \times p^2 + 1.645^2 p(1-p)}$$

Where

n	Sample size
N	Total number of sales invoices
P	Our expected proportion
1.645	Represents the 90% confidence required
0.1	Represents the 10% relative precision (0.1 × 0.5 = 0.05 = 5% points either side of p)

N is 8,783 as determined in the BPD database[/BPDD/], P is determined as 90%, as per the level of confidence, DOE expects that 90% of the samples taken shall comply with the project requirements.

Hence the *n* is calculated as 1.645^2*8,783*0.9*(1-0.9)/{(8,783-1)*0.1^2*0.9^2+1.645^2*0.9*(1-0.9)}=30. Hence, verification team checked 35 quality control records[/QCR/] during this monitoring period which is more than the 30 sample size requirement during this monitoring period, the quality control records[/QCR/] are cross checked with the BPD database[/BPDD/], it is verified that the BPD database[/BPDD/] during this monitoring period is correct with the quality control records[/QCR/] sample. Hence, it is concluded that the biogas plants commissioned value during this monitoring period of 8,783 is correct and credible.

Furthermore, during the site inspection, random samples of 55 HHs with biodigersters were checked by the verification team, 55 biodigersters were confirmed existed and operated well since commissioned, via comparing the HH information and ID code of biogas plants of 55 samples with the BPD database[/BPDD/] and corresponding quality control records[/QCR/], it is confirmed that the information collected by PP in BPD database[/BPDD/] is correct and actual, thus it is verified that total installed number of 130,194 biogas plants is plausible and actual.

2. For the parameters of $P_{bs2,y}$, $P_{bs3,y}$, $P_{h,y}$, $U_{p,y}$, $MS_{(T,S,k)}$, $MS_{(P,S,k)}$, $N_{(T)}$, the verification team made a sampling plan for both checking sample records and visiting households during this verification using Simple random Sampling approach and acceptance sampling as specified in the "Sampling and Surveys for CDM Project Activities and Programme of Activities" version 07.0[/SSS/] with the following steps,

(a) Take a random sample of the project's sample records;

In order to determine the size of the sample household for field/onsite check, the acceptable quality level (AQL), i.e. the proportion discrepancies between the PP sample records and the DOE sample records that are acceptable is determined as 0.5% and the proportion of discrepancies between the PP sample records and DOE sample records that are unacceptable (UQL) is determined as 10% according to "Sampling and Surveys for CDM Project Activities and Programme of Activities" version 07.0[/SSS/].

The maximum errors associated with the determination indicated above should remain at levels indicated below as per "Sampling and Surveys for CDM Project Activities and Programme of Activities"/SSS/:

(1) A 10% chance that the DOE will wrongly reject the PPs records (producer's risk);

(2) A 10% chance that the DOE will wrongly accept the PPs records (consumer's risk).

With the AQL of 0.5%, the UQL of 10%, the producer's risk of 10% and the consumer's risk of 10%, the size of the acceptance sampling is determined as 38 and the acceptance number is determined as 1 according to Table 1 of "Sampling and Surveys for CDM Project Activities and Programme of Activities"/SSS/.

To be more conservative, verification team planned random choosing 50 from the PP's sample records for all the sampling records for determine the parameters of $P_{bs2,y}$, $P_{bs3,y}$, $P_{h,y}$, $U_{p,y}$, $MS_{(T,S,k)}$, $MS_{(P,S,k)}$, $N_{(T)}$.

Furthermore, verification team took the onsite check of the 55 Biodigester HHs randomly sampled by the verifier for both temperate zone and warm zone.

Based on the review of background documents submitted by PP prior to site visit, verifier randomly selected household visit based on PP's sampling record.

(b) Check the acceptability of the data for each record in the sample records based on the expertise;

The PP's sampling records/BFT/, /PFT/, /US/, /CMS/, /BUSR/ during this monitoring period are found to be consistent with the 50 samples selected by the verification team from the sampling conducted by the PP. Also, no discrepancy is found between the PP sample records and the DOE sample records.

Furthermore, 55 biodigerster households were interviewed by the verification team which are listed in the PP sample records, by interview, it is verified that PP has undertaken sampling surveys and the biodigester in each HH was used and the biogas was generated normally.

(c) Based on the number of records where is agreement, determine if the sample records meet the requirements.

As there are no discrepant records, i.e. the discrepant record is less than the acceptance number of 1, the sample records is thus accepted as per "Sampling and Surveys for CDM Project Activities and Programme of Activities"/SSS/.

C.5. Clarification requests, corrective action requests and forward action requests raised

Areas of verification findings	No. of CL	No. of CAR	No. of FAR
Compliance of the monitoring report with the monitoring report form (D.1)	-	1	-
Remaining forward action requests from validation and/or previous verification (D.2)	1		
Compliance of the project implementation with the registered PDD (D.3)	1	-	-
Post-registration changes (D.4)	-	1	-
Compliance of the monitoring plan with the monitoring methodology including applicable tool and standardized baseline (D.5)	-	1	-
Compliance of monitoring activities with the registered monitoring plan (D.6)	1	1	-
Compliance with the calibration frequency requirements for measuring instruments (D.7)	-	-	-
Assessment of data and calculation of emission reductions or net removals (D.8)	-	1	-
Do No Harm Assessment (D.9)	-	-	–
Sustainable Data and parameters monitored (D.10)	1	-	–
Grievance Mechanism/Continues Inputs (D.11)	-	1	–

Others (please specify)	-	-	-
Total	**4**	**6**	**-**

SECTION D. Verification findings

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

Means of verification		A draft monitoring report was submitted to the verification team by the project participants prior to the start of the verification activities. Every section has been checked against the respective guidance and GS requirements. The following sources of information have been used in this context: • /MR/ • /GSR/
Findings	☒	The respective requirements have widely been complied with; however; the following issues needed to be addressed in this context:
		- CAR 1
Conclusion	☐	No CARs/CLs have been raised in this context. No correction was required in the context. The project is in line with the respective requirements.
	☒	The raised CARs/CLs have been addressed appropriately. The PP has carried out the requested corrections. All respective findings could be closed out. For details please refer to Appendix 4.
		A draft monitoring report was submitted to the verification team by the project participants. During the verification, mistakes and needs for clarification were identified. The PP has carried out the requested corrections so that it can be confirmed that the Monitoring report is complete and transparent and in accordance with the latest approved PDD and other relevant requirements. Refer to the below sections for details.

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

During the validation the validating DOE might have raised issues that could not be closed or resolved during the validation stage. For this purpose FARs might have been raised. Likewise FARs might have been raised in the course of previous verifications.
In the course of this verification the latest approved PDD/PDD/ and the previous verification report /VER/, where applicable, have been checked in order to identify any remaining forward action requests. For the current monitoring period the following applies:

(i) Open issues from validation:

☒	There were no open issues which have been addressed in the latest version of the validation report.
☐	All open issues from the validation have been appropriately addressed in the context of previous verifications.
☐	All issues related to the validation have been appropriately addressed in the course of the current monitoring period (for details please refer to Appendix 4)
☐	The following issues related to the validation have **not** yet been appropriately addressed (for details please refer to Appendix 4):
	- N/A

(ii) Open issues from previous verifications:

☐	N/A – as this is the first monitoring period for this GS project activity.
☒	There were no open issues in the previous verification report which have been addressed
☐	All issues related to the previous verification have been appropriately addressed in the course of the current monitoring period (for details please refer to Appendix 4)

☐	The following issues related to the previous verification have **not** yet been appropriately addressed (for details please refer to Appendix 4):
	- N/A

(iii) Open issues from GS:

☐	There were no open issues in the GS review or GS prior approval for deviation which have been addressed
☒	There were open issues in the GS review or GS prior approval for deviation which have been addressed as follow,
1.	**FAR #1** from GS issuance review for MP3/GSIR/ The PP is requested to provide information on the schedule for future implementation for this project. Please note if there is an increase of more than 20% in annual emission reduction comparing with ex ante estimated ER, the PP shall follow GS design change process to update the project implementation and justify the impact.
	DOE Assessment: First, during site visit, PP showed a PPT about the schedule for future implementation for this project and verification team checked the information, the PP is expected to install 5000-6000 units per year but the actual installation will be depended on the real market condition. By means of comparing the sales record in past years, it is confirmed the schedule is reasonable and no risk for the increase of more than 20% in annual emission reduction comparing with ex ante estimated ER. For this 4th monitoring period, via checking the ER calculation sheet/XLS/, it is verified that the ER for this monitoring period reduced 27%, thus no involved in increase of more than 20% in annual emission reduction comparing with ex ante estimated ER. Thus no GS design change process needed for this monitoring period.
2.	**FAR #2** from GS issuance review for MP3/GSIR/ For future issuances, PP shall justify that the project scenario energy use does not drastically increase when compared to the baseline. For future issuances, DOE shall provide an opinion on this issue and ensure that this aspect is verified including carrying out necessary interviews during the site visit pertaining to other uses of biogas as mentioned in PP's response above
	DOE Assessment: Via checking the MR, it is confirmed that PP has justified the energy consumption in both baseline and project scenario. As declared by the PP, due to the LPG is a low emission fuel, so from this monitoring period, the PP does not claim the emission reduction from the BS1 group (in which the household in the baseline use LPG only for cooking and later install the bio-digester). Thus PP only listed the two baseline scenarios, i.e. BS2 and BS3. • BS2: Biomass (fuel wood or agricultural residues) only households. • BS3: Mix fuel (LPG and biomass) households. The difference between Project HH and Baseline HH are calculated by PP, via checking the Tab "Energy balance" in ER calculation sheet/XLS/, it is verified that the difference in energy consumption for cooking (MJ/year) is only 1% for BS3 and 8% for BS2. Also the verification team compared the related information of MP2 and MP3 (there was no KPT conducted for MP1) as below table,

	Baseline HH (MP2) - 19 HHs for BS2 and 19 HHs for BS3	Project HH (MP2) - 60 HHs	Baseline HH (MP3) 79 records from both MP2 and MP3 for BS2 and 79 records from both MP2 and MP3 for BS3	Project HH (MP3) - 60 HHs	Baseline HH (MP4) 140 records from MP2, MP3 and MP4 for BS2 and 143 records from MP2, MP3 and MP4 for BS3	Project HH (MP4) - 100 HHs
BS2	6,780	8,540	7,326	8,947	7,028	7,636
BS3	6,287	8,540	8,631	8,947	7,525	7,636

As above table, it is verified that the comparison in MP4 is most representative as the number

	of records for fuel increased. Furthermore, during the site visit, the verification team interviewed the sample HHs about the cooking practices for both baseline and project scenarios. Based on verification team's observation during the site visit, there is no major increase in the energy use within the households as they have been using cooking fuel for the same daily tasks such as human cooking and animal feed preparation.However, CL 1 was raised and successfully closed (for details please refer to Appendix 4).

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

Means of verification	By means of an in-depth review of the PDD in its latest form – as downloaded from the GS project site - and the checks carried out during the on-site visit an assessment has been carried out whether the project has been implemented and operated in line with the latest approved PDD and whether all physical features of the project are in place. The following has been checked: implemented technology, project equipment as well as monitoring equipment. The Verification team has performed a site visit and found that the project has been put into operation and biodigester and biogas generation system are being installed and it is found that the implementation of the project activity is in accordance with the latest approved PDD. The changes in the factors and parameters used during this 4th monitoring period to arrive at the emission reduction calculations are transparently described in the Monitoring Report. PP has provided justifications for the changes and these changes are accounted correctly while calculating emission reductions/XLS/. The details of verification against changes incorporated by PP during this monitoring period are provided in the respective sections and there is no significant change observed in the listed monitoring parameters since last verification. This is the 4th monitoring period and the verification team herewith confirms that the project implementation is consistent since the start date of project as mentioned in the latest approved PDD. There are no major obstructions or gaps noted during this monitoring period. As per the latest approved PDD, it is noted that the emission reductions are calculated on the basis of the operations of numbers of units of biogas plants, hence it is considered as an important parameter for calculation of Emission reductions during particular monitoring period. PP has an effective system to keep a track of ID code of biogas plants through unique serial number/BPDD/ and Quality control records/QCR/. PP has established adequate QA/QC methods and reporting structure to capture relevant information in transparent manner which is verified by checking the QA/QC procedure manual "VN RBF 2015 guideline- Final"/RBF/. The data collected and processed is found auditable. The roles and responsibilities of monitoring group is confirmed as clearly defined in the MR. For the quality control of the biogas plants, each biogas enterprise should perform self-assessment, which is also used for unique number control of the plants. The sampled Quality control records/QCR/ have been checked by the verification team and verified that all households accepted the quality of the plants and the result-based incentive is transferred to the biogas enterprise which has also been confirmed by interview with mason/I2/. In Nov. 2016, a phone/tablet-based apps (Akvo flow) was developed to replace the old paper-based QC system and Masons can upload QC to the online database. This App is not used for this monitoring period. However, during the site visit, the Mason's smart phones were checked by verification team to confirm the App's operation. The backup server https://biogas-programme.akvoflow.org/ has been checked by verification team to confirm the emergency procedure is well prepared.

	The following sources of information have been used in this context: • /PDD/ • /MR/ • /GSR/ • /GST/ • /XLS/ • /RBF/ • /BPDD/ • /QCR/ • /VER/	
Findings	☒	The project has been implemented as described in the latest version of the PDD as well as in section C.1 of the monitoring report. No deviations thereof have been identified in the course of this verification.
	☐	The following deviations from the registered / approved project design and or the project description in the MR have been identified in the course of this verification (for further details please refer to section D.4): - N/A
	☐	In this context the following CARs, CLs have been raised: - N/A
	In case of phased implementation:	
	☒	N/A
	☐	The phased implementation has correctly and in sufficient detail been described in the latest version of the PDD.
	☐	The description in section C.1 of the MR differs in content or the level of detail from the latest version of the PDD. However, the description in the MR is correct and reflects the situation during the site inspection.
	☐	The project description in the PDD/MR is not deemed sufficient. The detailed implementation timeline is as follows: N/A
Conclusion	☒	No CARs/CLs have been raised in this context. No correction was required in the context. The project is in line with the respective requirements.
	☐	The raised CARs/CLs have been addressed appropriately. The PP has carried out the requested corrections. All respective findings could be closed out. For details please refer to Appendix 4.
	During the verification a site visit was carried out. On the basis of this site visit and the reviewed project documentation it can be confirmed that w.r.t. the realized technology, the project biogas plants, as well as the monitoring procedures, the project has been implemented and operated as described in the latest approved PDD.	

D.4. Post-registration changes

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

It has been checked whether Temporary deviations from the registered monitoring plan (TDfrMP) or Temporary deviations from monitoring methodology or standardized baseline (TDfMM) have been applied during this monitoring period. The result is summarized in the table below.

☒	No Temporary deviations from the registered monitoring plan (TDfrMP) or Temporary deviations from monitoring methodology or standardized baseline (TDfMM).have been submitted to the GS prior to the current monitoring period.		
☐	The following TDfrMP or TDfMM have been approved or are under approval by the GS		
	1	Title	N/A
		Status	☐ under approval; ☐ approved (approval No.:)

		Appr.date	
		Ref. No.	
	2	Title	
		Status	☐ under approval; ☐ approved (approval No.:)
		Appr.date	
		Ref.No.	
☒	During the verification of the current MP no need for a TDfrMP or TDfMM has been identified. The monitoring plan is in accordance with the approved methodology applied by the PA		
☐	An approval of the following TDfrMP or TDfMM is to be requested from the GS for the current MP as appendix 1 of the project standard does not apply. Please refer to the related PRC report submitted along with this issuance request for further details w.r.t. the assessment of the PRC.		
	1	Issue:	
	2	Issue:	
☐	The following TDfrMP or TDfMM for which appendix 1 of the PS is applicable have been applied:		
	1	Issue:	
	2	Issue:	

D.4.2. Corrections

It has been checked whether any corrections to project information or parameters fixed at validation have been approved during this monitoring period or submitted with this monitoring report. The result is summarized in the table below.

☒	During the verification of the current MP no need for corrections has been identified.		
☐	The following corrections have been applied:		
	1	Issue:	
	The PDD has been revised accordingly: (New) version No.: Revision date: XX/XX/XXXX		
	It is confirmed that the updated / corrected information is an accurate reflection of the actual project information and that the corrected parameters are in accordance with the applied methodology and the monitoring plan.		
	☐ A related post registration change has been submitted prior to the issuance request. The approval has been received on XX/XX/XXXX via approval number PRC-XXXX-00X. ☐ A related post registration change is submitted along with this issuance request. Please refer to the related PRC report submitted along with this issuance request for further details w.r.t. the assessment of the PRC.		

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

☒	N/A - as this is not the first verification within the crediting period
☐	The PPs do not intend to change the start date of the crediting period.
☐	As the change in the start date was below the related time period as indicated in PS § 277 and § 278 no prior approval was required but only a notification. This notification has been submitted

	by the PP without involvement of the DOE. The change and new start date has been checked from the related GSvproject webpage.
☐	The PPs intend to change the start date of the crediting period. As the intended change in start date beyond the related time period as indicated in PS § 279 prior approval by the Board is required. For detailed assessment of the change please refer to related PRC validation report. As per assessment in this report the DOE confirms that the change to the start date of the crediting period are in line with the related requirements of the VVS and PS.
☐	The approval to change the start date of the crediting period has been approved by GS registry. The registration date of the project is XX/XX/XXXX.

D.4.4. Inclusion of a monitoring plan to a registered project activity

☒	N/A - as this monitoring plan was part of the latest approved PDD
☐	In line with PS § 281 or § 282 the PP has forwarded a monitoring plan to the DOE for validation. No prior approval of the monitoring plan was required as the PP in line with PS § 282 wished to submit the monitoring plan together with the request for issuance for the first monitoring period. Please refer to the related PRC report submitted along with this issuance request for further details w.r.t. the assessment of the PRC..
☐	In line with § 282 the PP submitted a monitoring plan prior to the submission of the request for issuance for validation to the DOE. A DOE has assessed the monitoring plan in line with related VVS requirements and submitted a related PRC report for prior approval. The approval has been received on DD/MM/YYYY via approval number PRC-XXXX-00Z.

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

It has been checked whether any permanent changes from the registered monitoring plan (PCfrMP) or applied methodologies (PCfMM) including standardized baselines (PCfSB) have been approved prior or during this monitoring period or submitted with this monitoring report. The result is summarized in the table below.

☐	No PCfrMP, PCfMM or PCfSB have been submitted to the GS prior to the current monitoring period		
☒	The following PCfrMP, PCfMM or PCfSB have been approved or are under approval by the GS		
	1	Title	PDD BPD_Deviation of monitoring plan_v4.0_20170911
		Status	☐ under approval; ☒ approved
		Appr.date	11/09/2017
		Ref. No.	N/A
		Reason	Three monitoring methods are applied which has been proposed during MP3 and approved by GS including • Quality control measures • Carbon monitoring survey • Usage survey
	2	Title	N/A
		Status	☐ under approval; ☐ approved
		Appr.date	
		Ref.No.	N/A

☒	During the verification of the current MP no need for a PCfrMP, PCfMM or PCfSB has been identified. The monitoring plan is in accordance with the approved methodology applied by the PA		
☐	An approval of the following PCfrMP, PCfMM or PCfSB is to be requested from the EB for the current MP as appendix 1 of the project standard does not apply.		
	1	Issue:	
	2	Issue:	
☐	The following PCfrMP, PCfMM or PCfSB for which appendix 1 of the PS is applicable have been applied:		
	1	Issue:	
	2	Issue:	

CAR 2 was raised and successfully closed. For details please refer to Appendix 4.

D.4.6. Changes to the project design of a registered project activity

It has been checked whether any changes to the project design (CoPD) have been approved prior or during this monitoring period or submitted with this monitoring report. The result is summarized in the table below.

☒	No CoPD has been submitted to the GS prior to the current monitoring period		
☐	The following CoPD have been approved or are under approval by the GS		
	1	Title	
		Status	☐ under approval; ☐ approved
		Appr.date	
		Ref. No.	
	2	Title	
		Status	☐ under approval; ☐ approved
		Appr.date	
		Ref.No.	
☒	During the verification of the current MP no need for a CoPD has been identified. The monitoring plan is in accordance with the approved methodology applied by the PA		
☐	An approval of the following CoPD.is to be requested from the EB for the current MP as appendix 1 of the project standard does not apply.		
	1	Issue:	
	2	Issue:	
☐	The following CoPD for which appendix 1 of the PS is applicable have been applied:		
	1	Issue:	
	2	Issue:	

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

☒	N/A - as this monitoring plan was part of the latest approved PDD

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

Means of verification	By means of comparison of the MR with (i) the applied GS methodology (ii) all applicable GS guidelines and (iii) if applicable, a standardized baseline(SB) the verification team has checked whether the MP is in compliance with the MP related requirements of the applied methodology. The following sources of information have been used in this context: • /MR/ • /TPDDTEC/ • /gs/			
Findings	☒	The MP is completely in accordance with the approved methodology applied by the GS project (last registered/approved version of the PDD)		
	☐	The breakdown of MP accordance of the referenced tools is as follows:		
		1	Title (of the tool)	
			Version	
			MP compliance	☐ full compliance ☐ findings have been raised ☐ N/A (for MP)
	☐	The breakdown of MP accordance of the applicable SB is as follows:		
		1	Title (of the SB)	Name of SB
			Version	
			MP compliance	
	☐	In this context the following CARs, CLs, FARs have been raised:		
		- N/A		
Conclusion	☒	No CARs/CLs/FARs have been raised in this context. No correction was required. The project is in line with the respective requirements.		
	☐	The raised CARs/CLs/FARs have been addressed appropriately. The PP has carried out the requested corrections. All respective findings could be closed out. For details please refer to Appendix 4.		
	The monitoring plan complies with the applied methodology and the monitoring system and all applied procedures are completely in compliance to the latest approved monitoring plan and the methodology. The monitoring system and all applied procedures of sustainable development are completely in compliance to the latest approved Passport.			

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

D.6.1. Data and parameters that are available at validation

Means of verification

By means of comparison of the MR and the ER calculation with the latest approved PDD, the verification team has checked whether all parameters fixed ex-ante have been applied correctly.

The parameters that are fixed ex ante are following:

Parameters	Source of data	Values applied		Demonstration by Verification team
$EF_{b,CO2}$	2006 IPCC Guidelines defaults, see chapter 2 Stationary Combustion/IPCC/	**Fuel *b***	**EF_{CO2}, (kg/TJ)**	PP has applied an IPCC default value, taken from the 2006 IPCC Guidelines defaults, see chapter 2 Stationary Combustion/IPCC/. The value applied found reasonable and valid.
		LPG	63100	
		Charcoal	112000	
		Coal	94600	
		Firewood	112000	
		Agriculture residues	100000	
		Kerosene	71900	

		Charcoal production	1285 gCO_2 /kg charcoal	
$EF_{i,CH4}$	Data from latest approved PDD and IPCC/IPCC/	**Fuel *i*** / **EF_{CH4}, (kg/TJ)**: LPG 11.95; Charcoal 330.5; Coal 1458.5; Firewood 1224; Agriculture residues 2210; Kerosene 12.6; Charcoal production 1000		The data was taken from the 2006 IPCC Guidelines defaults see chapter 2 Stationary Combustion/IPCC/. For Charcoal production Good Practice Guidance and Uncertainty Management in National GHG inventories /IPCC/ The value applied found reasonable and valid.
$EF_{i,N2O}$	2006 IPCC Guidelines defaults, see chapter 2 Stationary Combustion table 2.9/IPCC/	**Fuel *i*** / **EF_{N2O}, (kg/TJ)**: LPG 2.1; Charcoal 5.45; Coal NA; Firewood 11.25; Agriculture residues 9.7; Kerosene 1.55; Charcoal production NA		PP has applied an IPCC default value, taken from the 2006 IPCC Guidelines defaults, see chapter 2 Stationary Combustion table 2.9/IPCC/. The value applied found reasonable and valid.
NCV_i	2006 IPCC Guidelines defaults, see chapter 1 Energy table 1.2/IPCC/	Fuel *i* / **NCV_i (TJ/Gg)**: LPG 47.3; Charcoal 29.5; Coal 25.8; Firewood 15.6; Agriculture residues 11.6; Kerosene 43.8		PP has applied an IPCC default value, taken from the 2006 IPCC Guidelines defaults, see chapter 1 Energy table 1.2/IPCC/. The value applied found reasonable and valid.
GWP_{CH4}	SAR IPCC/IPCC/	25 tCO_2e per tCH_4		PP has applied a value of 25 tCO_2e per tCH_4 for this monitoring period, which is confirmed as correct as per the SAR IPCC for the second commitment period and will be updated to any future COP/MOP decisions. The value applied found reasonable and valid.
GWP_{N2O}	SAR IPCC/IPCC/	298 tCO_2e per tN_2O		PP has applied a value of 298 tCO_2e per tN_2O for this monitoring period,

				which is confirmed as correct as per the SAR IPCC for the second commitment period and will be updated to any future COP/MOP decisions. The value applied found reasonable and valid.
	$VS_{(T)}$	Volume 4 of the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, chapter 10	Animal T: Pig; Buffalo; Diary cow; Cattle $VS_{(T)}$ Kg/day: 0.3; 3.9; 2.8; 2.3	PP has applied an IPCC default value, taken from the Volume 4 of the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, chapter 10[IPCC]. The value applied found reasonable and valid.
	$Bo_{(T)}$	Volume 4 of the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, chapter 10	Animal T: Pig; Buffalo; Diary cow; Cattle $Bo_{(T)}$ $m^3CH_4/kgVS$: 0.29; 0.1; 0.13; 0.1	PP has applied an IPCC default value, taken from the Volume 4 of the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, chapter 10[IPCC]. The value applied found reasonable and valid.
	$MCF_{(k)}$	Volume 4 of the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, chapter 10	10% for bio-digester systems	PP has applied an IPCC default value, taken from the Volume 4 of the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, chapter 10[IPCC]. The value applied found reasonable and valid.
	$\eta_{biogasstove}$	GS methodology: Indicative Programme, baseline, and monitoring methodology for Small Scale Bio-digester	98%	PP has applied an value of 98%, which is the default value derived from the applied GS methodology: Indicative Programme, baseline, and monitoring

<table>
<tr><td></td><td colspan="4">
<table>
<tr><td></td><td></td><td></td><td>methodology for Small Scale Bio-digester/GSM/</td></tr>
<tr><td>EF_{awms(T)}</td><td>IPCC default values for the region Asia from volume 4 of the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, chapter 10</td><td>
<table>
<tr><td rowspan="2">Animal T</td><td colspan="2">EF (kgCH₄/head/year)</td></tr>
<tr><td>Temperate zone</td><td>Warm zone</td></tr>
<tr><td>Pig</td><td>5.00</td><td>7.00</td></tr>
<tr><td>Buffalo</td><td>2.00</td><td>2.00</td></tr>
<tr><td>Dairy cow</td><td>23.00</td><td>31.00</td></tr>
<tr><td>Cattle</td><td>1.00</td><td>1.00</td></tr>
</table>
</td><td>PP has applied an IPCC default value, taken from the Volume 4 of the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, chapter 10/IPCC/. The value applied found reasonable and valid.</td></tr>
</table>

The following sources of information have been used in this context:
• /MR/
• /XLS/
• /PDD/
• /IPCC/
• /GSM/
• /GSP/
• /GST/
</td></tr>
<tr><td>Findings</td><td>☒</td><td>The MR and the ER calculation have considered the parameters fixed ex-ante or at the renewal of the crediting period correctly, no deviations have been observed.</td></tr>
<tr><td></td><td>☐</td><td>The following deviations from the parameters fixed ex-ante or at renewal of crediting period have been identified in the course of this verification:
- N/A</td></tr>
<tr><td></td><td>☒</td><td>In this context the following CARs, CLs, FARs have been raised:
- N/A</td></tr>
<tr><td>Conclusion</td><td>☐</td><td>No CARs/CLs/FARs have been raised in this context. No correction was required. The project is in line with the respective requirements.</td></tr>
<tr><td></td><td>☒</td><td>The raised CARs/CLs/FARs have been addressed appropriately. The PP has carried out the requested corrections. All respective findings could be closed out. For details please refer to Appendix 4.</td></tr>
<tr><td colspan="3">The parameters fixed ex ante have been indicated in the registered GS PDD. And the MR is checked as in line with the PDD.</td></tr>
</table>

D.6.2. Data and parameters monitored

<table>
<tr><td>Means of verification</td><td colspan="2">During the verification all relevant monitoring parameters (as listed in chapter B.7.1 of the PDD) have been verified with regard to the
(i) appropriateness of the applied measurement / determination method,
(ii) the correctness of the values applied for ER calculation,
(iii) the accuracy, and applied QA/QC measures.
The results as well as the verification procedure are described parameter-wise in the project specific verification checklist (Appendix 5).</td></tr>
<tr><td>Findings</td><td colspan="2">CL 2, CAR 3</td></tr>
<tr><td>Conclusion</td><td>☐</td><td>No CARs/CLs/FARs have been raised in this context. No correction was required. The project is in line with the respective requirements.</td></tr>
<tr><td></td><td>☒</td><td>The raised CARs/CLs/FARs have been addressed appropriately. The PP has carried out the requested corrections. All respective findings could be closed out. For details please refer to Appendix 4.</td></tr>
</table>

	It can be confirmed that all monitoring parameters have been measured / determined without material misstatements and in line with all applicable standards and relevant requirements.

D.6.3. Implementation of sampling plan

Means of verification	The verification team has been checked whether the PPs have applied a sampling approach to determine the monitored values. Further it has been checked whether the PPs have 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. The following sources of information have been used in this context: • /MR/ • /XLS/ • /PDD/ • /BFT/ • /PFT/ • /TPDDTEC/ • /GST/ • /US/ • /CMS/ • /SHH/ • /BUSR/ • /QBFT/			
Findings	☐	The PPs have not applied sampling approaches for the parameters monitored.		
	☒	The PPs have applied sampling approaches for the following parameters monitored.		
		1	Parameter:	$P_{bs2,y}$
			Name:	Quantity of fuel that is consumed in the baseline scenario 2 in year y
			Description on how the sampling efforts and survey comply with the validated sampling plan:	The value is derived from baseline fuel test. PP took a sample number of 180 for baseline fuel test, the sample size 60 for each baseline scenario, it is confirmed that the sampling approach was designed with a confidence interval of at least 90/30 according to GS recommendation to ensure the households interviewed are representative. Via checking the "MP4-GS1083-BUS report_E_Final"/BUSR/, it is confirmed that the EPRO selected representative HHs based on the questionnaire for selecting BFT HH/QBFT/, and the HHs are selected randomly in all the HHs without the biodigester which are applicable to the requirements in the questionnaire.
		2	Parameter:	$P_{bs3,y}$
			Name:	The value is derived from baseline fuel test. Quantity of fuel that is consumed in the baseline scenario 3 in year y

			Description on how the sampling efforts and survey comply with the validated sampling plan:	PP took a sample number of 180 for baseline fuel test, the sample size 60 for each baseline scenario, it is confirmed that the sampling approach was designed with a confidence interval of at least 90/30 according to GS recommendation to ensure the households interviewed are representative. Via checking the "MP4-GS1083-BUS report_E_Final"/BUSR/, it is confirmed that the EPRO selected representative HHs based on the questionnaire for selecting BFT HH/QBFT/, and the HHs are selected randomly in all the HHs without the biodigester which are applicable to the requirements in the questionnaire.
		3	Parameter:	$P_{h,y}$
			Name:	Quantity of fuel that is consumed in the project scenario in year y
			Description on how the sampling efforts and survey comply with the validated sampling plan:	The value is derived from project fuel test. PP took a sample number of 100 for project fuel test, it is confirmed that the sampling approach was designed with a confidence interval of at least 90/30 according to GS recommendation to ensure the households interviewed are representative. The sample size for the PFT is 5 household per districts, 20 clusters, total 100 households, 5 HH were randomly selected from each districts of CMS survey. Project fuel test/PFT/ (one of KPT) was executed by a selected independent consultant named EPRO consulting JSC (EPRO) from April to June 2019 combining with CMS. Nexus selected the samplings and supply the sampling list to EPRO for execution. Via checking the "GS1083__CMS and KPT_sampling HHs_MP4"/SHH/, it is confirmed that Nexus selected clusters/districts and HH randomly and the screenshots have been provided to verification team during the site, it is verified that the random selection is actual and credible.
		4	Parameter:	$U_{p,y}$
			Name:	Usage rate in project scenario p during year y
			Description on how the sampling efforts and survey comply with the validated sampling plan:	The value is derived from Usage survey. Usage survey were conducted by provincial technicians of BP from Jan 2018 to May 2019, via checking the "GS1083_Usage survey MP4_Sampling HHs"/US/, it is confirmed that the sample size determination is in line with the methodology requirement/TPDDTEC/ and GS rules/GST/,

				i.e. the minimum total sample size is 100, with at least 30 samples for project technologies of each age being credited. 35 units for each age group and total 350 HHs were surveyed which is confirmed more than the requirement. Nexus selected the samplings and supply the sampling list to provincial technicians of BP for execution. Nexus selected 35 HH randomly in each age group and the screenshots have been provided to verification team during the site, it is verified that the random selection is actual and credible.
		5	Parameter:	$MS_{(T,S,k)}$
			Name:	Fraction of livestock category *T*'s manure fed into the bio-digester *S,* in climate zone *k*
			Description on how the sampling efforts and survey comply with the validated sampling plan:	The value is derived from Carbon monitoring survey (CMS). Carbon monitoring survey (CMS)/CMS/ was executed by a selected independent consultant named EPRO consulting JSC (EPRO) from April to June 2019. Nexus selected the samplings and supply the sampling list to EPRO for execution. Via checking the "GS1083__CMS and KPT_sampling HHs_MP4"/SHH/, it is confirmed that the CMS sampling approach was designed with a confidence interval of at least 90/30 according to GS recommendation to ensure the households interviewed are representative. The sample size for the CMS is 17 households (include a 10% oversampling) from 20 clusters (10 clusters from each temperate and warm zone). The purpose of the 10% oversampling is to support any of the main selected households are not available during the survey. The total households for CMS survey are calculated as 17HH per cluster, 10 clusters per zone, thus 170 for each zone and total sample size is 340. Nexus selected clusters/districts and HH randomly and the screenshots have been provided to verification team during the site, it is verified that the random selection is actual and credible.
		6	Parameter:	$MS_{(P,S,k)}$
			Name:	Fraction of livestock category T's manure not fed into the bio-digester S, in climate zone k
			Description on how the sampling efforts and survey comply with the validated sampling plan:	The value is derived from Carbon monitoring survey (CMS). Carbon monitoring survey (CMS)/CMS/ was executed by a selected independent consultant named EPRO

				consulting JSC (EPRO) from April to June 2019. Nexus selected the samplings and supply the sampling list to EPRO for execution. Via checking the "GS1083__CMS and KPT_sampling HHs_MP4"/SHH/, it is confirmed that the CMS sampling approach was designed with a confidence interval of at least 90/30 according to GS recommendation to ensure the households interviewed are representative. The sample size for the CMS is 17 households (include a 10% oversampling) from 20 clusters (10 clusters from each temperate and warm zone). The purpose of the 10% oversampling is to support any of the main selected households are not available during the survey. The total households for CMS survey are calculated as 17HH per cluster, 10 clusters per zone, thus 170 for each zone and total sample size is 340. Nexus selected clusters/districts and HH randomly and the screenshots have been provided to verification team during the site, it is verified that the random selection is actual and credible.
		7	Parameter:	$N_{(T)}$
			Name:	Number of animals of livestock category T
			Description on how the sampling efforts and survey comply with the validated sampling plan:	The value is derived from Carbon monitoring survey (CMS). Carbon monitoring survey (CMS)/CMS/ was executed by a selected independent consultant named EPRO consulting JSC (EPRO) from April to June 2019. Nexus selected the samplings and supply the sampling list to EPRO for execution. Via checking the "GS1083__CMS and KPT_sampling HHs_MP4"/SHH/, it is confirmed that the CMS sampling approach was designed with a confidence interval of at least 90/30 according to GS recommendation to ensure the households interviewed are representative. The sample size for the CMS is 17 households (include a 10% oversampling) from 20 clusters (10 clusters from each temperate and warm zone). The purpose of the 10% oversampling is to support any of the main selected households are not available during the survey. The total households for CMS survey are calculated as 17HH per cluster, 10 clusters per zone, thus 170 for each zone and total sample size is 340. Nexus selected clusters/districts and HH randomly and the screenshots have

		been provided to verification team during the site, it is verified that the random selection is actual and credible.
	☒	In this context the following CARs, CLs, FARs have been raised: - CL 3, CAR 4
Conclusion	☐	No CARs/CLs/FARs have been raised in this context. No correction was required. The project is in line with the respective requirements.
	☒	The raised CARs/CLs/FARs have been addressed appropriately. The PP has carried out the requested corrections. All respective findings could be closed out. For details please refer to Appendix 4.
	According to latest version of Guidelines: "Sampling and surveys for CDM project activities and programmes of activities"/SSG/ and Standard: "Standard for sampling and surveys for CDM project activities and Programme of Activities"/SSS/, and based on the verification team's local and sectorial knowledge, the verification team confirms that the sampling approach applied by the PP is in accordance with the latest approved PDD and applied methodology.	

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

Means of verification	During the verification the relevant monitoring equipment has been checked whether the calibration requirements have been met; especially if the calibration frequency is in line with the requirements of the validated PDD and/or the applicable calibration standards. During the monitoring survey, it was observed that PP has used Weighing scales during baseline and project fuel test. As per the methodology, it is required to verify the accuracy of the devices prior to conducting the tests. The consultant who conducting the site survey have to maintain and get it calibrated before the expired date or using the new scale. Last calibration check was done on 05/07/2016 due to the WCFT was conducted in July and August 2016 and it is confirmed that the scales are in good condition and delivering correct outcome of measurement. The calibration records listed in "MP4-GS1083-CMS Inception Report_EN"/CMSIR/ was checked by verification team, it is confirmed that every scale had the calibration record which the expired date is still valid at time of conducting the field survey in Apr to Jun 2019. 14 calibrated scales are available for the survey. All calibration records are checked and confirmed as valid. The calibration was conducted by a third party named 3D VINA, and via cheking its public website/3d/ as listed in the records, it is verified that the company has the qualification and ability to do the calibration. Scales were inspected for the correctness of the calibration and found accurate, during site visit a weighment of known weights, all devices are showing correct results. Hence verification team concluded that the records of Calibration produced by the PP are reliable and acceptable. The following sources of information have been used in this context: • /MR/ • /XLS/ • /CMSIR/ • /3d/	
Findings	☒	Based on the details listed above the verification team can confirm that all installed monitoring equipment has been duly calibrated for this entire monitoring period.
	☐	Based on the assessment and information as above calibration have been identified. The PP has applied the maximum permissible error of the instrument to the measured values taken during the period between the scheduled date of calibration and the actual date of calibration. From the related calibration certificates and emission reduction calculation the verification team confirms that the maximum permissible error has been applied in a conservative manner so that the adjusted

		measured values due to the delayed calibration result in fewer claimed emission reductions.
	☐	In this context the following CARs, CLs, FARs have been raised: - N/A
Conclusion	☒	No CARs/CLs/FARs have been raised in this context. No correction was required. The project is in line with the respective requirements.
	☐	The raised CARs/CLs/FARs have been addressed appropriately. The PP has carried out the requested corrections. All respective findings could be closed out. For details please refer to Appendix 4.
	The accuracy of equipment used for monitoring is controlled and calibrated in accordance with the monitoring plan and relevant national rules. The calibrations of all monitoring equipments installed have been verified accordingly. Based on that the verifier can confirm that all installed monitoring equipment has been duly calibrated for the monitoring survey which is applicable to this entire monitoring period.	

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

During the verification the calculation of baseline GHG emissions has been checked. In detail the following has been verified:

- *Transparency:* It has been checked whether the calculation of baseline emissions is fully traceable and, where used, the Excel calculation provides all calculation formulae.
- *Parameter consistency:* It has been checked whether all internal and external parameters and data used for the calculation are applied consistently in the monitoring report and the calculation spreadsheet.
- *Correctness:* It has been checked whether the applied formulae and methods for calculating baseline emissions are in accordance with the monitoring plan and the approved methodology.
- *Completeness:* It has been checked whether all calculations are complete and without omissions.

Baseline Emissions from thermal energy demand Calculation Assessment:

The formula used for the determination of baseline emissions which is consistent with the latest approved PDD and the applied methodology:

$$\boldsymbol{BE_{th,h} = \sum_i (f_{NRB,y}\, F_{i,bl,h} \times NCV_i \times EF_{CO2,i} + F_{i,bl,h} \times NCV_i \times EF_{nonCO2,i})}$$

Where

$BE_{th,h}$	=	The total baseline emissions from the thermal energy demand of one household (tCO_{2e}/year)
$f_{NRB,y}$	=	Fraction of biomass during year y that is non-renewable (100% for fossil fuels)
$F_{i,bl,h}$	=	Quantity of fuel *i* consumed in the baseline during year y (kg/household/year) Total amount of fuel type *i* in the baseline scenario (kg/year) of one household
NCV_i	=	Net Calorific Value of fuel type *i* (TJ/ton of fuel)
$EF_{CO2,i}$	=	The CO_2 emission factor per unit of energy of fuel *i* (tCO_{2e}/TJ)
$EF_{nonCO2,i}$	=	The nonCO_2 emission factor per unit of energy of fuel *i* (tCO_{2e}/TJ)

For different baseline scenarios, the baseline emissions are calculated as below[2],

Emission with baseline scenario 2:

$$BE_{th,h,\ ,Biomass} = 5.61\ (tCO_{2e}/\ HH/year)$$

Emission with baseline scenario 3:

$$BE_{th,h,\ ,Mix} = 4.32\ (tCO_{2e}/\ HH/year)$$

The ER calculation sheet has been checked, it is confirmed that the input to calculate baseline emissions from thermal energy demand are taken from the related baseline fuel test/BFT/ done for this monitoring period and ex-ante values determined in the PDD. Baseline fuel test/BFT/ (one of KPT) was executed by a selected independent consultant named EPRO consulting JSC (EPRO) from April to June 2019 combining with CMS, which is valid to this monitoring period (01/01/2015 to 30/06/2016) due to the monitoring frequency is every two years as defined in the PDD[3]. The calculation reculls is confirmed as correct based on the values determined in PDD and monitored in BFT/BFT/.

Baseline Emissions for fuel Calculation Assessment:

According to the TPDDTEC methodology, the 90/30 rule check are confirmed as applied to all 3 scenarios. For the emission reduction with baseline scenarios 2 and 3 were met (see cell D13 and E13, tab "ER_fuel", ER spreadsheet/XLS/). So the mean ER value used is verified as reasonable.

The applied emission reductions for fuel is calculated as 3.62 $tCO_2e/HH/y$ via checking the cell C17, tab "ER_fuel" of ER spreadsheet/XLS/, therefore the baseline emission is the result of the project emission plus the calculated emission reductions via checking the cell C19, tab "ER_fuel" of ER spreadsheet/XLS/. The weighted average emission reduction for fuel is therefore:

$BE_{th,h,}$ = 4.37 $tCO_2e/HH/y$

The detail calculation presented in the ER spreadsheet/XLS/ was verified as appropriate and correct.

Baseline Emissions from AWMS Calculation Assessment:

The baseline emissions from animal waste management systems is calculated as follows:

$$BE_{awms,h} = GWP_{CH4} * \sum_{T} \left(EF_{awms(T)} * N_{(T),h} \right)$$

Where:

$BE_{awms,h}$	=	The baseline emissions from handling of animal waste in premise h (tCO_2e/year)
GWP_{CH4}	=	Global warming potential of methane (tCO_2e per tCH_4). The GWP applied for the second commitment period, the GWP are 25 and 298 for CH_4 and N_2O respectively
$N_{(T),h}$	=	The number of animals of livestock species per category T

[2] PP does not claim the emission reduction from the BS1 group (in which the household in the baseline use LPG only for cooking and later install the bio-digester). The emission reduction for this baseline scenario is observable because it is clear that all (or part) of LPG onsumption in BS1 household was replaced by biogas as renewable energy source. However, the emission reduction is not significant, so the emission reduction is ignored from this MP4.

[3] The previous survey for MP3 was conducted in

	$EF_{awms(T)}$ = Emission factor for the defined livestock population category T, (ton CH4 per head per yr). The relevant Default methane emission factor for livestock for default animal waste methane emission factors by temperature and region can be found in tables 10.14, 10.15 & 10.16 in Chapter 10: Emissions from Livestock and Manure Management, Volume 4 - AGRICULTURE, FORESTRY AND OTHER LAND USE, 2006 IPCC Guidelines for National Greenhouse Gas Inventories. The baseline emissions from AWMS for this monitoring period as follows: $BE_{AWMS, temperate}$ =1.78 $tCO_2e/HH/y$ $BE_{AWMS, warm}$ = 5.86 $tCO_2e/HH/y$ For details calculations presented in the ER spreadsheet were verified and considered as correct. The values monitored and recorded during these surveys are summarized and compared against previous monitoring period. The values monitored during such surveys are transparently shown in the Monitoring Report Section D.2. During onsite, verification team verified these values in detail using various supporting records and documents. Refer to the section D.6.1 and D.6.2 of this report for parameters assessment. The Baseline emission calculation is provided in the ER spreadsheet/XLS/ in a transparent manner and the calculation found correct. There is no material error noted in the accounting and application of various data against monitored parameters. The following sources of information have been used in this context: • /MR/ • /XLS/ • /TPDDTEC/ • /BFT/ • /BUSR/	
Findings	☒	The calculation of the baseline emissions was found to be fully compliant with the above stated principles. The calculations of baseline GHG emissions or baseline net GHG removals have been carried out in accordance with the formulae and methods described in the registered monitoring plan, the applied methodology and, where applicable, the applied standardized baseline. Any assumptions used in emission or removal calculations have been justified. Appropriate emission factors, IPCC default values, GWPs and other reference values have been correctly applied. No errors, miscalculations, omissions, misstatements or incomplete information has been identified.
	☐	The verification team has identified mistakes in the baseline emissions calculation or the underlying calculation approaches.
	☐	In this context the following CARs, CLs, FARs have been raised: - N/A
Conclusion	☐	No CARs/CLs/FARs have been raised in this context. No correction was required. The project is in line with the respective requirements.
	☒	The raised CARs/CLs/FARs have been addressed appropriately. The PP has carried out the requested corrections. All respective findings could be closed out. For details please refer to Appendix 4.
	It can be confirmed that the baseline calculation is overall correct.	

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

Means of verification	During the verification the calculation of project GHG emissions has been checked. In detail the following has been verified: • Transparency: It has been checked whether the calculation of project emissions is fully traceable and, where used, the Excel calculation provides all calculation formulae.

- Parameter consistency: It has been checked whether all internal and external parameters and data used for the calculation are applied consistently in the monitoring report and the calculation spreadsheet.
- Correctness: It has been checked whether the applied formulae and methods for calculating project emissions are in accordance with the monitoring plan and the approved methodology.
- Completeness: It has been checked whether all calculations are complete and without omissions.

Project Emission from Thermal Energy demand Calculation Assessment:

The project emissions are from thermal energy demand derived from PFT/PFT/ test results for this monitoring period.

$$PE_{th,h} = \sum_{i} (f_{NRB,y} F_{i,bl,h} \times NCV_i \times EF_{CO2,i} + F_{i,bl,h} \times NCV_i \times EF_{nonCO2,i})$$

Where

$PE_{th,h}$	=	The total project emissions from the thermal energy demand of one household (tCO_{2e}/year)
$f_{NRB,y}$	=	Fraction of biomass during year y that is non-renewable (100% for fossil fuels)
$F_{i,bl,h}$	=	Quantity of fuel *i* consumed in the project during year y (kg/household/year) Total amount of fuel type *i* in the project scenario (kg/year) of one household
NCV_i	=	Net Calorific Value of fuel type *i* (TJ/ton of fuel)
$EF_{CO2,i}$	=	The CO_2 emission factor per unit of energy of fuel *i* (tCO_{2e}/TJ)
$EF_{nonCO2,i}$	=	The nonCO_2 emission factor per unit of energy of fuel *i* (tCO_{2e}/TJ)

Therefore, similar to the baseline emission for thermal energy, demand project emissions for this monitoring period as follows:
$PE_{th,h,}$ = 0.75 tCO_2e/HH/y
The detail calculation presented in the ER spreadsheet was verified as appropriate and correct.

The Project involves displacement of fossil fuel usage for thermal energy, hence according to "Technologies and Practices to Displace Decentralized Thermal Energy Consumption, version 1.0" the project emissions are to be accounted and the values against project fuel used to cooking in project scenario are obtained from the PFT/PFT/ results. These values are found applied correctly to calculate the Project emissions. The Project emission calculation is found transparently shown in the ER Spreadsheet/XLS/.
During onsite, verification team verified these values in detail using various supporting records and documents. Refer to the section D.6.1 and D.6.2 of this report for parameters assessment.
The following sources of information have been used in this context:

- /MR/
- /PDD/
- /TPDDTEC/
- /XLS/
- /PFT/

Findings	☒	The calculation of the project emissions was found to be fully compliant with the above stated principles. The calculations of project GHG emissions or actual net GHG removals have been carried out in accordance with the formulae and methods described in the registered monitoring plan, the applied methodology and, where applicable, the applied standardized baseline. Any

		assumptions used in emission or removal calculations have been justified. Appropriate emission factors, IPCC default values, GWPs and other reference values have been correctly applied. No errors, miscalculations, omissions, misstatements or incomplete information have been identified.
	☐	The verification team has identified mistakes in the project emissions calculation or the underlying calculation approaches.
	☐	In this context the following CARs, CLs, FARs have been raised: - N/A
Conclusion	☒	No CARs/CLs/FARs have been raised in this context. No correction was required. The project is in line with the respective requirements.
	☐	The raised CARs/CLs/FARs have been addressed appropriately. The PP has carried out the requested corrections. All respective findings could be closed out. For details please refer to Appendix 4.
	It can be confirmed that the project emission calculation is overall correct.	

D.8.3. Calculation of leakage GHG emissions

Means of verification

As per the Gold Standard Methodology "Technologies and Practices to Displace Decentralized Thermal Energy Consumption – version 1.0", it is required to account the leakage emissions, in case project activity is using any fossil fuel during the Project Scenario.
The leakage emissions are determined as from physical leakage and incomplete combustion of biogas, as well as emissions from the animal waste not treated in the bio-digester and emissions from bio-slurry storage.

Leakage emissions from physical leakage and incomplete combustion of biogas Calculation Assessment:
The physical leakage and incomplete combustion of biogas from bio-digester per household is calculated as formula:

$$PE_{awms,h,y} = GWP_{CH4} \times \sum\left(N_{(T),h,y} \times EFawms_{(T)}\right).PL_y + \sum\left(LC_{(T),h,y} \times EFawms_{(T)}\right) \times \left(1 - \eta_{biogasstove}\right)(1 - PL_y)$$

Where:

$PE_{awms,h,y}$	=	Mean emission per household *h* (tCO_2e/year)
$N_{(T),h,y}$	=	Number of animals of livestock category T in year y in premise h
EF_{awmsT}	=	Emission factor for the defined livestock category T, (ton CH_4 per animal per year). Estimated using the IPCC TIER 2 approach.
PL_y	=	Physical leakage of the biodigester in year *y* (10 %)
EF_T	=	Annual CO_2 emission factor for livestock category *T*, (tCO_2e $animal^{-1}$ yr^{-1})
GWP_{CH4}	=	Global Warming Potential (GWP) of methane (tCO_2eq per tCH_4): 25 for the second commitment period.
$\eta_{biogasstove}$	=	Combustion efficiency of the biogas stove

The $EF_{AWMS(T)}$ will be calculated using the IPCC tier 2 approach:
The following formula is used from the Voluntary Gold Standard Biodigester Methodology to estimate the animal waste management emissions.

$$\boldsymbol{EF_{AWMS(T)} = \left(VS_{(T)} \times 365\right) \times \left[Bo_{(T)} \times D_{CH4} \times \sum_k \frac{MCF_{BL,k}}{100} \times MS_{(T,S,k)}\right]}$$

Where:

$EF_{AWMS(T)}$	=	CH_4 emission factor for livestock category T in the project scenario, ($tCH_4.animal^{-1}$)

$VS_{(T)}$	=	Daily volatile solid excreted for livestock category T, (kg VS per animal.day $^{-1}$)
365	=	Basis for calculating annual VS production, (days yr^{-1})
$Bo_{(T)}$	=	Maximum methane producing capacity for manure produced by livestock category T,(m^3 CH_4 kg^{-1} of VS)
D_{CH4}	=	Conversion factor of m^3 methane to kg methane, (0.067 kg/m^3)
$MCF_{(BL,k)}$	=	Methane conversion factors for the animal waste handling system in the baseline situation, bl, by climate zone *k, %*
$MS_{(T,S,k)}$	=	Fraction of livestock category T's manure treated in the animal waste management system *S*, in climate region *k*, (dimensionless)

Hence, via cheking the tab "ER_AWMS" of ER spreadsheet/XLS/, it is verified that
$PE_{awms,h,y}$ = 0.12 tCO_2e/HH/y (weighted average for temparate and warm zones)

Leakage emissions from digestate (bio-slurry) Calculation Assessment:
Biogas households were surveyed about their usage of bio-slurry during the CMS sampling survey for this monitoring period/CMS/. The CMS sampling survey results are checked by verification team and confirmed that the values used for Leakage emissions from digestate (bio-slurry) calculation is correct. Via checking the tab "PE_Bioslurry" in of ER spreadsheet/XLS/, it is verified that Leakage emissions from digestate (bio-slurry) per household is:
$LE_{Bio\text{-}slurry}$ = 0.04 tCO_2e/HH/y (average for temparate and warm zones).

Furthermore, for the leakage emission assessment listed in table 9 of the MR, the verification team provised demonstrations as following,

#	Leakage source	Assessment by PP	Demonstration by VVB
a	The displaced baseline technologies are reused outside the project boundary in place of lower emitting technology or in a manner suggesting more usage than would have occurred in the absence of the project.	The risk for leakage is very low. The baseline technologies are not reused outside the project boundary as reported by the surveyed biogas households. As reported by the surveyed biogas users, 51.5% of the baseline stoves were broken and could not be used; 14.0% were kept at home but not used; 23.5% were used as backup for the biogas stove; 5.5% for other purposes and only 1 case (0.3%) sold them lower than the market price. The remaining 5.2% responded that they use for other purpose (including give to other, through away or using in parallel with the biogas	The Carbon Monitoring Survey/CMS/ have been checked by the verification team, it is confirmed that the percentage of using baseline stoves by different method is correct and totally 100% HHs confirmed that baselise stoves are not reused out side the project boundary. Thus it is concluded tha this risk for leakage is very low.

			stoves). In all cases, the baseline stoves have not reused outside the project boundary in place of lower emitting technology or in a manner suggesting more usage than would have occurred in the absence of the project.	
	b	The non-renewable biomass or fossil fuels saved under the project activity are used by non-project users who previously used lower emitting energy sources.	The risk for leakage is very low. The share of household that use a lower emitting energy source, such as LPG, will not switch back to NRB or coal due to the project activity because the saved biomass or fossil fuels would not impact to the supply of fuel in the market as the adoption rate of the project activity is less than 1% of the total number of household (at time of 01/07/2016, the total number of households living in rural area in Vietnam is 15.99 million households so the percentage of households who have access to biogas digester from the proposed project is 90,608/15,990,000 = 0.6%).	Via checking the ER spreadsheet and comparing the household numbers issued by General Statistics Office of Vietnam, it is verified that the percentage of 0.6% is correct for respresenting the households who have access to biogas digester. This percentage is so small that not enough saved non-renewable biomass or fossil fuels due to project could be used by non-project users who previously used lower emitting energy sources. The price of firewood or fossil fuels will not be impacted by the little saved amount. Thus it is not reasonable that non-project users swith to NRB or coal. Thus it is concluded tha this risk for leakage is very low.
	c	The project significantly impacts the NRB fraction within an area where other CDM or VER	The risk for leakage is very low. No VER or CDM projects that account for NRB fraction in the project boundary of proposed project activity	Via checking the ER spreadsheet and comparing the household numbers issued by General Statistics Office of

		project activities account for NRB fraction in their baseline scenario.	might be impacted because the adoption rate of the project activity is less than 1% of the total number of household (at time of 01/07/2016, the total number of households living in rural area in Vietnam is 15.99 million households [4] so the percentage of households who have access to biogas digester [5] from the proposed project is 90,608/15,990,000 = 0.6%[6]).	Vietnam, it is verified that the percentage of 0.6% is correct for respresenting that adoption rate of the project activity is less than 1% of the total number of household. So no VER or CDM projects that account for NRB fraction in the project boundary of proposed project activity might be impacted. Thus it is concluded tha this risk for leakage is very low.
	d	The project population compensates for loss of the space heating effect of inefficient technology by adopting some other form of heating or by retaining some use of inefficient technology	The risk for leakage is very low. The cookstoves are not used for space heating as regarding the location of the baseline stoves, 89.8% of the HHs did not keep the stoves inside the room. Among 35 cases (10.2%) that kept it inside the room, there is only 1 case who used the baseline stove for heating purposes. After installing the household still use the baseline stove for heating in average 5 days of the year and average 2 hours per day.	Via on-site inspection, it is confirmed that almost all the HHs did not keep the stoves inside the room for space heating. This is also confirmed by interview with the HHs. So there is no compensates for loss of the space heating occurred and thus it is concluded tha this risk for leakage is very low.
	e	By virtue of promotion and marketing of a new technology with high efficiency, the project stimulates substitution within households who commonly used a technology with	The risk for leakage is very low. The baseline is not fixed in this project, and the combustion of biogas always leads to lower emissions compared to all baseline fuels as it is 100% renewable.	Base on the design of the project, it is confirmed that the baseline data is not fixed as ex ante determined, it is based on the actual survey with the project implementation.

[4] General Statistics Office of Vietnam: https://gso.gov.vn/Default.aspx?tabid=382&ItemID=16177
[5] See SD indicator #05
[6] Please find the calculation in cell G36, tab "SD" of the ER spreadsheet

		relatively lower emissions, in cases where such a trend is not eligible as an evolving baseline.		And also the ombustion of biogas leads to lower emissions compared to the baseline fuels. Thus it is concluded tha this risk for leakage is very low.

The following sources of information have been used in this context:

- /MR/
- /PDD/
- /TPDDTEC/
- /XLS/
- /CMS/

Findings	☐	No leakage emissions were to be considered (LE = 0).
	☒	The calculation of the leakage emissions was found to be fully compliant with the above stated principles. The calculations of leakage GHG emissions have been carried out in accordance with the formulae and methods described in the registered monitoring plan, the applied methodology and, where applicable, the applied standardized baseline. Any assumptions used in leakage emissions calculations have been justified. Where applicable, appropriate emission factors, IPCC default values, GWPs and other reference values have been correctly applied. No errors, miscalculations, omissions, misstatements or incomplete information have been identified.
	☐	The verification team has identified mistakes in the leakage emissions calculation or the underlying calculation approaches.
	☐	In this context the following CARs, CLs, FARs have been raised: - N/A
Conclusion	☒	No CARs/CLs/FARs have been raised in this context. No correction was required. The project is in line with the respective requirements.
	☐	The raised CARs/CLs/FARs have been addressed appropriately. The PP has carried out the requested corrections. All respective findings could be closed out. For details please refer to Appendix 4.
	It can be confirmed that the leakage emission calculation is overall correct.	

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

Means of verification

The verification team has checked if the MR includes summary tables of the emission reductions calculation specifying separately for both zones and total. It has been assessed whether the values are correct or need to be revised as a consequence of issues identified above.
As per the methodology and the latest approved PDD, the emission reductions for the project are calculated as the baseline emissions minus the project emissions and leakage.
Based on the above baseline emissions, project emissions and leakage calculation, the emission reductions for each biogas unit is calculated as below table,

Average annual emission reductions in temperate zone

Emission source	BE (tCO_2e/HH/year)	PE (tCO_2e/HH/year)	LE (tCO_2e/HH/year)	ER (tCO_2e/HH/year)
Fuel use	4.37	0.75	0	3.62

AWMS	1.78	0.09	0	1.68
Digestate		0.02	0	-0.02
Sum	**6.15**	**0.87**	**0**	**5.28**

Average annual emission reductions in warm zone

Emission source	BE (tCO_2e/HH/year)	PE (tCO_2e/HH/year)	LE (tCO_2e/HH/year)	ER (tCO_2e/HH/year)
Fuel use	4.37	0.75	0	3.62
AWMS	5.86	0.20	0	5.65
Digestate		0.09	0	-0.09
Sum	**10.23**	**1.05**	**0**	**9.18**

The cumulative ex-post emission reduction is determined by the following formula:

$$\boldsymbol{ER_{y,h} = U_{y,h} \times (BE_{y,h-} PE_{y,h}) \; x \; N_{p,y}}$$

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 (fraction)

$BE_{y,h}$ = 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

Via checking the usage survey[/US/], it is verified that the calculated usage rate $U_{y,h}$ is 69.59%. However to be more conservative, the effective usage rate $U_{Fy,h}$ of 60.31% was applied.

Hence, the emission reductions during the monitoring period from 01/01/2015 to 30/06/2016 are calculated as below table

Emission Reductions Calculation for temperate zone

Parameters / Period	Installation in month	Cumulative units	ER	Emission reductions	Percentage in operation	ER/month
	-	-	tCO_2e /year	tCO_2e /month	%	tCO_2e
01/01/2015-31/01/2015	189	93,047	5.28	0.44	60.31%	24,636
01/02/2015-28/02/2015	261	93,308	5.28	0.44	60.31%	24,687
01/03/2015-31/03/2015	329	93,637	5.28	0.44	60.31%	24,756
01/04/2015-30/04/2015	451	94,088	5.28	0.44	60.31%	24,843
01/05/2015-31/05/2015	656	94,744	5.28	0.44	60.31%	24,963
01/06/2015-30/06/2015	802	95,546	5.28	0.44	60.31%	25,137
01/07/2015-31/07/2015	627	96,173	5.28	0.44	60.31%	25,350
01/08/2015-31/08/2015	350	96,523	5.28	0.44	60.31%	25,516
01/09/2015-30/09/2015	334	96,857	5.28	0.44	60.31%	25,609
01/10/2015-31/10/2015	731	97,588	5.28	0.44	60.31%	25,697
01/11/2015-30/11/2015	2179	99,767	5.28	0.44	60.31%	25,891
01/12/2015-31/12/2015	98	99,865	5.28	0.44	60.31%	26,469
01/01/2016-31/01/2016	0	99,865	5.28	0.44	60.31%	26,495
01/02/2016-29/02/2016	0	99,865	5.28	0.44	60.31%	26,495

01/03/2016-31/03/2016	0	99,865	5.28	0.44	60.31%	26,495
01/04/2016-30/04/2016	1	99,866	5.28	0.44	60.31%	26,495
01/05/2016-31/05/2016	0	99,866	5.28	0.44	60.31%	26,496
01/06/2016-30/06/2016	0	99,866	5.28	0.44	60.31%	26,496
Total						**462,526**

Emission Reductions Calculation for warm zone

Parameters / Period	Installation in month	Cumulative units	ER	Emission reductions	Percentage in operation	ER/month
	-	-	tCO_2e /year	tCO_2e /month	%	tCO_2e
01/01/2015-31/01/2015	36	28,589	9.18	0.77	60.31%	13,176
01/02/2015-28/02/2015	67	28,656	9.18	0.77	60.31%	13,192
01/03/2015-31/03/2015	179	28,835	9.18	0.77	60.31%	13,223
01/04/2015-30/04/2015	212	29,047	9.18	0.77	60.31%	13,306
01/05/2015-31/05/2015	283	29,330	9.18	0.77	60.31%	13,404
01/06/2015-30/06/2015	200	29,530	9.18	0.77	60.31%	13,534
01/07/2015-31/07/2015	203	29,733	9.18	0.77	60.31%	13,627
01/08/2015-31/08/2015	154	29,887	9.18	0.77	60.31%	13,720
01/09/2015-30/09/2015	112	29,999	9.18	0.77	60.31%	13,791
01/10/2015-31/10/2015	129	30,128	9.18	0.77	60.31%	13,843
01/11/2015-30/11/2015	175	30,303	9.18	0.77	60.31%	13,903
01/12/2015-31/12/2015	24	30,327	9.18	0.77	60.31%	13,983
01/01/2016-31/01/2016	0	30,327	9.18	0.77	60.31%	13,994
01/02/2016-29/02/2016	0	30,327	9.18	0.77	60.31%	13,994
01/03/2016-31/03/2016	0	30,327	9.18	0.77	60.31%	13,994
01/04/2016-30/04/2016	0	30,327	9.18	0.77	60.31%	13,994
01/05/2016-31/05/2016	0	30,327	9.18	0.77	60.31%	13,994
01/06/2016-30/06/2016	1	30,328	9.18	0.77	60.31%	13,994
Total						**246,666**

Emission Reductions Calculation for both zones

Parameters / Period	Installation in month	Cumulative units	ER/month
	-	-	tCO_2e
01/01/2015-31/01/2015	225	121,636	37,812
01/02/2015-28/02/2015	328	121,964	37,879
01/03/2015-31/03/2015	508	122,472	37,979
01/04/2015-30/04/2015	663	123,135	38,149
01/05/2015-31/05/2015	939	124,074	38,367
01/06/2015-30/06/2015	1002	125,076	38,671
01/07/2015-31/07/2015	830	125,906	38,977
01/08/2015-31/08/2015	504	126,410	39,236
01/09/2015-30/09/2015	446	126,856	39,400
01/10/2015-31/10/2015	860	127,716	39,540

	01/11/2015-30/11/2015	2354	130,070	39,794
	01/12/2015-31/12/2015	122	130,192	40,452
	01/01/2016-31/01/2016	0	130,192	40,489
	01/02/2016-29/02/2016	0	130,192	40,489
	01/03/2016-31/03/2016	0	130,192	40,489
	01/04/2016-30/04/2016	1	130,193	40,489
	01/05/2016-31/05/2016	0	130,193	40,490
	01/06/2016-30/06/2016	1	130,194	40,490
	Total			**709,192**

Thus the total ER for this monitoring period is 709,192 tCO_2e, in which,

- ER for year 2015 is ~~462~~466,~~526~~ 256 tCO_2e
- ER for year 2016 is ~~246~~242,~~666~~ 936 tCO_2e

All the figures as per the monitoring report were cross-checked by the verification team against basic monitored data. Refer to Appendix 5 for details.

Findings	☒	Section E.4 of the MR includes in a summary table of the emission reductions calculation.
	☒	The summary table specified the baseline, project and leakage emissions as well as the total emission reductions separately.
	☐	The values as specified in the ER summary table are correct; no issues have been identified during the verification which requires changes in the ER calculation.
	☒	During the verification issues with impact on the ER calculation have been identified.
	☒	In this context the following CARs, CLs, FARs have been raised: - CAR 5
Conclusion	☐	No CARs/CLs/FARs have been raised in this context. No correction was required. The project is in line with the respective requirements.
	☒	The raised CARs/CLs/FARs have been addressed appropriately. The PP has carried out the requested corrections. All respective findings could be closed out. For details please refer to Appendix 4.
	Where corrections where required a revised emission reductions calculation was prepared by the PPs and presented to the verification team. All raised issues were addressed appropriately so that it can be confirmed that the emission reductions calculation is overall correct.	

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

Means of verification	The verification team has checked if the MR includes a comparison of actual values of the monitoring period with the estimations in the latest approved PDD. It has further checked which of the below listed cases is applicable for the calculated ER of the current monitoring period.	
Findings	☒	*Case 1:* The ex-ante estimated value was found to be proportionally higher than the ex-post determined value. No further action is deemed required.
	☐	*Case 2:* The ex-ante estimated value fits very good to the actually monitored value. No further justification is deemed required.
	☐	*Case 3:* The ex-ante estimated value was found to be proportionally lower than the ex-post determined value.
	☐	In this context the following CARs, CLs, FARs have been raised: - N/A
Conclusion	☒	No CARs/CLs/FARs have been raised in this context. No correction was required. The project is in line with the respective requirements.
	☐	The raised CARs/CLs/FARs have been addressed appropriately. The PP has carried out the requested corrections. All respective findings could be closed out. For details please refer to Appendix 4.
	The ex-ante estimated value was found to be proportionally higher than the ex-post determined value. No further action is deemed required.	

D.8.6. Remarks on difference from estimated value in latest approved PDD

Means of verification	On the basis of the above comparison of actual values of the monitoring period with the estimations in the latest approved PDD, the verification team has checked whether an appropriate explanation is included in the MR. The estimated emission reductions during this monitoring period is calculated as 965,936 tCO_2e as per the latest approved PDD. This value is verified by checking the excel sheet of cell P131, tab "ER database" of the registered ER spreadsheet "25 Sep 2012 ER worksheet BP VGS v3.1.xlsx"/RER/. The Actual emission reductions calculated by the PP for 4th Monitoring period are 709,192 tCO_2e which is found to be approximately 27% lower than that of estimated emissions as per the PDD. This decrease in the Emission reduction is mainly due to the lower usage rate of 60.31% than expected in PDD. Via checking the comparison results and reasons, it is concluded that the justification provided is found correct and it is found reflected appropriately in the calculation spreadsheet.	
Findings	☒	No further justification or explanation is deemed required as actual emissions of this MP do not exceed significantly the ex-ante calculated emission reductions (applicable for case 1, 2).
	☐	*For case 3:* The PP has provided a related justification in the MR. The reasons for the increase are demonstrated appropriately and found correct and reasonable.
	☐	In this context the following CARs, CLs, FARs have been raised: - N/A
Conclusion	☒	No CARs/CLs/FARs have been raised in this context. No correction was required. The project is in line with the respective requirements.
	☐	The raised CARs/CLs/FARs have been addressed appropriately. The PP has carried out the requested corrections. All respective findings could be closed out. For details please refer to Appendix 4.
	It is confirmed that the ex-ante estimated value was found to be proportionally higher than the ex-post determined value, no further justification or explanation is deemed required as actual emissions of this MP do not exceed the ex-ante calculated emission reductions.	

D.9. Do No Harm Assessment

Means of verification

The outcome to Do No Harm during this monitoring period of the project according to the Do No Harm Assessment in GS latest approved Passport is verified as follows:

Safeguarding principles	Project Assessment	Application of mitigation measure
Human rights	The project respects internationally proclaimed human rights including dignity, cultural property and uniqueness of indigenous people. The project is not complicit in Human Rights abuses.	Not required as determined in the Gold Standard Passport.
Involuntary settlements	The project does not involve and is not complicit in involuntary resettlement.	Not required as determined in the Gold Standard Passport.
Cultural heritage	The project does not involve and is not complicit in the alteration, damage or removal of any critical cultural heritage	Not required as determined in the Gold Standard Passport.
Labor – collective bargaining and	The project respects the employees' freedom of	Not required as determined in the

	freedom of association. Has the project demonstrated that it will not limit freedom of association and right to collective bargaining more than required by law?	association and their right to collective bargaining and is not complicit in restrictions of these freedoms and rights	Gold Standard Passport.
	Forced labor - Are employees free to quit their services without the menace of penalty? Are all employees offering their services on a voluntary basis?	The project does not involve and is not complicit in any form of forced or compulsory labor	Not required as determined in the Gold Standard Passport.
	Child Labor - Does the project employ or intend to employ children below the age of 15 in regular work or hazardous work? Does the project employ or intend to employ children below the age of 18 in hazardous work?	The project does not employ and is not complicit in any form of child labor	Not required as determined in the Gold Standard Passport.
	Labor discrimination - Does the project's employment policy district, exclude or prefer people based on race, colour, gender, religion, sexual orientation, political opinion, national extraction, social origin or physical or mental disability?	The project does not involve and is not complicit in any form of discrimination based on gender, race, religion, sexual orientation or any other basis.	Not required as determined in the Gold Standard Passport.
	Labor safety - Has there been a credible and sufficient investigation to identify potential hazards for workers? Are workers exposed to hazardous chemicals or other material? Are workers involved in processes which are potentially dangerous? Have	The project provides workers with a safe and healthy work environment and is not complicit in exposing workers to unsafe or unhealthy work environments.	Not required as determined in the Gold Standard Passport.

	other hazardous been identified? Has the risk of sexual harassment and abuse of women been considered sufficiently? Is there an emergency action plan in the case of accidents for every site? Is there an insurance or pension system for workers in place in case of health impacts?		
	Environmental harm	The project takes a precautionary approach in regard to environmental challenges and is not complicit in practices contrary to the precautionary principle.	Not required as determined in the Gold Standard Passport.
	Degradation of habitats	The project does not involve and is not complicit in significant conversion or degradation of critical natural habitats, including those that are (a) legally protected, (b) officially proposed for protection, (c) identified by authoritative sources for their high conservation value, or (d) recognized as protected by traditional local communities.	Not required as determined in the Gold Standard Passport.
	Corruption Is the project known to employ practiced where entrusted power is abused for private gain?	The project does not involve and is not complicit in corruption.	Not required as determined in the Gold Standard Passport.

Findings	N/A	
Conclusion	☒	No CARs/CLs/FARs have been raised in this context. No correction was required. The project is in line with the respective requirements.
	☐	The raised CARs/CLs/FARs have been addressed appropriately. The PP has carried out the requested corrections. All respective findings could be closed out. For details please refer to Appendix 4.
	In summary, the verification team confirms that the project under the Gold Standard results in Do No Harm to local sustainable development.	

D.10. Sustainable Data and parameters monitored

Means of verification	The monitoring of the contribution to sustainable development during this monitoring period according to the sustainability monitoring plan in GS latest approved Passport/GSP/ is verified as follows:

Sustainable development indicator	Methods and equipments used	Frequency	Assessment by verification team
Air quality	Reduction in fuel (wood, agricultural	Every two years – the frequency is	A selected independent consultant named

		residues, kerosene and coal) consumption (kg of fuel reduced/year) The BFT and PFT survey measured the consumed fuel in the biennial fuel monitoring survey.	confirmed as fulfilled as per the requirement by comparing the information in Monitoring report of MP3/VER/	EPRO consulting JSC (EPRO) has performed Project fuel test/PFT/ (one of KPT) and Baseline fuel test/BFT/ (one of KPT) from April to June 2019 and the results are documented in a report "MP4-GS1083-BUS report_E_Final"/BUSR/ and the fuel reduced during this monitoring period is calculated based on the Field test results. DOE verified the data of this survey/BUSR/ and found transparent. Further, during the site interview with Households, all the sampled households are asked about the questions as below: 1. Fuel consumption in baseline scenario, 2. Fuel consumption in project scenario during this MP, 3. If fuel saved during this MP 4. If air quality is better in kitchen during this MP It is concluded that all the HHs confirmed the fuel saved comparing with baseline scenario and air quality in kitchen is better than before. Thus, by checking the "MP4-GS1083-BUS report_E_Final"/BUSR/ and comparing the Tab "SD" of the "GS1083_ MP4_Monitoring database_ER" spreadsheet/XLS/, it is verified that 2,415.1kg/year firewood and 704.9

				agriculture residuals were reduced during this monitoring period. As compared with the baseline scenario, the amount of fuel consumed has reduced significantly thus improved air quality. Therefore, the score for this SD indicator is positive.
	Soil Condition	Usage of bio-slurry The CMS survey investigated the purpose of usage of bio-slurry	Every two years – the frequency is confirmed as fulfilled as per the requirement by comparing the information in Monitoring report of MP3/VER/	A selected independent consultant named EPRO consulting JSC (EPRO) has performed Carbon monitoring survey (CMS)/CMS/ from April to June 2019 and the results are documented in a report "MP4-GS1083-BUS report_E_Final"/BUSR/ and the way of using bio-slurry during this monitoring period is calculated by percentage based on the investigated results. DOE verified the data of this survey/BUSR/ and found transparent. Further, during the site interview with Households, all the sampled households are asked about the questions as below: How to deal with bio-slurry during this MP? It is concluded that all the only 11 HHs confirmed that they did not use the bio-slurry and others HH all used bio-slurry as fertilizer. Thus, by checking the "MP4-GS1083-BUS report_E_Final"/BUSR/ and comparing the Tab "SD" of the "GS1083_ MP4_Monitoring

				database_ER" spreadsheet/XLS/, it is verified that most households use bio-slurry as fertilizer during this monitoring period. In the baseline scenario, no bio-slurry used as fertilisers. Therefore, the score for this SD indicator is positive.
	Biodiversity	Cumulative savings of wood (tons/year) The PFT and BFT survey measured the consumed fuel in the biennial fuel monitoring survey.	Every two years – the frequency is confirmed as fulfilled as per the requirement by comparing the information in Monitoring report of MP3/VER/	A selected independent consultant named EPRO consulting JSC (EPRO) has performed Project fuel test/PFT/ (one of KPT) and Baseline fuel test/BFT/ (one of KPT) from April to June 2019 and the results are documented in a report "MP4-GS1083-BUS report_E_Final"/BUSR/ and the wood fuel saved during this monitoring period is calculated based on the Field test results. DOE verified the data of this survey/BUSR/ and found transparent. Further, during the site interview with Households, all the sampled households are asked about the questions as below: 1. Wood Fuel consumption in baseline scenario, 2. Wood Fuel consumption in project scenario during this MP, 3. If Wood fuel saved during this MP It is concluded that all the HHs who using wood as fuel confirmed the wood fuel were saved comparing with

				baseline scenario. Thus, by checking the "MP4-GS1083-BUS report_E_Final"/BUSR/ and comparing the Tab "SD" of the "GS1083_ MP4_Monitoring database_ER" spreadsheet/XLS/, it is verified that 189,624 ton/year wood were saved during this monitoring period. In conclusion, the reduction in wood use will be positive to the biodiversity as no more logging. In the baseline scenario, firewood is commonly used for daily cooking. Therefore, the score for this SD indicator is positive.
	Quality of Employment	Number of masons and technicians participating in the trainings PP keeps track on the number of trained masons and technicians	Every two years – the frequency is confirmed as fulfilled as per the requirement by comparing the information in Monitoring report of MP3/VER/	The Training records/TRA/ during this monitoring period is checked by verification team. DOE verified the attendance lists and and training lists /TRA/ and found that the masons and technicians participated in the training. Further, during the site interview with masons, all masons are asked about the questions as below: 1. Did you participate in the training to be the program mason during this MP? 2. How many masons in your enterprise? 3. How many plants have you finished? 4. Have you got the certificate as mason after training? 5. Do you think this

				project give more job opportunities? It is concluded that all the masons confirmed they attended the training before worked and got the certificate as the mason. There are more than 2 masons in one enterprise and they constructed plants as a team and all the masons got training and certificate. Each mason team have finished hundreds of plants depending on the working year. And they always have internal training among the enterprise. Thus, by checking the Training records/TRA/ and comparing the Tab "SD" of the "GS1083_ MP4_Monitoring database_ER" spreadsheet/XLS/, it is verified that 119 additional masons and 75 additional technicians were trained during this MP4 and total 1,275 masons and 865 technicians were trained till this monitoring period. There is an increased of trained masons and technicians, therefore, the score for this SD indicator is positive.
	Livelihood of the poor	Number of people having access to an improved waste management system PP keeps track on the number of households with bio-digesters and conduct the CMS	Every two years – the frequency is confirmed as fulfilled as per the requirement by comparing the information	Number of people having access to an improved waste management system is equal to the number of households with bio-digesters multiply with the average number of people in a household.

		survey for the average number of people in a household	in Monitoring report of MP3/VER/	a. Assessment to The number of households with bio-digesters This number is calculated by the Number of biogas plants commissioned $N_{p,y}$ multiply with usage rate $U_{P,y}$. Refer to Appendix 5 for assessment for both monitoring parameters. It is verified that the values are correct in MR. b. Assessment to the average number of people in a household A selected independent consultant named EPRO consulting JSC (EPRO) has performed Carbon monitoring survey (CMS)/CMS/ from April to June 2019 and the results are documented in a report "MP4-GS1083-BUS report_E_Final"/BUSR/ and the average number of people in a household is calculated as 4.32 based on the investigated results. DOE verified the data of this survey/BUSR/ and found transparent. Further, during the site inspection, it is verified that all the plants were normally operated and by interview with Households, all the sampled households are asked about the questions as below: 1. How many persons in your HH? 2. Do you think the bio-digester is beneficial to your life?

				It is concluded that all the HHs confirmed that bio-digester is beneficial to their lifes and the average number of people in a household is calculated as 5.13 by verifier which is conservative comparing with PP value. Thus, by checking the "MP4-GS1083-BUS report_E_Final"/BUSR/ and comparing the Tab "SD" of the "GS1083_ MP4_Monitoring database_ER" spreadsheet/XLS/, it is verified that 391,404 of people having access to an improved waste management system during this monitoring period. In the baseline scenario, there is no accessed to an improved waste management system. Therefore, the score for this SD indicator is positive.
	Access to affordable and clean energy services	Total amount of energy replaced by biogas (MJ/hh/year) The PFT and BFT survey measured the consumed fuel in the biennial fuel monitoring survey.	Every two years – the frequency is confirmed as fulfilled as per the requirement by comparing the information in Monitoring report of MP3/VER/	A selected independent consultant named EPRO consulting JSC (EPRO) has performed Project fuel test/PFT/ (one of KPT) and Baseline fuel test/BFT/ (one of KPT) from April to June 2019 and the results are documented in a report "MP4-GS1083-BUS report_E_Final"/BUSR/ and the total fuel saved during this monitoring period is calculated based on the Field test results. DOE verified the data of this survey/BUSR/

				and found transparent. Further, during the site interview with Households, all the sampled households are asked about the questions as below: 1. Fuel consumption in baseline scenario, 2. Fuel consumption in project scenario during this MP, 3. If fuel saved during this MP It is concluded that all the HHs confirmed the fuel were saved comparing with baseline scenario. Thus, by checking the "MP4-GS1083-BUS report_E_Final"/BUSR/ and comparing the Tab "SD" of the "GS1083_ MP4_Monitoring database_ER" spreadsheet/XLS/, it is verified that 37,662 MJ/hh/year energy was replaced by biogas during this monitoring period. In the baseline situation, there is no biogas to displace the amount of energy. Therefore, the score for this SD indicator is positive.
	Technology transfer and technological self-reliance	Number of masons trained in the construction of KT1 or KT2 bio-digesters PP keeps track on the number of trained masons	Every two years – the frequency is confirmed as fulfilled as per the requirement by comparing the information in Monitoring report of MP3/VER/	The Training records/TRA/ during this monitoring period is checked by verification team. DOE verified the attendance lists and and training lists /TRA/ and found that the masons are participated in the training. Further, during the site interview with masons, all masons are asked about the

				questions as below: 1. Did you participate in the training to be the program mason during this MP? 2. How many masons in your enterprise? 3. How many plants have you finished? 4. Have you got the certificate as mason after training? 5. Do you think this project give more job opportunities? It is concluded that all the masons confirmed they attended the training before worked and got the certificate as the mason. There are more than 2 masons in one enterprise and they constructed plants as a team and all the masons got training and certificate. Each mason team have finished hundreds of plants depending on the working year. And they always have internal training among the enterprise. Thus, by checking the Training records/TRA/ and comparing the Tab "SD" of the "GS1083_ MP4_Monitoring database_ER" spreadsheet/XLS/, it is verified that 119 additional masons were trained during this MP4 and total 1,275 masons were trained till this monitoring period. In the baseline scenario, there were no trainings provided.

				Therefore, the score for this SD indicator is positive.
Findings	CL 4			
Conclusion	☐	No CARs/CLs/FARs have been raised in this context. No correction was required. The project is in line with the respective requirements.		
	☒	The raised CARs/CLs/FARs have been addressed appropriately. The PP has carried out the requested corrections. All respective findings could be closed out. For details please refer to Appendix 4.		
	In summary, the verification team confirms that the project under the Gold Standard results in a positive contribution to local sustainable development.			

D.11. Grievance Mechanism/Continues Inputs

Means of verification	As confirmed through the onsite visit and interview with the PP and HHs[/I3/], the Grievance Mechanism/Continues Inputs has been in place. As per the onsite visit, the Grievance Expression Process Book is available in project owner's office at Room 104, Bldg 2G, Van Phuc Compound, 298 Kim Ma, Hanoi; and as per the interview with the HHs, they have access to provide feedback through this book about the project activity, they can also provide feedback through the PP's telephone number of 04 3726 1771 and email address of bpovn@biogas.org.vn and through GS's email address of info@goldstandard.org as all the above contact information have been provided on the book.	
Findings	☐	The Grievance Mechanism/Continues Inputs has been in place. No adverse finding has been identified in the course of this verification.
	☒	The respective requirements have widely been complied with; however; the following issues needed to be addressed in this context:
		- CAR 6
Conclusion	☐	No CARs/CLs have been raised in this context. No correction was required in the context. The project is in line with the respective requirements.
	☒	The raised CARs/CLs have been addressed appropriately. The PP has carried out the requested corrections. All respective findings could be closed out. For details please refer to Appendix 4.
	During the on-site inspection of the project owner office, by checking the grievance book and on-site interview with the HHs and masons, it is confirmed that there is no grievance raised and no legal contest or dispute during the monitoring period. All the methods of continuous input /grievance mechanism are confirmed during on-site investigation and interviews. There are no grievances/complaints received from the stakeholders during this monitoring period of the project activity.	

SECTION E. Double Counting Assessment

The DOE has checked for double counting by reviewing all relevant registries including CDM[/unfccc/], VCS[/vcs/] and other GHGs programs such as EU ETS, IREC or subnational, various regional schemes such as the Canadian and American provincial/state-based schemes. It is confirmed that there is no potential exists for Double Counting of emissions reductions due to issuance of Gold Standard VERs/CO_2-certificates from the considered project activity.

Furthermore, for the project users and stove number sold management, to avoid the double counting, PP has implemented the related actions as following,

i. BP has added an ID code to each bio-digester installed and kept the numbers in a database;
   Verifier checked the BPD database[/BPDD/] comparing with all the ID codes with previous MP database and found no duplication of the ID codes to all bio-digesters. Furthermore, through on-site investigation, verification team found that all sampled bio-digesters

have a unique ID code painted or carved on the cover of bio-digesters or the wall of the house.

ii. Each bio-digester is corresponded to one HH, and each HH has unique geographical coordinate;

iii. BP will only account for the HHs with bio-digesters installed by BP's cooprated enterprises, thus removing the risk that other HHs may be double counted.
Via checking the BPD database/BPDD/ against the ER calculation sheet/XLS/, it is confirmed that only bio-digesters installed by BP are accouted, no risk of counting other HHs into the ER sheet.

In conclusion, the risk of double counting is unlikely to happen.

SECTION F. Internal quality control

Before the submission of the final verification report a technical review of the whole verification procedure was carried out. The technical reviewers are competent GHG auditors being appointed for the scope this project falls under. The technical reviewers are not considered to be part of the verification team and thus not involved in the decision making process up to the technical review.

As a result of the technical review process the verification opinion and the topic specific assessments as prepared by the verification team leader may have been confirmed or revised. Furthermore reporting improvements might have been achieved.

After the successful technical review an overall (esp. procedural) assessment of the complete verification has been carried out by a senior assessor located in the accredited premises of TÜV NORD.

After this step the submission for requesting for issuance is conducted.

SECTION G. Verification opinion

SNV Vietnam has commissioned the TÜV NORD JI/CDM Certification Program to carry out the Gold Standard 4th periodic verification of the project: "Biogas Program for Animal Husbandry Sector of Vietnam", with regard to the relevant requirements for GS project activities. The project reduces GHG emissions by installs biodigesters at household level to treat animal manure to generate biogas replacing conventional fuel for cooking and thereby reduce the CO_2 emissions due to less usage of fossil fuel. This verification covers the period from 01/01/2015-30/06/2016 (Including both days).

As a result of this verification, the verifier confirms that:

- all operations of the project are implemented and installed as planned and described in the validated and latest approved project design document.
- the monitoring plan is in accordance with the applied approved GS methodology, i.e., Technologies and Practices to Displace Decentralized Thermal Energy Consumption – version 1.0.
- Installed equipments being essential for generating emission reduction run reliably and are calibrated appropriately.
- Equipment essential for measuring parameters required for calculating emission reductions are calibrated appropriately.
- the monitoring report is in accordance with the relevant GS requirements.
- the project contributes to sustainability development.
- the monitoring system is in place and functional. The project has generated GHG emission reductions.

TÜV NORD JI/CDM CP further confirms that the project has achieved emission reductions in the above mentioned reporting period as follows:

Emission reductions:

Total	**709,192 t CO_2e**
01/01/2015-30/06/2016:	709,192 tCO_2e
01/01/2015-31/12/2015:	~~462~~466,~~526~~ 256 tCO_2e
01/01/2016-30/06/2016:	~~246~~242,93~~66~~6 tCO_2e

Gold Standard

SECTION H. Certification statement

As a duly accredited DOE, TÜV NORD CERT confirms that the project

"Biogas Program for Animal Husbandry Sector of Vietnam"

registered under

GS-No. : 1083

has achieved emission reductions in accordance with all applicable requirements for registered GS project activities during the current monitoring period

MP-No.: 4th

from: 01/01/2015

to: 30/06/2016

(including both days) as follows:

Emission reductions:

Total	**709,192 t CO_2e**
01/01/2015-30/06/2016:	709,192 tCO_2e
01/01/2015-31/12/2015:	~~462~~466,~~526~~ 256 tCO_2e
01/01/2016-30/06/2016:	~~246~~242,~~666~~ 936 tCO_2e

Beijing, ~~20~~17/~~12~~01/~~2019~~2020

Zhao Xuejiao
Team Leader

Appendix 1. Abbreviations

Abbreviations	Full texts
AWMS	Animal Waste Management System
BE	Baseline emission
BFT	Baseline Fuel Test
BP	Biogas Program for Animal Husbandry Sector of Vietnam
BPD	Biogas Project Division
BUS	Biogas User Survey
CA	Corrective Action / Clarification Action
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CL	Clarification Request
CMS	Carbon Monitoring Survey
CO_2	Carbon dioxide
CO_2e	Carbon dioxide equivalent
CP	Crediting Period
DverR	Draft Verification Report
ER	Emission Reduction
FAR	Forward Action Request
GHG	Greenhouse gas(es)
GS	Gold Standard
GSR	Gold Standard Requirement
GST	Gold Standard Toolkit
GSP	Gold Standard Passport
GWP	Global Warming Potential
HH	Household
IPCC	Intergovernmental Panel on Climate Change
KPT	Kitchen Performance Test
LPG	Liquefied Petroleum Gas
MP	Monitoring Plan/Monitoring Period
MR	Monitoring Report
NGO	Non-Governmental Organization
NRB	Non-Renewable Biomass
PA	Project Activity
PDD	Project Design Document
PE	Project Emission
PFT	Project Fuel Test
PP	Project Participant/ Project Proponent
PS	Project Survey/Project Standard

QA/QC	Quality Assurance / Quality Control
SD	Sustainability Development
SDI	Sustainability Development Indicator
SDM	SD Matrix
SN	Serial Number
SNV	Netherlands Development Organization
UNFCCC	United Nations Framework Convention on Climate Change
VER	Voluntary Emission Reduction
VVS	Validation and Verification Standard
XLS	Emission Reduction Calculation Spread Sheet

Appendix 2. Competence of team members and technical reviewers

TÜV NORD Certification

Statement of Competence

Appointment and authorization according to the procedures of the TÜV NORD JI/CDM Certification Program

Ms. Xue Jiao Fancy Zhao

SCHEME	STATUS	VALID UNTIL
CDM	Senior Assessor (Validation, Verification)	2020-05-01
VCS / ISO 14064-2	Senior Assessor	2020-05-01

Authorization status for technical areas within sectoral scopes:

CODE	TECHNICAL AREA
1.2	Renewables
3.1	Energy Demand
8.1	Mining and mineral production
13.1	Solid waste and wastewater
13.2	Manure

230- Rev. 9, Date: 2019-11-05

TÜV NORD Certification

Statement of Competence

Appointment and authorization according to the procedures of the TÜV NORD JI/CDM Certification Program

Mr. Kunal Rami

SCHEME	STATUS	VALID UNTIL
CDM	Senior Assessor (Validation, Verification) Technical Reviewer	2020-03-28
VCS / ISO 14064-2	Senior Assessor Technical Reviewer	2020-03-28

Authorization status for technical areas within sectoral scopes:

CODE	TECHNICAL AREA
1.2	Renewables
2.1	Energy distribution
3.1	Energy demand
6.1	Construction
7.1	Transport
13.1	Solid waste and wastewater

224 - Rev. 8, Date: 2018-09-31

Appendix 3. Documents reviewed or referenced

No.	Author	Title	References to the document	Provider
1	EPRO consulting JSC (EPRO)	Baseline Fuel Test/BFT/	Baseline Fuel Test listed in "GS1083_BP_MP4 Carbon monitoring _result_V1.2_Final." And Baseline Fuel Test listed in "MP4-GS1083-BUS report_E_Final"	Project Owner
2	Project Owner	Blueprints of KT1 and KT2/BKT/	Blueprints of KT1 and KT2	Project Owner
3	BP	Business License/BL/	Business License of BP "20161110_PMU establishment"	Project Owner
4	BP	BPD database/BPDD/	BPD database list all the installed biogas plants/units with unique ID code and general information of all HHs	Project Owner
5	EPRO consulting JSC (EPRO)	BUS report /BUSR/	"MP4-GS1083-BUS report_E_Final"	Project Owner
6	Nexus and EPRO consulting JSC (EPRO)	Carbon Monitoring Survey/CMS/	"GS1083_BP_MP4 Carbon monitoring _result_V1.2_Final"_questionnaires CMS Sampling listed in GS1083__CMS and KPT_sampling HHs_MP4 And sample survey results listed in MP4-GS1083-BUS report_E_Final	Project Owner
7	Nexus and EPRO consulting JSC (EPRO)	CMS survey report for MP3/CMS3/	"MP3_CMS survey report_Aug 2016"	Project Owner
8	EPRO consulting JSC (EPRO) and 3D VINA	CMS Inception Report/CMSIR/	"MP4-GS1083-CMS Inception Report_EN" including calibration records for all scales	Project Owner
9	Project Owner	Handbook and technical design/HTD/	Handbook and technical design of KT1 and KT2	Project Owner
10	Nexus for Development	Monitoring Report/MR/	Monitoring Report for MP4 of Biogas Program for Animal Husbandry Sector of Vietnam • version 2.0 dated 05/08/2019 • version 2.1 dated 02/10/2019 • version 2.2, dated 17/12/2019 after GS Review I • version 2.3, dated 14/01/2020 after GS Review I	Nexus for Development
11	EPRO consulting JSC (EPRO)	Project Fuel Test/PFT/	Project Fuel Test listed in "GS1083_BP_MP4 Carbon monitoring _result_V1.2_Final." And Project Fuel Test listed in "MP4-GS1083-BUS report_E_Final"	Project Owner
12	Nexus	Questionnaire for selecting BFT HH/QBFT/	Questionnaire for selecting BFT HH	Project Owner

No.	Author	Title	References to the document	Provider
13	Masons	Quality control records/QCR/	Quality control records samples during this monitoring period	Project Owner
14	BP	"VN RBF 2015 guideline-Final"/RBF/	QA/QC procedure manual "VN RBF 2015 guideline- Final"	Project Owner
15	Nexus	Randomly selection of Sample Screenshots/RSSS/	Randomly selection of Sample Screenshots conducted by Nexus for all the random sampling selection.	Project Owner
16	Nexus	GS1083__CMS and KPT_sampling HHs_MP4/SHH/	GS1083__CMS and KPT_sampling HHs_MP4 for sample selection	Project Owner
17	Nexus	Screen Shots of request for proposal/SRP/	• Request for proposal of CMS MP4_1st time_1_20180925.png • Request for proposal of CMS MP4_1st time_2_20180925.png • Result from CMS MP4 tender_1st time_20181015.jpg • Request for proposal of CMS MP4_2nd time_20181019.jpg • Result from CMS MP4 tender_2nd time_20181212.jpg	Project Owner
18	Project Owner	Training records/TRA/	• Biogas Technician Training Manual_2011 • List of trained biogas enterprise per district_20160630 • List of trained iQCer per district_20160630 • Attendance Lists of training	Project Owner
19	Provincial technicians of BP	Usage Survey/US/	GS1083_MP4_Usage survey_Results_Version 1.0. And GS1083_Usage survey MP4_Sampling HHs_2018_08_09.	Project Owner
20	Nexus for Development	Emission Reduction Calculation Sheets/XLS/	Emission Reduction Calculation sheets (related to MR for MP4) • version 2.0 dated 05/08/2019 • version 2.1 dated 02/10/2019 • version 2.2, dated 17/12/2019 after GS Review I	Nexus for Development
21	National sector standard	10TCN 497:2005 /10TCN/	Sectoral standard 10TCN 497:2005 - Part 6	
22	Gold Standard	Gold Standard Annexes/Annex-GS/	Gold Standard Annexes http://www.cdmgoldstandard.org/project-certification/rules-and-toolkit	Gold Standard
23	TÜV NORD JI / CDM Certification Program	CP Manual/CPM/	TÜV NORD JI / CDM CP Manual (incl. CP procedures and forms)	TÜV NORD JI / CDM

No.	Author	Title	References to the document	Provider
				Certification Program
24	Gold Standard	GS_Issuance _Review (MP3)/GSIR/	"MP3_Issuance_Review_GS1083 _Round_FINAL" by GS	Gold Standard
25	Gold Standard	GS methodology/GSM/	GS methodology: Indicative Programme, baseline, and monitoring methodology for Small Scale Bio-digester	Gold Standard
26	Nexus for Development	Gold Standard Passport/GSP/	Gold Standard Passport for GS-VER project: "Biogas Program for Animal Husbandry Sector of Vietnam" version 3.1 dated 25/09/2012	Gold Standard
27	Gold Standard	Gold Standard Requirement /GSR/	Gold Standard Requirement version 2.1	Gold Standard
28	Gold Standard	Gold Standard Toolkit/GST/	Gold Standard Toolkit version 2.1	Gold Standard
29	Intergovernmental Panel on Climate Change	IPCC Guidelines/IPCC/	• 2006 IPCC Guidelines for National Greenhouse Gas Inventories: work book • 2006 IPCC Guidelines chapter 2 Stationary Combustion • 2006 IPCC Guidelines defaults, see chapter 1 Energy • SAR IPCC for the second commitment period • Volume 4 of the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, chapter 10	www.ipcc-nggip.iges.or.jp http://www.ipcc.ch/publications_and_data/ar4/wg1/en/ch2s2-10-2.html
30	Nexus for Development	Project Design Document/PDD/	Latest approved Project Design Document for GS-VER project: "Biogas Program for Animal Husbandry Sector of Vietnam" version 4.0, dated 11/09/2017 approved by GS after deviation of monitoring plan.	Gold Standard
31	On-site Verification Team	Photographs of Project Site/PHT/	Photographs of Biogas using status by Households in Kitchens, ID code of each biodigester, biogas production process and animal types took by the verification team during on-site visit to biogas plant users	On-site Verification Team
32	Nexus for Development	Registered ER spreadsheet/RER/	"25 Sep 2012 ER worksheet BP VGS v3.1.xlsx"	GS website
33	UNFCCC	Guideline of Sampling and surveys/SSG/	Guideline of Sampling and surveys for CDM project activities and programmes of activities, version 04.0	UNFCCC website
34	UNFCCC	Standard for Sampling and Surveys/SSS/	Standard for Sampling and Surveys for CDM Project Activities and Programme of Activities, version 07.0, dated 04/05/2017	UNFCCC website
35	Gold Standard	Applied Methodology/TPDDTEC/	Approved GS Methodology: "Technologies and Practices to Displace Decentralized Thermal	GS Website

域代码已更改

No.	Author	Title	References to the document	Provider
			Energy Consumption – version1.0"	
36	TÜV Rheinland (China) Ltd.	Validation Report/VAL/	Validation Report for GS project "Biogas Program for Animal Husbandry Sector of Vietnam" Version No. 02.2, 25/10/2012	Gold Standard
37	DOEs	Verification Records/VER/	Previous verifications: MRs and Verification Reports	Gold Standard
38	UNFCCC	Validation and Verification Standard/VVS/	Validation and Verification Standard for project activity, version 02.0	UNFCCC
39	3D VINA	3D VINA/3d/	Public website of Third party for calibration www.hieuchan3d.com	Website
40	Gold Standard Organization	Gold Standard/gs/	http://www.goldstandard.org/	Website
41	IPCC	IPCC publications/ipcc/	www.ipcc-nggip.iges.or.jp	Website
42	UNFCCC	UNFCCC/unfccc/	http://cdm.unfccc.int	Website
43	VCS	VCS/vcs/	http://www.v-c-s.org/	Website

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

Table 1. CL from this verification

CL ID	1	**Section no.**	B.3	**Date:** 30/09/2019
Description of CL				
The data source of energy balance for baseline and project situation is not provided and clarified.				
Project participant response (1st round)				
The energy requirement for baseline and project situation were calculated based on the fuel consumption which resulted from the KPT test. Please refer to cell J4:M5, tab "Energy balance" of the ER spreadsheet for detail calculation. A footnote for clarification of data source was added into section B.3 of the updated MR.				
Documentation provided by project participant (1st round)				**Date:** 02/10/2019
☐ Changes in the PDD		Section(s):		New version No.:
☒ Changes in MR		Section(s): B.3		New version No.: 2.1
☐ Changes in XLS		Worksheet(s):		New version No.:
☐ Other:				
DOE assessment (1st round)				**Date:** 15/10/2019
The revised MR is checked, it is confirmed that data source of energy balance for baseline and project situation has provided and clarified. And via checking the cell J4:M5, tab "Energy balance" of the ER spreadsheet/XLS/, it is confirmed that the energy balance is calculated correctly.				
Conclusion *Tick the appropriate checkbox*	☐ Additional action should be taken (finding remains open) ☒ The finding is closed			

CL ID	2	**Section no.**	C.2	**Date:** 30/09/2019
Description of CL				
It states in the PDD that CMS was executed from April 2019 to June 2019, however how to make sure the values collected in 2019 can respresentative this MP in year 2015 and 2016 is not clarified.				
Project participant response (1st round)				

Due to there were FARs from MP2 regarding the monitoring activities to be solved during MP3 issuance review, the PP had to wait until the final conclusion from GS before conducting the next CMS survey for MP4. In Sept 2018, after securing the budgets for the next monitoring activities, verification and issuance cost, the PP published the Request for proposal of the monitoring survey service from third parties. The request for proposal was needed to republish for another 2 times because of the very intensive works with surveying more than 500 households in 20 districts among the country so during the first and second round of request for proposal, there was not any valid application. Please see more detail from the timeline below:

Activity	Time	Note
MP3 CMS field survey	May to Jun 2016	
Finalizing the CMS survey report by the third party	Aug 2016	*Please see supporting document: "MP3_CMS survey report_Aug 2016.pdf"*
Preparing MP3 MR report and setting up budget for DOE verification cost and issuance fee	Sept 2016 to Jul 2017	*It took long time due to the high budget of issuance fee for 1 million credits. The PP must make sure the budget to be available before conducting the verification.*
Signing DOE contract for MP3 verification	Aug 2017	
DOE site visit for MP3	Oct 2017	
Submitting to GS for issuance review	Dec 2017	
Finalizing the MP3 issuance review	Apr 2018	
Setting up budget for monitoring cost, DOE verification cost and issuance fee	May – Aug 2018	*It took long time due to the high budget for monitoring survey throughout the country and high issuance cost of about 800K VERs. The PP must make sure*

		the budget to be available before conducting the verification.
Designing monitoring activities and developing the questionnaires for MP4 based on GS FARs from MP3 issuance review	May – Aug 2018	
Publishing the request for proposal – 1st time	Sept 2018	*Please see supporting document:* • *Request for proposal of CMS MP4_1st time_1_20180925.png* • *Request for proposal of CMS MP4_1st time_2_20180925.png* • *Result from CMS MP4 tender_1st time_20181015.jpg* Not any application from any third party.
Publishing the request for proposal – 2nd time	Oct 2018	*Please see supporting document:* • *Request for proposal of CMS MP4_2nd time_20181019.jpg* • *Result from CMS MP4 tender_2nd time_20181212.jpg* Only one application but it was an invalid proposal.
Publishing the request for proposal – 3rd time	Dec 2018	*Request for proposal of CMS MP4_2nd time_20181019.jpg* • *Request for proposal of CMS MP4_3rd time_20181217.jpg*
Contract negotiation and signing with survey company	Jan to Mar 2019	
MP4 CMS field survey	Apr to Jun 2019	
Finalizing the CMS survey report by the third party	Jul 2019	
Tendering for DOE	Aug 2019	
DOE site visit for MP4	Sept 2019	

After the carbon monitoring survey contract was signed, the selected third party conducted the CMS survey during the period of Apr to Jun 2019. Even the time of survey was in 2019, the questionnaires were designed to ask for the specific information of the monitoring period (Jan 2015 to Jun 2016), for example the number of animal that the households raised, etc. Please find the detail questionnaires in the "Annex 1. Survey questionnaire" of the monitoring survey report ("*MP4-GS1083-BUS report_E_Final.pdf*")

The CMS survey for the previous monitoring period (MP3) was conducted from May to June 2016 which was within this MP4 monitoring period. Comparing to the MP3 survey results, the weight average emission reduction from MP4 was lower as below:

Emission reduction source	**MP3**	**MP4**	**Changed compare to MP3**
AWMS (tCO_2e/unit)	3.45	2.61	-24.3%
Fuel saving (tCO_2e/unit)	4.45	3.62	-18.7%

Therefore, it could be concluded that the values collected in 2019 were conservative and representative for the MP4 monitoring period.

Documentation provided by project participant (1st round)		**Date:** 02/10/2019
☐ Changes in the PDD	Section(s):	New version No.:
☒ Changes in MR	Section(s): C.2	New version No.: 2.1
☐ Changes in XLS	Worksheet(s):	New version No.:
☐ Other:	/CMS3/, /SRP/,/BUSS/	
DOE assessment (1st round)		**Date:** 15/10/2019

The revised MR is checked, it is confirmed that the reason of CMS was executed from April 2019 to June 2019 is clarified, via checking the "MP3_CMS survey report_Aug 2016"/CMS3/ and the Screen Shots of request for proposal/SRP/, it is verified that the timeline provided by PP is actual and it is considered that the delay of survey was due to the budget and selection of third party. Based on the verification team's knowledge about the emission reduction market, it is confirmed that the short of budget is the actual situation for the PP and postponed the survey was constrained.

Furthermore, via checking all the questionnaires/BUSR/ which were collected from the monitoring survey, it is verifided that the questions were designed to ask for the specific information of this monitoring period. During the site interview with the HHs, the questions by verification team were all designed relevant to this monitoring period, and by comparing the results from verification team with PP's questionnaires, it is confirmed that the results are same. Finally, by comparing with the values of CMS survey for the previous monitoring period (MP3) which was conducted from May to June 2016 covering this monitoring period, it is verified that the values collected during this survey conducted in 2019 is more conservative for the ER calculation. Hence, it is concluded that the values from survey conducted in 2019 is relevant to this monitoring period and is conservative for ER calculation.

Conclusion *Tick the appropriate checkbox*	☐ Additional action should be taken (finding remains open) ☒ The finding is closed

CL ID	3	**Section no.**	D.3.4	**Date:** 30/09/2019
Description of CL				
When the usage survey was conducted is not clarified in D.3.4.				
Project participant response (1st round)				
The information on survey date for each sample could be found in column C of the MP4 Usage survey result. The usage survey was conducted from Jan 2018 to May 2019 due to the large number of sample sizes (350 samples) and scattered distribution in the country (40 provinces). Compare to the usage survey result of 81.87% which was conducted within this MP4 monitoring period (Apr 2015 until Nov 2015), the current applied usage rate for MP4 of 60.31% is much lower due to the more delaying of the survey, the lower usage rate. Therefore, it is conservative to apply the lower usage rate for the case of delaying the usage monitoring survey.				
Documentation provided by project participant (1st round)				**Date:** 02/10/2019
☐	Changes in the PDD		Section(s):	New version No.:
☒	Changes in MR		Section(s): D.3.4	New version No.: 2.1
☐	Changes in XLS		Worksheet(s):	New version No.:
☒	Other:		/US/	
DOE assessment (1st round)				**Date:** 15/10/2019
The revised MR is checked, it is confirmed that the period for conducted usage survey is listed in the table 19 in section D.3.4. Via on-site interview with the PP representative, it is verified that usage survey was conducted from Jan 2018 to May 2019 by provincial technicians of BP with large sample size and scattered regions. Furthermore, via checking the usage survey results/US/ for this monitoring period 60.31% against the value used for last MP 81.87% which was conducted during the period of this monitoring period(Apr 2015 until Nov 2015), it is confirmed that the conservative value, the lower usage rate is used for this MP which is verified as acceptable.				
Conclusion *Tick the appropriate checkbox*		☐ Additional action should be taken (finding remains open) ☒ The finding is closed		

CL ID	4	**Section no.**	F.2	**Date:** 30/09/2019
Description of CL				
It is observed that for ID4 and ID7 of SD monitoring parameter, the frequncy is annually, however, the time of training is not listed to illustrate the actual trainings are fulfilled the requirement.				
Project participant response (1st round)				
The information on time of training for each additional mason and technician could be found in the column E of the training list. In particular during this monitoring period, the training for masons were conducted from Sept to Nov 2015 and the training for technicians were conducted from Aug to Sept 2015. The footnotes indicating the training time were added into the updated MR.				
Documentation provided by project participant (1st round)				**Date:** 02/10/2019
☐	Changes in the PDD		Section(s):	New version No.:
☒	Changes in MR		Section(s): F.2	New version No.: 2.1
☐	Changes in XLS		Worksheet(s):	New version No.:
☐	Other:			
DOE assessment (1st round)				**Date:** 15/10/2019
The revised MR is checked, it is confirmed that the time of training is listed, via checking the training records/TRA/, it is verified that the time is correct.				

Futhermore, it is confirmed that the training is conducted annully since the latest monitoring period which is fulfilled the requirement of the monitoring frequency.	
Conclusion *Tick the appropriate checkbox*	☐ Additional action should be taken (finding remains open) ☒ The finding is closed

Table 2. CAR from this verification

CAR ID	1	**Section no.**	A	**Date:** 30/09/2019
Description of CAR				
1. The duration of monitoring period is not complete, both start and end days included or not is not illustrated in cover page. 2. The ER values in seciton A.1 are missing with units. 3. The sectoral scope listed in section A.4 is not consistent with the cover page. 4. The number of crediting period is missing in A.5.				
Project participant response (1st round)				
1. Both start and end days of the monitoring period are included in this verification. Information was updated in page 3 of the MR. 2. The unit tCO_2e of ER values were added in section A.1 of the update MR. 3. The typo mistake on the sectoral scope in section A.4 was corrected in the updated MR. 4. This monitoring period is under the first crediting period. Information was updated in the MR.				
Documentation provided by project participant (1st round)				**Date:** 02/10/2019
☐ Changes in the PDD		Section(s):		New version No.:
☒ Changes in MR		Section(s): A		New version No.: 2.1
☐ Changes in XLS		Worksheet(s):		New version No.:
☐ Other:				
DOE assessment (1st round)				**Date:** 15/10/2019
1. The revised duration of monitoring period is confirmed as complete, both start and end days included or not has been llustrated in cover page. 2. The revised MR is checked, it is confirmed that ER values in seciton A.1 are added with units. 3. It is confirmed as a typo mistake, the revised sectoral scope listed in section A.4 is checked as consistent with the cover page. 4. The number of crediting period of first is added in section A.5 which is confirmed as correct.				
Conclusion *Tick the appropriate checkbox*	☐ Additional action should be taken (finding remains open) ☒ The finding is closed			

CAR ID	2	**Section no.**	B.2.1	**Date:** 30/09/2019
Description of CAR				
The information of permanent deviations from registered monitoring plan is missing in section B.2.3.				
Project participant response (1st round)				
Section B.2.3 was updated with the change since MP3, please refer to section C.1 of the MR and section B.7.2 of the PDD version 4 “PDD BPD_Deviation of monitoring plan_v4.0_20170911.pdf”				
Documentation provided by project participant (1st round)				**Date:** 02/10/2019
☐ Changes in the PDD		Section(s):		New version No.:
☒ Changes in MR		Section(s): B.2.1		New version No.: 2.1
☐ Changes in XLS		Worksheet(s):		New version No.:
☐ Other:				
DOE assessment (1st round)				**Date:** 15/10/2019
The revised MR is checked, it is confirmed that the information of post registration change of permanent deviations from registered monitoring plan has been added into the section B.2.3. Via checking the latest approved PDD, it is confirmed that the information is correct and is verified as approved by GS.				
Conclusion *Tick the appropriate checkbox*	☐ Additional action should be taken (finding remains open) ☒ The finding is closed			

CAR ID	3	**Section no.**	D.2	**Date:** 30/09/2019
Description of CAR				

For all the monitored parameters table in D.2, below findings are observed, 1. Monitoring frequency is missing for all the parameters as per the PDD, 2. Explanation of how the frequency is fulfilled with the PDD requirement is needed to be clarified for each parameter.
Project participant response (1st round)
1. The monitoring frequency is added in each parameter. 2. The explanation on how it is fulfilled with the PDD requirement was added for each monitoring parameters.

Documentation provided by project participant (1st round)		**Date:** 02/10/2019
☐ Changes in the PDD	Section(s):	New version No.:
☒ Changes in MR	Section(s): D.2	New version No.: 2.1
☐ Changes in XLS	Worksheet(s):	New version No.:
☐ Other:		

DOE assessment (1st round)	**Date:** 15/10/2019
1. The revised MR is checked, it is confirmed that the monitoring frequency is added into each parameter and confirmed as in line with the PDD. 2. The revised MR is checked, it is confirmed that the Explanation of how the frequency is fulfilled with the PDD requirement is clarified for each parameter as stated in the related footnote. Refer to CL 2 for the detail assessment of how the values collected is fulfilled with the PDD requirement.	
Conclusion *Tick the appropriate checkbox*	☐ Additional action should be taken (finding remains open) ☒ The finding is closed

CAR ID	4	**Section no.**	D.3.3	**Date:** 30/09/2019
Description of CAR				
It is stated that PP conducted the BFT for all 3 baseline scenarios in section D.3.3 which is not consistent with the description in other parts of MR.				
Project participant response (1st round)				
The BFT was conducted by the third party which was contracted by the PP. The information was updated in the MR section D.3.3.				

Documentation provided by project participant (1st round)		**Date:** 02/10/2019
☐ Changes in the PDD	Section(s):	New version No.:
☒ Changes in MR	Section(s): D.3.3	New version No.: 2.1
☐ Changes in XLS	Worksheet(s):	New version No.:
☒ Other:	/BFT/	

DOE assessment (1st round)	**Date:** 15/10/2019
The revised MR is checked, it is confirmed that the revision is correct which is consistent with the other parts of the MR. Via checking the Baseline Fuel Test listed in "MP4-GS1083-BUS report_E_Final"/BFT/, it is verified that the 3rd party (EPRO) who contracted with PP conducted the survey.	
Conclusion *Tick the appropriate checkbox*	☐ Additional action should be taken (finding remains open) ☒ The finding is closed

CAR ID	5	**Section no.**	E.4	**Date:** 30/09/2019
Description of CAR				
It is observed that the in section E.4 1. The table 44 and 45 is not ex-ante estimate of the emission reductions for each biogas unit, description is not correct, 2. Unit of BE, PE and ER is not correct. 3. The value of LE is missing in table 44 and 45. 4. The cumulative ex-post emission reductions calculation formular is not clear, why $N_{p,y}$ replaces $ER_{y,h}$ should be clarified. 5. ER values is missing with units after table 48.				
Project participant response (1st round)				

1. The typo mistake was corrected to the ex-post calculation of emission reduction. 2. The unit of BE, PE and ER were corrected to tCO_2e/hh/year. 3. Please note that the leakage emissions for the project in this monitoring period is zero as analyzed in section C.2.5 of the MR. The other leakage emission from AWMS system and from bio-slurry were already included under the PE emission. However, the table 44 and 45 were updated with including a new column for PE to avoid confusion. 4. There was an error in the formulae for emission reduction calculation due to automatic update function from Word. This error was fixed in the updated MR. 5. The unit tCO_2e of ER values were added into section E.4 of the update MR		
Documentation provided by project participant (1st round)		**Date:** 02/10/2019
☐ Changes in the PDD	Section(s):	New version No.:
☒ Changes in MR	Section(s): E.4	New version No.: 2.1
☐ Changes in XLS	Worksheet(s):	New version No.:
☐ Other:		
DOE assessment (1st round)		**Date:** 15/10/2019
1. The revised MR is checked, it is confirmed that description is revised to ex-post calculation which is confirmed as correct for table 44 and 45. 2. The revised MR is checked, it is confirmed that units of BE, PE and ER with tCO_2e/hh/year is correct. 3. The revised MR is checked, it is confirmed that the value of LE is added in table 44 and 45. The value is 0 as assessed in the section C.2.5 of MR. 4. The cumulative ex-post emission reductions calculation formular is confirmed as revised to be clear, it is confimed as a typo mistake and revised accordingly. 5. The revised MR is checked, it is confirmed that ER values is added with units after table 48. And the units are confirmed as correct.		
Conclusion *Tick the appropriate checkbox*	☐ Additional action should be taken (finding remains open) ☒ The finding is closed	

CAR ID	6	**Section no.**	-	**Date:** 30/09/2019
Description of CAR				
It is observed that details of any grievances received and explain the mechanism in place are not provided for reporting the grievances during the monitoring period in the MR. Also how the comments/grievances were resolved and the actions taken (if any) are not described in the MR.				
Project participant response (1st round)				
There was no feedback/comment to the project implementation during this monitoring period. The section G has been included in the updated MR for reporting the grievances received.				
Documentation provided by project participant (1st round)				**Date:** 02/10/2019
☐ Changes in the PDD		Section(s):		New version No.:
☒ Changes in MR		Section(s): -		New version No.: 2.1
☐ Changes in XLS		Worksheet(s):		New version No.:
☐ Other:				
DOE assessment (1st round)				**Date:** 15/10/2019
The revised MR is checked, it is confirmed that the grievance mechanism is added. As confirmed through the onsite visit and interview with the PP and HHs[/13/], the Grievance Mechanism/Continues Inputs has been in place. As per the onsite visit, the Grievance Expression Process Book is available in project owner's office at Room 104, Bldg 2G, Van Phuc Compound, 298 Kim Ma, Hanoi; and as per the interview with the HHs, they have access to provide feedback through this book about the project activity, they can also provide feedback through the PP's telephone number of 04 3726 1771 and email address of bpovn@biogas.org.vn and through GS's email address of info@goldstandard.org as all the above contact information have been provided on the book. All the above methods of continuous input /grievance mechanism are confirmed during on-site investigation and interviews. It is verified that there are no grievances/complaints received from the stakeholders during this monitoring period of the project activity.				
Conclusion *Tick the appropriate checkbox*	☐ Additional action should be taken (finding remains open) ☒ The finding is closed			

Table 3 FAR from this verification

FAR ID	N/A	**Section No.**		**Date:** DD/MM/YYYY

Description of FAR		
Project participant response		**Date:** DD/MM/YYYY
Documentation provided by project participant		
☐ Changes in the PDD	Section(s):	New version No.:
☐ Changes in MR	Section(s):	New version No.:
☐ Changes in XLS	Worksheet(s):	New version No.:
☐ Other:		
DOE assessment		**Date:** DD/MM/YYYY
Conclusion *Tick the appropriate checkbox*	☐ To be checked during the next periodic verification	

Appendix 5. Monitored Parameters

Table A-5: Periodic Verification Checklist – Monitored Parameters

Checklist Item (incl. guidance for the verification team)	Refe-rence	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
A. **$f_{NRB,y}$**		**Fraction of non-renewability**		
a) Measurement / Determination method (VVS, §§ 389-393) *Describe how the monitoring parameter was measured / determined. Focus primarily on the original data level but also describe the applied data aggregation trails (from ODL to data aggregation level zero).* *Check if relevant equipment has been exchanged and if in cases of failures / downtimes of standard equipment other measurement / determination methods have been used. Furthermore, verify the frequency of measurements as per the requirements.* *Assess whether the measurement / determination method is in line with the registered monitoring plan of the PDD and the applied methodology.*	/PDD/ /MR/ /TPDDTEC/ /XLS/	*Description:* PP has applied value of 67% , this value is a fixed value for the 1st crediting period which has been determined in the latest approved PDD by baseline survey. *Verifier´s action:* The latest apprpved PDD is checked and confirmed. *Conclusion:* The measurement approach is documented as per latest approved PDD and applied methodology.	OK	OK
b) Accuracy and QA/QC Procedure (VVS, §§ 394-400) *In case of measured (or estimated) values, check whether the accuracy of equipment used for monitoring is controlled and calibrated in accordance with the monitoring plan or if significant inaccuracies occur; in this case, make sure that the most conservative assumptions theoretically possible have been made for calculating ERs.* *Describe whether all applicable QA/QC procedures are met. Assess further if the calibration of the monitoring equipment has been carried out in line with the latest EB guidance.* *Include calibration dates and information in validity of the installed monitoring equipment in the table in Annex 2.*	/PDD/ /MR/ /TPDDTEC/ /XLS/	*Description:* PP has applied value of 67% , this value is a fixed value for the 1st crediting period which has been determined in the latest approved PDD by baseline survey. *Verifier´s action:* The latest apprpved PDD is checked and confirmed. *Conclusion:* Applicable QA/QC procedures are met.	OK	OK
c) Correctness	/PDD/	☒ Correct ☐ Not correct (initial assessment)	OK	OK

Checklist Item (incl. guidance for the verification team)	Refe-rence	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
(VVS, §§ 389-393) *Determine whether the value given in the monitoring report is correct or determined in a conservative manner.* *In case of conservative approaches used in lieu of the monitoring as per registered MP detailed assessment of the conservativeness of the approach used should be given.* *In case of mistakes / deviations pl. provide details and descriptions of the CARs raised.*	/MR/ /TPDDTEC/ /XLS/	*Description:* PP has applied value of 67% , this value is a fixed value for the 1st crediting period which has been determined in the latest approved PDD by baseline survey. *Verifier´s action:* The latest apprpved PDD is checked and confirmed. *Conclusion:* The value is correct.		
B. ***$P_{bs2,y}$***		**Quantity of fuel that is consumed in the baseline scenario 2 in year y**		
a) Measurement / Determination method ***(VVS, §§ 389-393)*** *Describe how the monitoring parameter was measured / determined. Focus primarily on the original data level but also describe the applied data aggregation trails (from ODL to data aggregation level zero).* *Check if relevant equipment has been exchanged and if in cases of failures / downtimes of standard equipment other measurement / determination methods have been used. Furthermore, verify the frequency of measurements as per the requirements.* *Assess whether the measurement / determination method is in line with the registered monitoring plan of the PDD and the applied methodology.*	/I1/ /I3/ /PDD/ /MR/ /TPDDTEC/ /CMSIR/ /XLS/ /BFT/ /BUSR/ /QBFT/	*Description:* PP has applied values as below table for this monitoring period. **Fuel *i*** / **Average per household kg/hh/day** LPG: 0 Firewood: 10.19 Agriculture residues: 2.90 These values are obtained from the Baseline fuel test/BFT/ (one of KPT) which was executed by a selected independent consultant named EPRO consulting JSC (EPRO) from April to June 2019 combining with CMS. And results are listed in "MP4-GS1083-BUS report_E_Final"/BUSR/. Nexus defined the sample size 60 for each baseline scenario in 3 baseline scenarios, total 180HH for EPRO's execution. It is confirmed that the sampling approach was designed with a confidence interval of at least 90/30 according to GS recommendation to ensure the households interviewed are representative. Via checking the "MP4-GS1083-BUS report_E_Final"/BUSR/, it is confirmed that the EPRO selected representative HHs based on	~~CL 2, CAR 3~~	OK

Checklist Item (incl. guidance for the verification team)	Refe-rence	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
		the questionnaire for selecting BFT HH/QBFT/, and the HHs are selected randomly in all the HHs without the biodigester which are applicable to the requirements in the questionnaire. Statistical calculations are found addressing all points and found that stratified sampling is followed. The value applied is found statistically correct. PP has ensured that adequate QA/QC measures are implemented and the data is verified, entered and analyzed independently. *Verifier´s action:* The measurement approach is confirmed by cross checking the Baseline fuel test/BFT/, questionnaire for selecting BFT HH/QBFT/ and the results in the "MP4-GS1083-BUS report_E_Final"/BUSR/. In addition, the verification team visited households with biogas plants during this verification using Simple random Sampling approach and acceptance sampling approach to check it the data provided by PP is correct. Refer to C.4.2 for details. *Conclusion:* The measurement is documented as per latest approved PDD and applied methodology. However, the monitoring frequency is missing in table and how the monitoring frequency is fulfilled as per the PDD is not clarified. CL 2 was raised.		
b) Accuracy and QA/QC Procedure (VVS, §§ 394-400) *In case of measured (or estimated) values, check whether the accuracy of equipment used for monitoring is controlled and calibrated in accordance with the monitoring plan or if significant inaccuracies occur; in this case, make sure that the most conservative assumptions theoretically possible have been made for calculating ERs.*	/I1/ /I3/ /PDD/ /MR/ /TPDDTEC/ /CMSIR/ /XLS/ /3d/	*Description:* For determine the value of $P_{bs2,y}$ in KPT survey, the monitoring equipment of Weighing Scales are used for baseline fuel test. As per the methodology, it is required to verify the accuracy of the devices prior to conducting the tests. The consultant who conducting the site survey have to maintain and get it calibrated before the expired date or using the new scale. Last calibration check was done on 05/07/2016 due to the WCFT was conducted in July and August 2016 and it is confirmed that	OK	OK

Checklist Item (incl. guidance for the verification team)	Refe-rence	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
Describe whether all applicable QA/QC procedures are met. Assess further if the calibration of the monitoring equipment has been carried out in line with the latest EB guidance. Include calibration dates and information in validity of the installed monitoring equipment in the table in Annex 2.		the scales are in good condition and delivering correct outcome of measurement. The calibration records listed in "MP4-GS1083-CMS Inception Report_EN"/CMSIR/ was checked by verification team, it is confirmed that every scale had the calibration record which the expired date is still valid at time of conducting the field survey in Apr to Jun 2019. 14 calibrated scales are available for the survey. All calibration records are checked and confirmed as valid. The calibration was conducted by a third party named 3D VINA, and via cheking its public website/3d/ as listed in the records, it is verified that the company has the qualification and ability to do the calibration. Scales were inspected for the correctness of the calibration and found accurate, during site visit a weighment of known weights, all devices are showing correct results. Hence verification team concluded that the records of Calibration produced by the PP are reliable and acceptable. *Verifier´s action:* The above mentioned was verified by cross checking the "MP4-GS1083-CMS Inception Report_EN"/CMSIR/ agaist the third party's qualification/3d/. *Conclusion:* The accuracy of equipment used for monitoring is checked as controlled and calibrated in accordance with the monitoring plan.		
c) Correctness (VVS, §§ 389-393) *Determine whether the value given in the monitoring report is correct or determined in a conservative manner.* *In case of conservative approaches used in lieu of the monitoring as per registered MP detailed assessment of the conservativeness of the approach used should be given.* *In case of mistakes / deviations pl. provide details and descriptions of the CARs raised.*	/PDD/ /MR/ /TPDDTEC/ /XLS/ /BFT/ /BUSR/	☒ Correct ☐ Not correct (initial assessment) *Description:* The Quantity of fuel that is consumed in the baseline scenario 2 $P_{bs2,y}$ during this monitoring period is reported in the MR based on the Baseline Fuel Test listed in "GS1083_BP_MP4 Carbon monitoring _result_V1.2_Final", and the results are in the "MP4-GS1083-BUS report_E_Final". *Verifier´s action:*	OK	OK

<table>
<tr><th>Checklist Item
(incl. guidance for the verification team)</th><th>Refe-rence</th><th>Verification Team Comments
(Means and results of assessment)</th><th>Draft Concl.</th><th>Final Concl.</th></tr>
<tr><td></td><td></td><td>By means of checking the ER-spreadsheet/XLS/, “GS1083_BP_MP4 Carbon monitoring _result_V1.2_Final” and “MP4-GS1083-BUS report_E_Final”.

Conclusion:
The values are correct.</td><td></td><td></td></tr>
<tr><td>C. $P_{bs3,y}$</td><td></td><td>Quantity of fuel that is consumed in the baseline scenario 3 in year y</td><td></td><td></td></tr>
<tr><td>a) Measurement / Determination method (VVS, §§ 389-393)
Describe how the monitoring parameter was measured / determined. Focus primarily on the original data level but also describe the applied data aggregation trails (from ODL to data aggregation level zero).
Check if relevant equipment has been exchanged and if in cases of failures / downtimes of standard equipment other measurement / determination methods have been used. Furthermore, verify the frequency of measurements as per the requirements.
Assess whether the measurement / determination method is in line with the registered monitoring plan of the PDD and the applied methodology.</td><td>/I1/
/I3/
/PDD/
/MR/
/TPDDTEC/
/CMSIR/
/XLS/
/BFT/
/BUSR/
/QBFT/</td><td>Description:

PP has applied values as below table for this monitoring period.
<table><tr><th>Fuel i</th><th>Average per household
kg/hh/day</th></tr><tr><td>LPG</td><td>0.14</td></tr><tr><td>Firewood</td><td>7.67</td></tr><tr><td>Agriculture residues</td><td>1.86</td></tr></table>These values are obtained from the Baseline fuel test/BFT/ (one of KPT) which was executed by a selected independent consultant named EPRO consulting JSC (EPRO) from April to June 2019 combining with CMS. And results are listed in “MP4-GS1083-BUS report_E_Final”/BUSR/.

Nexus defined the sample size 60 for each baseline scenario in 3 baseline scenarios, total 180HH for EPRO’s execution. It is confirmed that the sampling approach was designed with a confidence interval of at least 90/30 according to GS recommendation to ensure the households interviewed are representative.

Via checking the “MP4-GS1083-BUS report_E_Final”/BUSR/, it is confirmed that the EPRO selected representative HHs based on the questionnaire for selecting BFT HH/QBFT/, and the HHs are selected randomly in all the HHs without the biodigester which are applicable to the requirements in the questionnaire. Statistical calculations are found addressing all points and found that</td><td>~~CL 2, CAR 3~~</td><td>OK</td></tr>
</table>

Checklist Item (incl. guidance for the verification team)	Refe-rence	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
		stratified sampling is followed. The value applied is found statistically correct. PP has ensured that adequate QA/QC measures are implemented and the data is verified, entered and analyzed independently. *Verifier´s action:* The measurement approach is confirmed by cross checking the Baseline fuel test/BFT/, questionnaire for selecting BFT HH/QBFT/ and the results in the "MP4-GS1083-BUS report_E_Final"/BUSR/. In addition, the verification team visited households with biogas plants during this verification using Simple random Sampling approach and acceptance sampling approach to check it the data provided by PP is correct. Refer to C.4.2 for details. *Conclusion:* The measurement is documented as per latest approved PDD and applied methodology. However, the monitoring frequency is missing in table and how the monitoring frequency is fulfilled as per the PDD is not clarified. CL 2 was raised.		
b) Accuracy and QA/QC Procedure (VVS, §§ 394-400) *In case of measured (or estimated) values, check whether the accuracy of equipment used for monitoring is controlled and calibrated in accordance with the monitoring plan or if significant inaccuracies occur; in this case, make sure that the most conservative assumptions theoretically possible have been made for calculating ERs.* *Describe whether all applicable QA/QC procedures are met. Assess further if the calibration of the monitoring equipment has been carried out in line with the latest EB guidance.* *Include calibration dates and information in validity of the installed monitoring equipment in the table in Annex 2.*	/I1/ /I3/ /PDD/ /MR/ /TPDDTEC/ /CMSIR/ /XLS/ /3d/	*Description:* For determine the value of $P_{bs3,y}$ in KPT survey, the monitoring equipment of Weighing Scales are used for baseline fuel test. As per the methodology, it is required to verify the accuracy of the devices prior to conducting the tests. The consultant who conducting the site survey have to maintain and get it calibrated before the expired date or using the new scale. Last calibration check was done on 05/07/2016 due to the WCFT was conducted in July and August 2016 and it is confirmed that the scales are in good condition and delivering correct outcome of measurement. The calibration records listed in "MP4-GS1083-CMS Inception Report_EN"/CMSIR/ was checked by verification team, it is confirmed that every scale had the calibration record which the	OK	OK

Checklist Item (incl. guidance for the verification team)	Refe-rence	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
		expired date is still valid at time of conducting the field survey in Apr to Jun 2019. 14 calibrated scales are available for the survey. All calibration records are checked and confirmed as valid. The calibration was conducted by a third party named 3D VINA, and via cheking its public website/3d/ as listed in the records, it is verified that the company has the qualification and ability to do the calibration. Scales were inspected for the correctness of the calibration and found accurate, during site visit a weighment of known weights, all devices are showing correct results. Hence verification team concluded that the records of Calibration produced by the PP are reliable and acceptable. *Verifier´s action:* The above mentioned was verified by cross checking the "MP4-GS1083-CMS Inception Report_EN"/CMSIR/ agaist the third party's qualification/3d/. *Conclusion:* The accuracy of equipment used for monitoring is checked as controlled and calibrated in accordance with the monitoring plan.		
c) Correctness (VVS, §§ 389-393) *Determine whether the value given in the monitoring report is correct or determined in a conservative manner.* *In case of conservative approaches used in lieu of the monitoring as per registered MP detailed assessment of the conservativeness of the approach used should be given.* *In case of mistakes / deviations pl. provide details and descriptions of the CARs raised.*	/PDD/ /MR/ /TPDDTEC/ /XLS/ /BFT/ /BUSR/	☒ Correct ☐ Not correct (initial assessment) *Description:* The Quantity of fuel that is consumed in the baseline scenario 3 $P_{bs3,y}$ during this monitoring period is reported in the MR based on the Baseline Fuel Test listed in "GS1083_BP_MP4 Carbon monitoring _result_V1.2_Final", and the results are in the "MP4-GS1083-BUS report_E_Final". *Verifier´s action:* By means of checking the ER-spreadsheet/XLS/, "GS1083_BP_MP4 Carbon monitoring _result_V1.2_Final" and "MP4-GS1083-BUS report_E_Final". *Conclusion:*	OK	OK

<table>
<tr><th>Checklist Item
(incl. guidance for the verification team)</th><th>Refe-rence</th><th>Verification Team Comments
(Means and results of assessment)</th><th>Draft Concl.</th><th>Final Concl.</th></tr>
<tr><td></td><td></td><td>The values are correct.</td><td></td><td></td></tr>
<tr><td>D. $P_{h,y}$</td><td></td><td>Quantity of fuel that is consumed in the project scenario in year y</td><td></td><td></td></tr>
<tr><td>a) Measurement / Determination method (VVS, §§ 389-393)
Describe how the monitoring parameter was measured / determined. Focus primarily on the original data level but also describe the applied data aggregation trails (from ODL to data aggregation level zero).
Check if relevant equipment has been exchanged and if in cases of failures / downtimes of standard equipment other measurement / determination methods have been used. Furthermore, verify the frequency of measurements as per the requirements.
Assess whether the measurement / determination method is in line with the registered monitoring plan of the PDD and the applied methodology.</td><td>/I1/ /I3/ /PDD/ /MR/ /TPDDTEC/ /CMSIR/ /XLS/ /PFT/ /BUSR/ /SHH/ /RSSS/</td><td>Description:
PP has applied values as below table for this monitoring period.<table><tr><th>Fuel i</th><th>Average per household
kg/hh/day</th></tr><tr><td>LPG</td><td>0.06</td></tr><tr><td>Firewood</td><td>1.07</td></tr><tr><td>Agriculture residues</td><td>0.09</td></tr></table>These values are obtained from the Project fuel test/PFT/ (one of KPT) which was executed by a selected independent consultant named EPRO consulting JSC (EPRO) from April to June 2019 combining with CMS. And results are listed in “MP4-GS1083-BUS report_E_Final”/BUSR/.
Nexus selected the samplings and supply the sampling list to EPRO for execution. Via checking the “GS1083__CMS and KPT_sampling HHs_MP4”/SHH/, it is confirmed that the sampling approach was designed with a confidence interval of at least 90/30 according to GS recommendation to ensure the households interviewed are representative. The sample size for the PFT is 5 household per districts, 20 clusters, total 100 households, 5 HH were randomly selected from each districts of CMS survey. Nexus selected clusters/districts and HH randomly and the screenshots/RSSS/ have been provided to verification team during the site, it is verified that the random selection is actual and credible. Statistical calculations are found addressing all points and found that stratified sampling is followed.
The value applied is found statistically correct. PP has ensured that adequate QA/QC measures are implemented and the data is verified, entered and analyzed independently.</td><td><s>CL 2, CAR 3</s></td><td>OK</td></tr>
</table>

Checklist Item (incl. guidance for the verification team)	Refe-rence	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
		Verifier´s action: The measurement approach is confirmed by cross checking the Project fuel test/PFT/, "GS1083__CMS and KPT_sampling HHs_MP4"/SHH/ and the results in the "MP4-GS1083-BUS report_E_Final"/BUSR/. In addition, the verification team visited households with biogas plants during this verification using Simple random Sampling approach and acceptance sampling approach to check it the data provided by PP is correct. Refer to C.4.2 for details. *Conclusion:* The measurement is documented as per latest approved PDD and applied methodology. However, the monitoring frequency is missing in table and how the monitoring frequency is fulfilled as per the PDD is not clarified. CL 2 was raised.		
b) Accuracy and QA/QC Procedure (VVS, §§ 394-400) *In case of measured (or estimated) values, check whether the accuracy of equipment used for monitoring is controlled and calibrated in accordance with the monitoring plan or if significant inaccuracies occur; in this case, make sure that the most conservative assumptions theoretically possible have been made for calculating ERs.* *Describe whether all applicable QA/QC procedures are met. Assess further if the calibration of the monitoring equipment has been carried out in line with the latest EB guidance.* *Include calibration dates and information in validity of the installed monitoring equipment in the table in Annex 2.*	/I1/ /I3/ /PDD/ /MR/ /TPDDTEC/ /CMSIR/ /XLS/ /3d/	*Description:* For determine the value of $P_{h,y}$ in KPT survey, the monitoring equipment of Weighing Scales are used for baseline fuel test. As per the methodology, it is required to verify the accuracy of the devices prior to conducting the tests. The consultant who conducting the site survey have to maintain and get it calibrated before the expired date or using the new scale. Last calibration check was done on 05/07/2016 due to the WCFT was conducted in July and August 2016 and it is confirmed that the scales are in good condition and delivering correct outcome of measurement. The calibration records listed in "MP4-GS1083-CMS Inception Report_EN"/CMSIR/ was checked by verification team, it is confirmed that every scale had the calibration record which the expired date is still valid at time of conducting the field survey in Apr to Jun 2019. 14 calibrated scales are available for the survey. All calibration records are checked and confirmed as valid. The	OK	OK

Checklist Item (incl. guidance for the verification team)	Refe-rence	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
		calibration was conducted by a third party named 3D VINA, and via cheking its public website/3d/ as listed in the records, it is verified that the company has the qualification and ability to do the calibration. Scales were inspected for the correctness of the calibration and found accurate, during site visit a weighment of known weights, all devices are showing correct results. Hence verification team concluded that the records of Calibration produced by the PP are reliable and acceptable. *Verifier´s action:* The above mentioned was verified by cross checking the "MP4-GS1083-CMS Inception Report_EN"/CMSIR/ agaist the third party's qualification/3d/. *Conclusion:* The accuracy of equipment used for monitoring is checked as controlled and calibrated in accordance with the monitoring plan.		
c) Correctness (VVS, §§ 389-393) *Determine whether the value given in the monitoring report is correct or determined in a conservative manner.* *In case of conservative approaches used in lieu of the monitoring as per registered MP detailed assessment of the conservativeness of the approach used should be given.* *In case of mistakes / deviations pl. provide details and descriptions of the CARs raised.*	/PDD/ /MR/ /TPDDTEC/ /XLS/ /PFT/ /BUSR/	☒ Correct ☐ Not correct (initial assessment) *Description:* The Quantity of fuel that is consumed in the project scenario $P_{h,y}$ during this monitoring period is reported in the MR based on the Project Fuel Test listed in "GS1083_BP_MP4 Carbon monitoring _result_V1.2_Final", and the results are in the "MP4-GS1083-BUS report_E_Final". *Verifier´s action:* By means of checking the ER-spreadsheet/XLS/, "GS1083_BP_MP4 Carbon monitoring _result_V1.2_Final" and "MP4-GS1083-BUS report_E_Final". *Conclusion:* The values are correct.	OK	OK
E. $U_{p,y}$		**Percentage of bio-digesters in use in monitoring period y**		

Checklist Item (incl. guidance for the verification team)	Refe-rence	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
a) Measurement / Determination method (VVS, §§ 389-393) *Describe how the monitoring parameter was measured / determined. Focus primarily on the original data level but also describe the applied data aggregation trails (from ODL to data aggregation level zero).* *Check if relevant equipment has been exchanged and if in cases of failures / downtimes of standard equipment other measurement / determination methods have been used. Furthermore, verify the frequency of measurements as per the requirements.* *Assess whether the measurement / determination method is in line with the registered monitoring plan of the PDD and the applied methodology.*	/I1/ /I3/ /PDD/ /MR/ /TPDDTEC/ /XLS/ /US/	*Description:* The value applied by PP for this monitoring period is 60.31% which is obtained from the Usage Survey result/US/. Usage survey were conducted by provincial technicians of BP from Jan 2018 to May 2019, via checking the "GS1083_Usage survey MP4_Sampling HHs"/US/, it is confirmed that the sample size determination is in line with the methodology requirement/TPDDTEC/ and GS rules/GST/, i.e. the minimum total sample size is 100, with at least 30 samples for project technologies of each age being credited. 35 units for each age group and total 350 HHs were surveyed which is confirmed more than the requirement. Nexus selected the samplings and supply the sampling list to provincial technicians of BP for execution. Nexus selected 35 HH randomly in each age group and the screenshots/RSSS/ have been provided to verification team during the site, it is verified that the random selection is actual and credible. *Verifier´s action:* Adequate measurement arrangements are made by the PP and is verified by checking the screenshots/RSSS/ and "GS1083_Usage survey MP4_Sampling HHs"/US/ & "GS1083_MP4_Usage survey_Results_Version 1.0". In addition, the verification team visited households with biogas plants during this verification using Simple random Sampling approach and acceptance sampling approach to check it the data provided by PP is correct. Refer to C.4.2 for details. *Conclusion:* The measurement is documented as per latest approved PDD and applied methodology. However, the monitoring frequency is missing in table and how the monitoring frequency is fulfilled as per the PDD is not clarified. CL 2 was raised.	~~CL 2, CAR 3~~	OK

Checklist Item (incl. guidance for the verification team)	Refe-rence	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
b) Accuracy and QA/QC Procedure (VVS, §§ 394-400) *In case of measured (or estimated) values, check whether the accuracy of equipment used for monitoring is controlled and calibrated in accordance with the monitoring plan or if significant inaccuracies occur; in this case, make sure that the most conservative assumptions theoretically possible have been made for calculating ERs.* *Describe whether all applicable QA/QC procedures are met. Assess further if the calibration of the monitoring equipment has been carried out in line with the latest EB guidance.* *Include calibration dates and information in validity of the installed monitoring equipment in the table in Annex 2.*	/PDD/ /MR/ /TPDDTEC/ /XLS/ /US/	*Description:* The value is measured and calculated based on the usage survey results from Group 0-1 to Group 9-10. There is no equipment used for the measuring. *Verifier´s action:* This was verified by means of checking the "GS1083_Usage survey MP4_Sampling HHs"/US/ and "GS1083_MP4_Usage survey_Results_Version 1.0". *Conclusion:* QA/QC procedures are met. No inaccuracies occurred.	OK	OK
c) Correctness (VVS, §§ 389-393) *Determine whether the value given in the monitoring report is correct or determined in a conservative manner.* *In case of conservative approaches used in lieu of the monitoring as per registered MP detailed assessment of the conservativeness of the approach used should be given.* *In case of mistakes / deviations pl. provide details and descriptions of the CARs raised.*	/PDD/ /MR/ /TPDDTEC/ /XLS/ /US/	☒ Correct ☐ Not correct (initial assessment) *Description:* The value given in the MR is derived from the Usage Survey result in "GS1083_MP4_Usage survey_Results_Version 1.0"/US/. *Verifier´s action:* It was verified by cross checking the ER calculation sheet against the Usage Survey result in "GS1083_MP4_Usage survey_Results_Version 1.0"/US/. *Conclusion:* The value given in MR is correct and consistent with survey results.	OK	OK
F. $N_{p,y}$		**Number of biogas plants commissioned**		
a) Measurement / Determination method (VVS, §§ 389-393) *Describe how the monitoring parameter was measured / determined. Focus primarily on the original data level but also*	/I1/ /I3/ /PDD/ /MR/	*Description:* This value is obtained from the BPD database/BPDD/. BP has so far installed 130,194 units of biogas plants in different provinces of two zones including warm zone and temperate zone	~~CL 2, CAR 3~~	OK

Checklist Item (incl. guidance for the verification team)	Refe-rence	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
describe the applied data aggregation trails (from ODL to data aggregation level zero). *Check if relevant equipment has been exchanged and if in cases of failures / downtimes of standard equipment other measurement / determination methods have been used. Furthermore, verify the frequency of measurements as per the requirements.* *Assess whether the measurement / determination method is in line with the registered monitoring plan of the PDD and the applied methodology.*	/TPDDTEC/ /XLS/ /BPDD/ /QCR/	of the host country, and 8,783 units during this monitoring period from 01/01/2015 to 30/06/2016, this is verified by checking the BPD database/BPDD/. For parameter $N_{p,y}$, the supporting evidence is BPD database/BPDD/, and to verify the accuracy and correctness of monitored data, verification team cross-checked the quality control records/QCR/ for each installed biodigester during this monitoring period, total number is 8,783. Verification team has utilized sampling approach as per the "Guideline of Sampling and surveys for CDM project activities and programmes of activities" version 04.0/SSG/, this sampling approach found to be appropriate as the quality control records are homogenous. The sample size is calculated as 30 for this monitoring period, refer to section C.4.2 of this report for details. verification team checked 35 quality control records/QCR/ which is more than the 30 sample size requirement during this monitoring period, the quality control records/QCR/ are cross checked with the BPD database/BPDD/, it is verified that the BPD database/BPDD/ during this monitoring period is correct with the quality control records/QCR/ sample. Hence, it is concluded that the biogas plants commissioned value during this monitoring period of 8,783 is correct and credible. Furthermore, during the site inspection, random samples of 55 HHs with biodigersters were checked by the verification team, 55 biodigersters were confirmed existed, via comparing the HH information and ID code of biogas plants of 55 samples with the BPD database/BPDD/ and corresponding quality control records/QCR/, it is confirmed that the information collected by PP in BPD database/BPDD/ is correct and actual, thus it is verified that total installed number of 130,194 biogas plants is plausible and actual. *Verifier´s action:* The value is confirmed by checking the raw data quality control records/QCR/ and cross checking with the BPD database/BPDD/.		

Checklist Item (incl. guidance for the verification team)	Refe-rence	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
		Furthermore, on-site inspection was conducted to verify the existence and actual operation status after commissioned. *Conclusion:* The measurement is documented as per latest approved PDD and applied methodology. However, the monitoring frequency is missing in table. CL 2 was raised.		
b) Accuracy and QA/QC Procedure (VVS, §§ 394-400) *In case of measured (or estimated) values, check whether the accuracy of equipment used for monitoring is controlled and calibrated in accordance with the monitoring plan or if significant inaccuracies occur; in this case, make sure that the most conservative assumptions theoretically possible have been made for calculating ERs.* *Describe whether all applicable QA/QC procedures are met. Assess further if the calibration of the monitoring equipment has been carried out in line with the latest EB guidance.* *Include calibration dates and information in validity of the installed monitoring equipment in the table in Annex 2.*	/I1/ /I3/ /PDD/ /MR/ /TPDDTEC/ /XLS/ /BPDD/ /QCR/	*Description:* No monitoring equipment needed. *Verifier´s action:* The value is confirmed by checking the raw data quality control records/QCR/ and cross checking with the BPD database/BPDD/. *Conclusion:* Applicable QA/QC procedures are met.	OK	OK
c) Correctness (VVS, §§ 389-393) *Determine whether the value given in the monitoring report is correct or determined in a conservative manner.* *In case of conservative approaches used in lieu of the monitoring as per registered MP detailed assessment of the conservativeness of the approach used should be given.* *In case of mistakes / deviations pl. provide details and descriptions of the CARs raised.*	/PDD/ /MR/ /TPDDTEC/ /BPDD/ /QCR/	☒ Correct ☐ Not correct (initial assessment) *Description:* The value of $N_{p,y}$ during this monitoring period is reported in the MR based on the BPD database/BPDD/. *Verifier´s action:* The value is confirmed by checking the raw data quality control records/QCR/ and cross checking with the BPD database/BPDD/. *Conclusion:* The value is correct.	OK	OK

<table>
<tr><th>Checklist Item
(incl. guidance for the verification team)</th><th>Refe-rence</th><th>Verification Team Comments
(Means and results of assessment)</th><th>Draft Concl.</th><th>Final Concl.</th></tr>
<tr><td>G. MS(T,S,k)</td><td></td><td>Fraction of livestock category T's manure fed into the bio-digester S, in climate zone k</td><td></td><td></td></tr>
<tr><td>a) Measurement / Determination method (VVS, §§ 389-393)
Describe how the monitoring parameter was measured / determined. Focus primarily on the original data level but also describe the applied data aggregation trails (from ODL to data aggregation level zero).
Check if relevant equipment has been exchanged and if in cases of failures / downtimes of standard equipment other measurement / determination methods have been used. Furthermore, verify the frequency of measurements as per the requirements.
Assess whether the measurement / determination method is in line with the registered monitoring plan of the PDD and the applied methodology.</td><td>/I1/
/I2/
/PDD/
/MR/
/TPDDTEC/
/XLS/
/SHH/
/CMS/
/BUSR/
/RSSS/</td><td>Description:
PP has applied values as below table for this monitoring period.<table><tr><th>Climate zone</th><th>Pig</th><th>Buffalo</th><th>Dairy cow</th><th>Cattle</th></tr><tr><td>temperate</td><td>97.48%</td><td>5.56%</td><td>N/A</td><td>43.71%</td></tr><tr><td>warm</td><td>93.40%</td><td>N/A</td><td>N/A</td><td>13.11%</td></tr></table>These values are obtained from the Carbon monitoring survey (CMS)/CMS/ which was executed by a selected independent consultant named EPRO consulting JSC (EPRO) from April to June 2019. Nexus selected the samplings and supply the sampling list to EPRO for execution. Via checking the "GS1083__CMS and KPT_sampling HHs_MP4"/SHH/, it is confirmed that the CMS sampling approach was designed with a confidence interval of at least 90/30 according to GS recommendation to ensure the households interviewed are representative. The sample size for the CMS is 17 households (include a 10% oversampling) from 20 clusters (10 clusters from each temperate and warm zone). The purpose of the 10% oversampling is to support any of the main selected households are not available during the survey. The total households for CMS survey are calculated as 17HH per cluster, 10 clusters per zone, thus 170 for each zone and total sample size is 340. Nexus selected clusters/districts and HH randomly and the screenshots/RSSS/ have been provided to verification team during the site, it is verified that the random selection is actual and credible.
The value applied is found statistically correct. PP has ensured that adequate QA/QC measures are implemented and the data is verified, entered and analyzed independently.
Verifier´s action:</td><td>~~CL 2, CAR 3~~</td><td>OK</td></tr>
</table>

Checklist Item (incl. guidance for the verification team)	Refe-rence	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
		The measurement approach is confirmed by cross checking the Carbon monitoring survey (CMS)/CMS/, "GS1083__CMS and KPT_sampling HHs_MP4"/SHH/ and the screenshots/RSSS/. In addition, the verification team visited households with biogas plants during this verification using Simple random Sampling approach and acceptance sampling approach to check it the data provided by PP is correct. Refer to C.4.2 for details. *Conclusion:* The measurement is documented as per latest approved PDD and applied methodology. However, the monitoring frequency is missing in table and how the monitoring frequency is fulfilled as per the PDD is not clarified. CL 2 was raised.		
b) Accuracy and QA/QC Procedure (VVS, §§ 394-400) *In case of measured (or estimated) values, check whether the accuracy of equipment used for monitoring is controlled and calibrated in accordance with the monitoring plan or if significant inaccuracies occur; in this case, make sure that the most conservative assumptions theoretically possible have been made for calculating ERs.* *Describe whether all applicable QA/QC procedures are met. Assess further if the calibration of the monitoring equipment has been carried out in line with the latest EB guidance.* *Include calibration dates and information in validity of the installed monitoring equipment in the table in Annex 2.*	/I1/ /I2/ /PDD/ /MR/ /TPDDTEC/ /XLS/ /SHH/ /CMS/ /BUSR/ /RSSS/	*Description:* The value is measured and calculated based on the carbon monitoring survey results. There is no equipment used for the measuring. *Verifier´s action:* This was verified by means of checking the Carbon monitoring survey (CMS)/CMS/, "GS1083__CMS and KPT_sampling HHs_MP4"/SHH/ and "MP4-GS1083-BUS report_E_Final"/BUSR/. *Conclusion:* QA/QC procedures are met. No inaccuracies occurred.	OK	OK
c) Correctness (VVS, §§ 389-393) *Determine whether the value given in the monitoring report is correct or determined in a conservative manner.*	/PDD/ /MR/ /TPDDTEC/ /XLS/	☒ Correct ☐ Not correct (initial assessment) *Description:* The **Fraction of livestock category *T*'s manure fed into the bio-digester *S*, in climate zone *k*** during this monitoring period is reported in the MR based on the Carbon monitoring survey	OK	OK

<table>
<tr><th>Checklist Item
(incl. guidance for the verification team)</th><th>Refe-rence</th><th>Verification Team Comments
(Means and results of assessment)</th><th>Draft Concl.</th><th>Final Concl.</th></tr>
<tr><td>In case of conservative approaches used in lieu of the monitoring as per registered MP detailed assessment of the conservativeness of the approach used should be given.
In case of mistakes / deviations pl. provide details and descriptions of the CARs raised.</td><td>/WDR/
/WPI/
/DPI/
/IPCC/</td><td>(CMS) listed in “GS1083_BP_MP4 Carbon monitoring _result_V1.2_Final”/CMS/, and the results are in the “MP4-GS1083-BUS report_E_Final”/BUSR/.
Verifier´s action:
By means of checking the ER-spreadsheet/XLS/, “GS1083_BP_MP4 Carbon monitoring _result_V1.2_Final”/CMS/ and “MP4-GS1083-BUS report_E_Final” /BUSR/.
Conclusion:
The values are correct.</td><td></td><td></td></tr>
<tr><td>H. MS(P,S,k)</td><td></td><td>Fraction of livestock category T’s manure not fed into the bio-digester S, in climate zone k</td><td></td><td></td></tr>
<tr><td>a) Measurement / Determination method (VVS, §§ 389-393)
Describe how the monitoring parameter was measured / determined. Focus primarily on the original data level but also describe the applied data aggregation trails (from ODL to data aggregation level zero).
Check if relevant equipment has been exchanged and if in cases of failures / downtimes of standard equipment other measurement / determination methods have been used. Furthermore, verify the frequency of measurements as per the requirements.

Assess whether the measurement / determination method is in line with the registered monitoring plan of the PDD and the applied methodology.</td><td>/I1/
/I2/
/PDD/
/MR/
/TPDDTEC/
/XLS/
/SHH/
/CMS/
/BUSR/
/RSSS/</td><td>Description:
PP has applied values as below table for this monitoring period.<table><tr><th>Climate zone</th><th>Pig</th><th>Buffalo</th><th>Dairy cow</th><th>Cattle</th></tr><tr><td>temperate</td><td>2.52%</td><td>94.44%</td><td>N/A</td><td>56.29%</td></tr><tr><td>warm</td><td>6.60%</td><td>N/A</td><td>N/A</td><td>86.89%</td></tr></table>These values are obtained from the Carbon monitoring survey (CMS)/CMS/ which was executed by a selected independent consultant named EPRO consulting JSC (EPRO) from April to June 2019. Nexus selected the samplings and supply the sampling list to EPRO for execution. Via checking the “GS1083__CMS and KPT_sampling HHs_MP4”/SHH/, it is confirmed that the CMS sampling approach was designed with a confidence interval of at least 90/30 according to GS recommendation to ensure the households interviewed are representative. The sample size for the CMS is 17 households (include a 10% oversampling) from 20 clusters (10 clusters from each temperate and warm zone). The purpose of the 10% oversampling is to support any of the main selected households are not available during the survey. The total households for CMS survey are calculated as 17HH per cluster, 10 clusters per zone,</td><td>~~CL 2, CAR 3~~</td><td>OK</td></tr>
</table>

Checklist Item (incl. guidance for the verification team)	Refe-rence	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
		thus 170 for each zone and total sample size is 340. Nexus selected clusters/districts and HH randomly and the screenshots/RSSS/ have been provided to verification team during the site, it is verified that the random selection is actual and credible. The value applied is found statistically correct. PP has ensured that adequate QA/QC measures are implemented and the data is verified, entered and analyzed independently. *Verifier´s action:* The measurement approach is confirmed by cross checking the Carbon monitoring survey (CMS)/CMS/, "GS1083__CMS and KPT_sampling HHs_MP4"/SHH/ and the screenshots/RSSS/. In addition, the verification team visited households with biogas plants during this verification using Simple random Sampling approach and acceptance sampling approach to check it the data provided by PP is correct. Refer to C.4.2 for details. *Conclusion:* The measurement is documented as per latest approved PDD and applied methodology. However, how the monitoring frequency is fulfilled as per the PDD is not clarified. CL 2 was raised.		
b) Accuracy and QA/QC Procedure (VVS, §§ 394-400) *In case of measured (or estimated) values, check whether the accuracy of equipment used for monitoring is controlled and calibrated in accordance with the monitoring plan or if significant inaccuracies occur; in this case, make sure that the most conservative assumptions theoretically possible have been made for calculating ERs.*	/I1/ /I2/ /PDD/ /MR/ /TPDDTEC/ /XLS/ /SHH/ /CMS/	*Description:* The value is measured and calculated based on the carbon monitoring survey results. There is no equipment used for the measuring. *Verifier´s action:* This was verified by means of checking the Carbon monitoring survey (CMS)/CMS/, "GS1083__CMS and KPT_sampling HHs_MP4"/SHH/ and "MP4-GS1083-BUS report_E_Final"/BUSR/.	OK	OK

<table>
<tr><th>Checklist Item
(incl. guidance for the verification team)</th><th>Refe-rence</th><th>Verification Team Comments
(Means and results of assessment)</th><th>Draft Concl.</th><th>Final Concl.</th></tr>
<tr><td>Describe whether all applicable QA/QC procedures are met. Assess further if the calibration of the monitoring equipment has been carried out in line with the latest EB guidance.

Include calibration dates and information in validity of the installed monitoring equipment in the table in Annex 2.</td><td>/BUSR/
/RSSS/</td><td>Conclusion:

QA/QC procedures are met.
No inaccuracies occurred.</td><td></td><td></td></tr>
<tr><td>c) Correctness
(VVS, §§ 389-393)
Determine whether the value given in the monitoring report is correct or determined in a conservative manner.
In case of conservative approaches used in lieu of the monitoring as per registered MP detailed assessment of the conservativeness of the approach used should be given.

In case of mistakes / deviations pl. provide details and descriptions of the CARs raised.</td><td>/PDD/
/MR/
/TPDDTEC/
/XLS/
/WDR/
/WPI/
/DPI/
/IPCC/</td><td>☒ Correct ☐ Not correct (initial assessment)

Description:

The Fraction of livestock category T's manure not fed into the bio-digester S, in climate zone k during this monitoring period is reported in the MR based on the Carbon monitoring survey (CMS) listed in “GS1083_BP_MP4 Carbon monitoring _result_V1.2_Final”/CMS/, and the results are in the “MP4-GS1083-BUS report_E_Final”/BUSR/.

Verifier´s action:

By means of checking the ER-spreadsheet/XLS/, “GS1083_BP_MP4 Carbon monitoring _result_V1.2_Final”/CMS/ and “MP4-GS1083-BUS report_E_Final” /BUSR/.

Conclusion:
The values are correct.</td><td>OK</td><td>OK</td></tr>
<tr><td>I. $N_{(T)}$</td><td></td><td>Number of animals of livestock category T</td><td></td><td></td></tr>
<tr><td>a) Measurement / Determination method
(VVS, §§ 389-393)
Describe how the monitoring parameter was measured / determined. Focus primarily on the original data level but also describe the applied data aggregation trails (from ODL to data aggregation level zero).
Check if relevant equipment has been exchanged and if in cases of failures / downtimes of standard equipment other measurement / determination methods have been used. Furthermore, verify the frequency of measurements as per the requirements.</td><td>/I1/
/I2/
/PDD/
/MR/
/TPDDTEC/
/XLS/
/SHH/
/CMS/
/BUSR/</td><td>Description:

PP has applied values as below table for this monitoring period.
<table><tr><th>Animal</th><th>N(T),h climate zone temperate</th><th>N(T),h climate zone warm</th></tr><tr><td>T</td><td>#</td><td>#</td></tr><tr><td>Pig</td><td>14.06</td><td>33.37</td></tr><tr><td>Buffalo</td><td>0.14</td><td>0.00</td></tr><tr><td>Dairy cow</td><td>0.00</td><td>0.00</td></tr><tr><td>Cattle</td><td>0.47</td><td>0.74</td></tr></table></td><td><s>CL 2, CAR 3</s></td><td>OK</td></tr>
</table>

Checklist Item (incl. guidance for the verification team)	Refe-rence	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
Assess whether the measurement / determination method is in line with the registered monitoring plan of the PDD and the applied methodology.	/RSSS/	These values are obtained from the Carbon monitoring survey (CMS)/CMS/ which was executed by a selected independent consultant named EPRO consulting JSC (EPRO) from April to June 2019. Nexus selected the samplings and supply the sampling list to EPRO for execution. Via checking the "GS1083__CMS and KPT_sampling HHs_MP4"/SHH/, it is confirmed that the CMS sampling approach was designed with a confidence interval of at least 90/30 according to GS recommendation to ensure the households interviewed are representative. The sample size for the CMS is 17 households (include a 10% oversampling) from 20 clusters (10 clusters from each temperate and warm zone). The purpose of the 10% oversampling is to support any of the main selected households are not available during the survey. The total households for CMS survey are calculated as 17HH per cluster, 10 clusters per zone, thus 170 for each zone and total sample size is 340. Nexus selected clusters/districts and HH randomly and the screenshots/RSSS/ have been provided to verification team during the site, it is verified that the random selection is actual and credible. The value applied is found statistically correct. PP has ensured that adequate QA/QC measures are implemented and the data is verified, entered and analyzed independently. *Verifier´s action:* The measurement approach is confirmed by cross checking the Carbon monitoring survey (CMS)/CMS/, "GS1083__CMS and KPT_sampling HHs_MP4"/SHH/ and the screenshots/RSSS/. In addition, the verification team visited households with biogas plants during this verification using Simple random Sampling approach and acceptance sampling approach to check it the data provided by PP is correct. Refer to C.4.2 for details. *Conclusion:*		

Checklist Item (incl. guidance for the verification team)	Refe-rence	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
		The measurement is documented as per latest approved PDD and applied methodology. However, how the monitoring frequency is fulfilled as per the PDD is not clarified. CL 2 was raised.		
b) Accuracy and QA/QC Procedure (VVS, §§ 394-400) *In case of measured (or estimated) values, check whether the accuracy of equipment used for monitoring is controlled and calibrated in accordance with the monitoring plan or if significant inaccuracies occur; in this case, make sure that the most conservative assumptions theoretically possible have been made for calculating ERs.* *Describe whether all applicable QA/QC procedures are met. Assess further if the calibration of the monitoring equipment has been carried out in line with the latest EB guidance.* *Include calibration dates and information in validity of the installed monitoring equipment in the table in Annex 2.*	/I1/ /I2/ /PDD/ /MR/ /TPDDTEC/ /XLS/ /SHH/ /CMS/ /BUSR/ /RSSS/	*Description:* The value is measured and calculated based on the carbon monitoring survey results. There is no equipment used for the measuring. The average number of animal was calculated based on the number of days they are in farm (for fattening pig and piglet) and number of hours they were stabled (for sow, boar, buffalo, cow, etc.) which follows the methodology formulae. *Verifier´s action:* This was verified by means of checking the Carbon monitoring survey (CMS)/CMS/, "GS1083__CMS and KPT_sampling HHs_MP4"/SHH/ and "MP4-GS1083-BUS report_E_Final"/BUSR/. The survey report "MP4-GS1083-BUS report_E_Final.pdf" is checked, it is verified that the calculation of average number of animal are correct and in line with the equation in the applied methodology. *Conclusion:* QA/QC procedures are met. No inaccuracies occurred.	OK	OK
c) Correctness (VVS, §§ 389-393) *Determine whether the value given in the monitoring report is correct or determined in a conservative manner.* *In case of conservative approaches used in lieu of the monitoring as per registered MP detailed assessment of the conservativeness of the approach used should be given.*	/PDD/ /MR/ /TPDDTEC/ /XLS/ /WDR/ /WPI/	☒ Correct ☐ Not correct (initial assessment) *Description:* The Number of animals of livestock category T $N_{(T)}$ during this monitoring period is reported in the MR based on the Carbon monitoring survey (CMS) listed in "GS1083_BP_MP4 Carbon monitoring _result_V1.2_Final"/CMS/, and the results are in the "MP4-GS1083-BUS report_E_Final"/BUSR/.	OK	OK

Checklist Item (incl. guidance for the verification team)	Refe-rence	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
In case of mistakes / deviations pl. provide details and descriptions of the CARs raised.	/DPI/ /IPCC/	*Verifier´s action:* By means of checking the ER-spreadsheet/XLS/, "GS1083_BP_MP4 Carbon monitoring _result_V1.2_Final"/CMS/ and "MP4-GS1083-BUS report_E_Final" /BUSR/. *Conclusion:* The values are correct.		
J. PL		**Physical leakage of the bio-digester**		
a) Measurement / Determination method (VVS, §§ 389-393) *Describe how the monitoring parameter was measured / determined. Focus primarily on the original data level but also describe the applied data aggregation trails (from ODL to data aggregation level zero).* *Check if relevant equipment has been exchanged and if in cases of failures / downtimes of standard equipment other measurement / determination methods have been used. Furthermore, verify the frequency of measurements as per the requirements.* *Assess whether the measurement / determination method is in line with the registered monitoring plan of the PDD and the applied methodology.*	/PDD/ /MR/ /TPDDTEC/ /XLS/	*Description:* The data is a default value derived from the applied GS methodology and has been defined in the latest approved PDD. *Verifier´s action:* The applied GS methodology and PDD have been checked and value is confimed as correct. *Conclusion:* The measurement is documented as per latest approved PDD and applied methodology.	OK	OK
b) Accuracy and QA/QC Procedure (VVS, §§ 394-400) *In case of measured (or estimated) values, check whether the accuracy of equipment used for monitoring is controlled and calibrated in accordance with the monitoring plan or if significant inaccuracies occur; in this case, make sure that the most conservative assumptions theoretically possible have been made for calculating ERs.* *Describe whether all applicable QA/QC procedures are met. Assess further if the calibration of the monitoring equipment has been carried out in line with the latest EB guidance.*	/PDD/ /MR/ /TPDDTEC/ /XLS/	*Description:* The data is a default value derived from the applied GS methodology and has been defined in the latest approved PDD. And date will be updated if there is any change in newer version of methodology. *Verifier´s action:* The applied GS methodology and PDD have been checked and value is confimed as correct.	OK	OK

<table>
<tr><th>Checklist Item
(incl. guidance for the verification team)</th><th>Refe-rence</th><th>Verification Team Comments
(Means and results of assessment)</th><th>Draft Concl.</th><th>Final Concl.</th></tr>
<tr><td>Include calibration dates and information in validity of the installed monitoring equipment in the table in Annex 2.</td><td></td><td>Conclusion:
QA/QC procedures are met.
No inaccuracies occurred.</td><td></td><td></td></tr>
<tr><td>c) Correctness
(VVS, §§ 389-393)
Determine whether the value given in the monitoring report is correct or determined in a conservative manner.
In case of conservative approaches used in lieu of the monitoring as per registered MP detailed assessment of the conservativeness of the approach used should be given.
In case of mistakes / deviations pl. provide details and descriptions of the CARs raised.</td><td>/PDD/
/MR/
/TPDDTEC/
/XLS/</td><td>☒ Correct ☐ Not correct (initial assessment)
Description:
The Physical leakage of the bio-digester PL data of 10% is a default value derived from the applied GS methodology and has been defined in the latest approved PDD.
Verifier´s action:
The applied GS methodology and PDD have been checked and value is confimed as correct.
Conclusion:
The values are correct.</td><td>OK</td><td>OK</td></tr>
<tr><td>K. $EF_{awms,T}$</td><td></td><td>Animal waste methane emission factor calculated by average local temperatures, IPCC default values and result of CMS monitoring survey.</td><td></td><td></td></tr>
<tr><td>a) Measurement / Determination method
(VVS, §§ 389-393)
Describe how the monitoring parameter was measured / determined. Focus primarily on the original data level but also describe the applied data aggregation trails (from ODL to data aggregation level zero).
Check if relevant equipment has been exchanged and if in cases of failures / downtimes of standard equipment other measurement / determination methods have been used. Furthermore, verify the frequency of measurements as per the requirements.
Assess whether the measurement / determination method is in line with the registered monitoring plan of the PDD and the applied methodology.</td><td>/I1/
/I2/
/PDD/
/MR/
/TPDDTEC/
/XLS/
/SHH/
/CMS/
/BUSR/
/RSSS/
/IPCC/</td><td>Description:
PP has applied values as below table for this monitoring period.<table><tr><th>EF AWMS by animal</th><th>Zone temperate</th><th>Zone Warm</th></tr><tr><td>Pig</td><td>2.084</td><td>2.039</td></tr><tr><td>Buffalo</td><td>1.431</td><td>0.000</td></tr><tr><td>Dairy cow</td><td>0.000</td><td>0.000</td></tr><tr><td>Cattle</td><td>2.993</td><td>1.942</td></tr></table>The values are calculated from the following sources:
IPCC default values for input parameter VS(T), Bo(T) (cells D35:E40 and N35:O40) of tab “ER_AWMS”, ER spreadsheet) for the region Asia from table 10A-4, 10A-5, 10A-6, 10A-7, chapter 10, volume 4 of the 2006 IPCC</td><td><s>CL 2, CAR 3</s></td><td>OK</td></tr>
</table>

Checklist Item (incl. guidance for the verification team)	Refe-rence	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
		Guidelines for National Greenhouse Gas Inventories, chapter 10 (online: http://www.ipcc-nggip.iges.or.jp/public/2006gl/vol4.html) • CMS monitoring • Local temperatures (tab "Input", monitoring database spreadsheet) The IPCC default value depends on the average annual temperature. $EF_{awms,T}$ is calculated from average local temperature, the IPCC default values such as VS(T), Bo(T), MCF(k) and also the actual waste management practice $MS_{(T,S,k)}$ from CMS monitoring. These values are obtained from the Carbon monitoring survey (CMS)/CMS/ which was executed by a selected independent consultant named EPRO consulting JSC (EPRO) from April to June 2019. Nexus selected the samplings and supply the sampling list to EPRO for execution. Via checking the "GS1083__CMS and KPT_sampling HHs_MP4"/SHH/, it is confirmed that the CMS sampling approach was designed with a confidence interval of at least 90/30 according to GS recommendation to ensure the households interviewed are representative. The sample size for the CMS is 17 households (include a 10% oversampling) from 20 clusters (10 clusters from each temperate and warm zone). The purpose of the 10% oversampling is to support any of the main selected households are not available during the survey. The total households for CMS survey are calculated as 17HH per cluster, 10 clusters per zone, thus 170 for each zone and total sample size is 340. Nexus selected clusters/districts and HH randomly and the screenshots/RSSS/ have been provided to verification team during the site, it is verified that the random selection is actual and credible. The value applied is found statistically correct. PP has ensured that adequate QA/QC measures are implemented and the data is verified, entered and analyzed independently.		

Checklist Item (incl. guidance for the verification team)	Refe-rence	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
		Verifier´s action: The measurement approach is confirmed by cross checking the IPCC values/IPCC/, Carbon monitoring survey (CMS)/CMS/, "GS1083__CMS and KPT_sampling HHs_MP4"/SHH/ and the screenshots/RSSS/. *Conclusion:* The measurement is documented as per latest approved PDD and applied methodology. However, the monitoring frequency is missing and how the monitoring frequency is fulfilled as per the PDD is not clarified. CL 2 was raised.		
b) Accuracy and QA/QC Procedure (VVS, §§ 394-400) *In case of measured (or estimated) values, check whether the accuracy of equipment used for monitoring is controlled and calibrated in accordance with the monitoring plan or if significant inaccuracies occur; in this case, make sure that the most conservative assumptions theoretically possible have been made for calculating ERs.* *Describe whether all applicable QA/QC procedures are met. Assess further if the calibration of the monitoring equipment has been carried out in line with the latest EB guidance.* *Include calibration dates and information in validity of the installed monitoring equipment in the table in Annex 2.*	/I1/ /I2/ /PDD/ /MR/ /TPDDTEC/ /XLS/ /SHH/ /CMS/ /BUSR/ /RSSS/ /IPCC/	*Description:* The value is measured and calculated based on the carbon monitoring survey results. There is no equipment used for the measuring. *Verifier´s action:* This was verified by means of checking the IPCC values/IPCC/, Carbon monitoring survey (CMS)/CMS/, "GS1083__CMS and KPT_sampling HHs_MP4"/SHH/ and "MP4-GS1083-BUS report_E_Final"/BUSR/. *Conclusion:* QA/QC procedures are met. No inaccuracies occurred.	OK	OK
c) Correctness (VVS, §§ 389-393) *Determine whether the value given in the monitoring report is correct or determined in a conservative manner.* *In case of conservative approaches used in lieu of the monitoring as per registered MP detailed assessment of the conservativeness of the approach used should be given.*	/PDD/ /MR/ /TPDDTEC/ /XLS/ /WDR/	☒ Correct ☐ Not correct (initial assessment) *Description:* The Number of animals of livestock category T $N_{(T)}$ during this monitoring period is reported in the MR based on the Carbon monitoring survey (CMS) listed in "GS1083_BP_MP4 Carbon	OK	OK

<table>
<tr><th>Checklist Item
(incl. guidance for the verification team)</th><th>Refe-rence</th><th>Verification Team Comments
(Means and results of assessment)</th><th>Draft Concl.</th><th>Final Concl.</th></tr>
<tr><td>In case of mistakes / deviations pl. provide details and descriptions of the CARs raised.</td><td>/WPI/
/DPI/
/IPCC/</td><td>monitoring _result_V1.2_Final”/CMS/, and the results are in the “MP4-GS1083-BUS report_E_Final”/BUSR/.
Verifier´s action:
By means of checking the IPCC values/IPCC/, ER-spreadsheet/XLS/, “GS1083_BP_MP4 Carbon monitoring _result_V1.2_Final”/CMS/ and “MP4-GS1083-BUS report_E_Final” /BUSR/.
Conclusion:
The values are correct.</td><td></td><td></td></tr>
<tr><td>L. PE_{bio-slurry}</td><td></td><td>Emissions from anaerobic disposal of bio-slurry</td><td></td><td></td></tr>
<tr><td>a) Measurement / Determination method (VVS, §§ 389-393)
Describe how the monitoring parameter was measured / determined. Focus primarily on the original data level but also describe the applied data aggregation trails (from ODL to data aggregation level zero).
Check if relevant equipment has been exchanged and if in cases of failures / downtimes of standard equipment other measurement / determination methods have been used. Furthermore, verify the frequency of measurements as per the requirements.
Assess whether the measurement / determination method is in line with the registered monitoring plan of the PDD and the applied methodology.</td><td>/I1/
/I2/
/PDD/
/MR/
/TPDDTEC/
/XLS/
/SHH/
/CMS/
/BUSR/
/RSSS/</td><td>Description:
PP has applied values as below table for this monitoring period.<table><tr><th colspan="4">Average Bio-slurry emissions</th></tr><tr><th></th><th>Units</th><th>CO2e/unit</th><th>CO2e</th></tr><tr><td>Temperate</td><td>99,866</td><td>0.024</td><td>2,439</td></tr><tr><td>Warm</td><td>30,328</td><td>0.090</td><td>2,721</td></tr><tr><td>Total</td><td>130,194</td><td></td><td>5,160</td></tr><tr><td>Average emissions</td><td>0.04</td><td>tCO2e/year/hh</td><td></td></tr></table>These original data for calculation of above values are obtained from the Carbon monitoring survey (CMS)/CMS/ which was executed by a selected independent consultant named EPRO consulting JSC (EPRO) from April to June 2019. Nexus selected the samplings and supply the sampling list to EPRO for execution. Via checking the “GS1083__CMS and KPT_sampling HHs_MP4”/SHH/, it is confirmed that the CMS sampling approach was designed with a confidence interval of at least 90/30 according to GS recommendation to ensure the households interviewed are representative. The sample size for the CMS is</td><td>~~CL 2, CAR 3~~</td><td>OK</td></tr>
</table>

Checklist Item (incl. guidance for the verification team)	Refe-rence	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
		17 households (include a 10% oversampling) from 20 clusters (10 clusters from each temperate and warm zone). The purpose of the 10% oversampling is to support any of the main selected households are not available during the survey. The total households for CMS survey are calculated as 17HH per cluster, 10 clusters per zone, thus 170 for each zone and total sample size is 340. Nexus selected clusters/districts and HH randomly and the screenshots/RSSS/ have been provided to verification team during the site, it is verified that the random selection is actual and credible. The value applied is found statistically correct. PP has ensured that adequate QA/QC measures are implemented and the data is verified, entered and analyzed independently. *Verifier´s action:* The measurement approach is confirmed by cross checking the Carbon monitoring survey (CMS)/CMS/, "GS1083__CMS and KPT_sampling HHs_MP4"/SHH/ and the screenshots/RSSS/. *Conclusion:* The measurement is documented as per latest approved PDD and applied methodology. However, the monitoring frequency&QA/QC procedure is missing and how the monitoring frequency is fulfilled as per the PDD is not clarified. CL 2 was raised.		
b) Accuracy and QA/QC Procedure (VVS, §§ 394-400) *In case of measured (or estimated) values, check whether the accuracy of equipment used for monitoring is controlled and calibrated in accordance with the monitoring plan or if significant inaccuracies occur; in this case, make sure that the most conservative assumptions theoretically possible have been made for calculating ERs.*	/I1/ /I2/ /PDD/ /MR/ /TPDDTEC/ /XLS/ /SHH/	*Description:* The value is measured and calculated based on the carbon monitoring survey results. There is no equipment used for the measuring. *Verifier´s action:*	OK	OK

Checklist Item (incl. guidance for the verification team)	Refe-rence	Verification Team Comments (Means and results of assessment)	Draft Concl.	Final Concl.
Describe whether all applicable QA/QC procedures are met. Assess further if the calibration of the monitoring equipment has been carried out in line with the latest EB guidance. *Include calibration dates and information in validity of the installed monitoring equipment in the table in Annex 2.*	/CMS/ /BUSR/ /RSSS/	This was verified by means of checking the Carbon monitoring survey (CMS)/CMS/, "GS1083__CMS and KPT_sampling HHs_MP4"/SHH/ and "MP4-GS1083-BUS report_E_Final"/BUSR/. *Conclusion:* QA/QC procedures are met. No inaccuracies occurred.		
c) Correctness (VVS, §§ 389-393) *Determine whether the value given in the monitoring report is correct or determined in a conservative manner.* *In case of conservative approaches used in lieu of the monitoring as per registered MP detailed assessment of the conservativeness of the approach used should be given.* *In case of mistakes / deviations pl. provide details and descriptions of the CARs raised.*	/PDD/ /MR/ /TPDDTEC/ /XLS/ /WDR/ /WPI/ /DPI/ /IPCC/	☒ Correct ☐ Not correct (initial assessment) *Description:* The original data for calculation of emissions from anaerobic disposal of bio-slurry $PE_{bio\text{-}slurry}$ during this monitoring period is reported in the MR based on the Carbon monitoring survey (CMS) listed in "GS1083_BP_MP4 Carbon monitoring _result_V1.2_Final"/CMS/, and the results are in the "MP4-GS1083-BUS report_E_Final"/BUSR/. *Verifier´s action:* By means of checking the ER-spreadsheet/XLS/, "GS1083_BP_MP4 Carbon monitoring _result_V1.2_Final"/CMS/ and "MP4-GS1083-BUS report_E_Final" /BUSR/. *Conclusion:* The values are correct.	OK	OK