



GS PoA VERIFICATION REPORT

ALTERNATIVE ENERGY PROMOTION CENTRE (AEPC)

NEPAL BIOGAS SUPPORT PROGRAM-POA

PoA UNFCCC REF. No. : 9572

PoA GS REF. No. : 3110

Report No: 8000460171 – 16/075

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Verification Report:	Report No.	Rev. No.	Date of 1st issue:	Date of this rev.
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Programme of Activities:	Title:		UNFCCC Registration date:	UNFCCC-No.:
	Nepal Biogas Support Program-PoA		31-01-2013	9572
			GS Registration date:	GS-No.:
			14-08-2015	3110
	PoA Scale		Verification No.:	
	☐ Large Scale	☒ Small Scale	2nd periodic verification	
	Lifetime of the PoA:		From:	To:
	28 years		22-06-2007	21-06-2035
	CPA/VPA #1 title:		UNFCCC Inclusion date	UNFCCC-No.:
	Nepal Biogas Support Program- CPA 1: 20,000 digesters		31-03-2013	CPA 9572-0001
			GS Inclusion date	GS-No.:
			14-08-2015	GS 3109
	Crediting period:		From:	To:
	☒ Renewable (7y) ☐ Fixed (10y)		31-01-2013	30-01-2020
	CPA/VPA #2 title:		UNFCCC Inclusion date	UNFCCC-No.:
	Nepal Biogas Support Program- CPA 2: 19,927 digesters		08-05-2014	CPA 9572-0002
			GS Inclusion date	GS-No.:
			14-08-2015	GS 3113
	Crediting period:		From:	To:
	☒ Renewable (7y) ☐ Fixed (10y)		08-05-2014	07-05-2021
CPA/VPA #3 title:		UNFCCC Inclusion date	UNFCCC-No.:	
Nepal Biogas Support Program- CPA 3: 19,959 digesters.		08-05-2014	CPA 9572-0003	
		GS Inclusion date	GS-No.:	
		14-08-2015	GS 3114	
Crediting period:		From:	To:	
☒ Renewable (7y) ☐ Fixed (10y)		08-05-2014	07-05-2021	
CPA/VPA #4 title:		UNFCCC Inclusion date	UNFCCC-No.:	
Nepal Biogas Support Program- CPA 4: 19,970 digesters.		08-05-2014	CPA 9572-0004	
		GS Inclusion date	GS-No.:	
		14-08-2015	GS 3116	
Crediting period:		From:	To:	
☒ Renewable (7y) ☐ Fixed (10y)		08-05-2014	07-05-2021	
Project Participant(s):	Client:		Coordinating/Managing Entity	
	Alternative Energy Promotion Centre (AEPC)		Alternative Energy Promotion Centre (AEPC)	
	Non Annex 1 country:		Annex 1 country:	
	Nepal		Germany	
	PP from non-Annex 1 country:		PP from Annex 1 country:	
Alternative Energy Promotion Centre (AEPC)		atmosfair gGmbH		

CPA No.	Monitoring period (MP):			Applied methodology/ies		
	From:	To:	No. of days:	Title:	No.:	Scope(s) / TA(s)
1	01/08/2014	31/07/2015	365	Switch from Non-Renewable Biomass for Thermal Applications by the User	AMS-I.E version 04,	1 / 1.2
2	01/08/2014	31/07/2015	365	Switch from Non-Renewable Biomass for Thermal Applications by the User	AMS-I.E version 04,	1 / 1.2
3	01/08/2014	31/07/2015	365	Switch from Non-Renewable Biomass for Thermal Applications by the User	AMS-I.E version 04,	1 / 1.2
4	01/08/2014	31/07/2015	365	Switch from Non-Renewable Biomass for Thermal Applications by the User	AMS-I.E version 04,	1 / 1.2
Monitoring Report #1:				Monitoring Report #2:		
Draft version:		Final version:		CPA Batch	Draft version:	Final version:
06/06/2016		16/02/2017 (GS-MR)		1-4	N/A	N/A
Verification team / Technical Review and Final Approval:		Verification Team:			Technical review:	Final approval:
		G. Ezhilarasu (TL/TE) Indrapal Parmar (TM)			David Lubanga Stefan Winter	Stefan Winter
Key dates of verification:		Uploading of VER Work & Audit Plans :		DVerR issued:	On-site (from):	On-site (to):
		24-05-2016		24-10-2016	06-06-2016	14-06-2016
Summary of Verification opinion		Alternative Energy Promotion Centre (AEPC) has commissioned the TÜV NORD JI/CDM Certification Program to carry out the 2nd periodic verification of the PoA : “”, with regard to the relevant requirements for GS project activities. 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 project design document, ☒ the monitoring plan is in accordance with the applied approved CDM/GS methodology, ☐ the installed equipment essential for measuring parameters required for calculating emission reductions are calibrated appropriately, ☒ the monitoring system is in place and functional. The project has generated GHG emission reductions, and ☒ the GHG emission reductions are calculated without material misstatements in a conservative and appropriate manner. ☒ the project has contributed to sustainable development. TÜV NORD JI/CDM CP herewith confirms that the project has achieved emission reductions in the above mentioned reporting period as listed below (verified amount).				
Emission reductions: [tCO _{2e}]		Total verified amount		As per draft MR #1:	As per CPA-DD per annum:	
		252,382		257,734	CPA1: 61,889 CPA2: 66,236 CPA3: 66,329 CPA4: 66,397	
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		GS POA VER Report – 3110				54

Abbreviations:

AEPC	Alternative Energy Promotion Centre
BSP	Biogas Support Program
BUS	Biogas User Survey
CA	Corrective Action / Clarification Action
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CER	Certified Emission Reduction
CME	Coordinating and Managing Entity
CO₂	Carbon dioxide
CO_{2eq}	Carbon dioxide equivalent
CL	Clarification Request
CPA	Component Project Activity
DVerR	Draft Verification Report
ER	Emission Reduction
FAR	Forward Action Request
GHG	Greenhouse gas(es)
GS	Gold Standard
MP	Monitoring Plan
MR	Monitoring Report
NRB	Non Renewable Biomass
PA	Project Activity
PCP	Project Cycle Procedure
POA-DD	Programme of Activities Design Document
PP	Project Participant
PS	Project Standard
QA/QC	Quality Assurance / Quality Control
UNFCCC	United Nations Framework Convention on Climate Change
VVS	Validation and Verification Standard
XLS	Emission Reduction Calculation Spread Sheet

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1. INTRODUCTION

Alternative Energy Promotion Centre (AEPC) has commissioned the TÜV NORD JI/CDM Certification Program (CP) to carry out the 2nd periodic verification of the Programme of Activities:

“Nepal Biogas Support Program-PoA”

with regard to the relevant requirements for GS project activities. The verifiers have reviewed the implementation of the monitoring plan(s) (MP) as described in the registered PoA-DD and CPA-DD and GS PoA Passport.

GHG data for this monitoring period was verified in detailed manner applying the set of requirements, audit practices and principles as required under the CDM Validation and Verification Standard^{/VVS/} of the UNFCCC and the applied methodology.

Sustainable Development Indicators for this monitoring period were verified in detailed manner as required under the GS Toolkit^{/GST/}, GS requirements^{/GSR/}, relevant GS Annexes, and the GS Validation and Verification Manual^{/GS-VVM/}.

This report summarizes the findings and conclusions of this GS 2nd periodic verification of the above mentioned UNFCCC and GS registered project activity.

1.1. Objective

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

- implementation and operation of the project activity as given in the CPA-DD and GS passports,
- compliance with applied approved methodology and the provisions of the sustainability monitoring plan,
- 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.

1.2. Scope

The verification of this registered project is based on the validated Programme of Activities design document^{/PoA-DD/}, the validated Component Project Activity Design Document (s) (CPA-DD/VPA-DDs), the GS PoA Passport, the monitoring report(s)^{/MR/}, emission reduction calculation spread sheet^{/XLS/}, supporting documents made available to the verifier and information collected through performing interviews and during the on-site assessment. Furthermore publicly available information was considered as far as available and required.

The verification is carried out on the basis of the following requirements, applicable for this Programme of Activities:

- Article 12 of the Kyoto Protocol ^{/KP/},
- guidelines for the implementation of Article 12 of the Kyoto Protocol as presented in the Marrakech Accords under decision 3/CMP.1 ^{/MA/}, and subsequent decisions made by the Executive Board and COP/MOP,
- other relevant rules, including the host country legislation,
- CDM Validation and Verification Standard ^{/VVS/},
- GS Validation and Verification Manual ^{/GS-VVM/},
- GS Toolkit and Requirements versions 2.2 ^{/GST//GSR/}
- monitoring plan as given in the registered PoA-DD and CPA-DD(s) ^{/PoA-DD//CPA-DD/},
- Approved CDM/GS Methodology (ies).

2. GHG PROJECT DESCRIPTION

2.1. Technical Project Description of the Programme of Activities

The following description of the programme as per webhosted monitoring report (for CPA-1, CPA-2, CPA-3 and CPA-4) and registered PoA-DD was verified:

The PoA involves the implementing household biogas applications at individual household in Nepal. These applications displace firewood with biogas from animal waste and human excreta. The biogas is used as a fuel for cooking. Following the methodological guidance under Programme of Activities (PoA), only the replacement of non-renewable biomass (NRB) is counted as emission reduction under the Clean Development Mechanism (CDM) for this project.

Target group under the BSP are rural households who currently use non-renewable biomass (firewood). The BSP is centrally managed by Alternative Energy Promotion Centre (AEPC) with the support of Biogas Sector Partnership Nepal (BSP-NEPAL), the implementing agency of the AEPC. AEPC is a public entity that executes all renewable/alternative energy programs in Nepal including BSP. Its main objectives are disseminating and promoting renewable energy technologies and mitigating environmental degradation. AEPC is responsible for administrating the government subsidy, coordination with all relevant stakeholders and monitoring BSP-NEPAL. AEPC is the coordinating and managing entity of this PoA.

The information presented in the PoA documents on the technical design is consistent with the actual planning and implementation of the Programme of Activity Design Document (PoA-DD) and Component Project Activity Design Document (CPA-DD) confirmed in the following ways:

- A review of data and information ;
- An on-site visit^{/PHOTO/IM/} to the place where the respective real case CPA is being implemented and interview with relevant stakeholder and personnel with knowledge of the project in attendance; and

In conclusion, verification team confirms that the PoA project description, as included in the monitoring report for CPA-1, CPA-2, CPA-3 and CPA-4 are sufficiently accurate and complete in order to comply with the requirements of the GS/CDM.

The key parameters of the CPA type #1 are given in Table 2-1.

Table 2-1: Technical data of the Bio digesters in POA and CPAs

Parameter	Unit	Value
Model No. of Bio-Digester	-	GGC 2047
Capacity of Bio-Digester	m ³	2, 4, 6, 8 & 10
Type of Bio-Digester	-	closed underground container made of concrete or other materials

2.2. Project Location

The details of the Project locations are given in Table 2-2:

Table 2-2: Project Location

No.	Project Location
Host Country	Nepal/Small Scale
Region:	various locations across Nepal
Project location address:	Nepal
Latitude:	North 26.20 degree to North 30.45 degree
Longitude:	East 80.07 degree to East 88.20 degree

2.3. Project Verification History

Essential events since the registration of the PoA-DD are presented in the following Table 2-3.

Table 2-3 a: Status of previous Monitoring Periods – CDM cycle

#	Item	Time	Status
1	1 st Monitoring period	31/01/2013-31/07/2014	issued
2	2 nd Monitoring period	01/08/2014 -31/07/2015	Request for issuance documents uploaded by DOE to UNFCCC webpage

Table 2 -3 B: Status of previous Monitoring Periods – GS cycle

#	Item	Time	Status
1	1 st Monitoring period	14/08/2013 until 31/07/2014	GS Retrospective Labelling On going
2	2 nd Monitoring period	01/08/2014 -31/07/2015	GS – Issuance on going

An overview of all Post Registration Changes is given in the following table.

Table 2-4: Overview Post Registration Changes

#	Appl. from – to / as of	MP	Type of post registration change ¹⁾	Description	Status ²⁾ / Date
1	N/A		TDfrMP	N/A	N/A

#	Appl. from – to / as of	MP	Type of post registration change ¹⁾	Description	Status ²⁾ / Date
2	N/A		TDfMM	N/A	N/A
3	For CPA-1	1 st MP	CrCPA-DD	Under CPA-1 corrections in the ecological zones of biogas digesters implemented are required. Out of the 20,000 digesters (10,011 in terai, 9,873 in hills and 116 in remote hill) reported during registration. As verified by verification team it was noted that there have been some cross posting of ecological zones in the spreadsheet communicated during the registration of the PoA/CPA inclusion. Hence a correction is proposed for CPA-1 for which the number and identity of the digesters will remain the same however, they are distributed as 10,955 in Terai, 8,940 in Hills and 105 in Remote Hills. The rearrangement of the digesters across the ecological zones is presented in section A.3 (CPA-1) above. The rearrangement of the digesters doesn't involve any changes in the CPA threshold and scale of the CPA. However, there is a slight revision in the ex-ante emission estimation (from 61,510 tCO ₂ e to 61,889 tCO ₂ e) as the rearrangement of the digesters triggered the revision in emission reduction in each ecological zone category	Acceptance (by DOE)
4	N/A		PCfrMP	N/A	N/A
5	N/A		PCfMM	N/A	N/A
6	N/A		CoPD	N/A	N/A

- ¹⁾ ICPAiPoA : Inclusion of component project activities in programme of activities
TDfrMP : Temporary deviation from registered monitoring plan
TDfMM : Temporary deviation from the monitoring methodology
CrCPADD : Corrections to the registered CPA-DD
PCfrMP : Permanent changes from registered Monitoring Plan
PCfMM : Permanent changes from Monitoring Methodology
CoPD : Changes to the project design of a registered PoA, or generic or specific CPA

- ²⁾ Approval (by EB) or Acceptance (by DOE)

3. METHODOLOGY AND VERIFICATION SEQUENCE

3.1. Verification Steps

The verification consisted of the following steps:

- Contract review
- Appointment of team members and technical reviewers
- A desk review of the carbon and SD Monitoring Reports^{/MR/} submitted by the client and additional supporting documents with the use of customised verification protocol^{/CPM/} according to the Validation and Verification Standards^{/VVS/IGS-VVM/},
- Verification planning,
- On-Site assessment,
- Background investigation and follow-up interviews with personnel of the project developer and its contractors,
- Draft verification reporting
- Resolution of corrective actions (if any)
- Final verification reporting
- Technical review
- Final approval of the verification.

3.2. Contract review

To assure that

- the project falls within the scopes for which accreditation is held,
- the necessary competences to carry out the verification can be provided,
- Impartiality issues are clear and in line with the CDM accreditation requirements

a contract review was carried out before the contract was signed.

3.3. Appointment of team members and technical reviewers

On the basis of a competence analysis and individual availabilities a verification team, consisting of one team leader and 2 additional team members, was appointed.

The list of involved personnel, the tasks assigned and the qualification status are summarized in the Table 3-1 below.

Table 3-1: Involved Personnel

	Name	Company	Function ¹⁾	Qualification Status ²⁾	Scheme competence ³⁾	Technical competence ⁴⁾	Verification competence ⁵⁾	Host country Competence	On-site visit
☒ Mr. ☐ Ms.	Govindarajan Ezhilarasu	TUV India Pvt. Ltd.	TL/TE ^{A)}	SA	☒	1.2	☒	☒	☒
☒ Mr. ☐ Ms.	Indrapal Parmar	TUV India Pvt. Ltd.	TM/TE ^{A)}	LA	☒	1:2	☒	☒	☐
☒ Mr. ☐ Ms.	David Lubanga	-	OR ^{B)}	LA	☒	1.2	☒	☐	-
☒ Mr. ☐ Ms.	Stefan Winter	TN CERT GmbH	TR/FA ^{B)}	SA	☒	1.2	☒	☐	-

¹⁾ TL: Team Leader; TM: Team Member, TR: Technical review; OT: Observer-Team, OR: Observer-TR; FA: Final approval

²⁾ GHG Auditor Status: A: Assessor; LA: Lead Assessor; SA: Senior Assessor; T: Trainee; TE: Technical Expert

³⁾ GHG auditor status (at least Assessor)

⁴⁾ As per S01-MU03 or S01-VA070-A2 (such as 1.1, 1.2, ...)

⁵⁾ In case of verification projects

^{A)} Team Member: GHG auditor (at least Assessor status), Technical Expert (incl. Host Country Expert or Verification Expert), not ETE

^{B)} No team member

All team members contributed to the review of documents, the assessment of the component project activities and to the preparation of this report under the leadership of the team leader.

Technical experts contributed to the assessment of special aspects of the project activity, e.g. technical or host country aspects.

Statements of competence for the above mentioned team members are enclosed in annex 2 of this report.

3.4. Verification Planning

In order to ensure a complete, transparent and timely execution of the verification task the team leader has planned the complete sequence of events necessary to arrive at a substantiated final verification opinion.

Various tools have been established in order to ensure an effective verification planning.

Risk analysis and detailed audit testing planning

For the identification of potential reporting risks and the necessary detailed audit testing procedures for residual risk areas table A-1 is used. The structure and content of this table is given in

Table 3-2 below.

Table 3-2: Table A-1; Identification of verification risk areas

Table A-1: GHG calculation procedures and management control testing / Detailed audit testing of residual risk areas and random testing				
Identification of potential reporting risk	Identification, assessment and testing of management controls	Areas of residual risks	Additional verification testing performed	Conclusions and Areas Requiring Improvement (including Forward Action Requests)
<i>The following potential risks were identified and divided and structured according to the possible areas of occurrence.</i>	<i>The potential risks of raw data generation have been identified in the course of the monitoring system implementation. The following measures were taken in order to minimize the corresponding risks. The following measures are implemented:</i>	<i>Despite the measures implemented in order to reduce the occurrence probability the following residual risks remain and have to be addressed in the course of every verification.</i>	<i>The additional verification testing performed is described. Testing may include:</i> - Sample cross checking of manual transfers of data - Recalculation - Spreadsheet 'walk throughs' to check links and equations - Inspection of calibration and maintenance records for key equipment - Check sampling analysis results <i>Discussions with process engineers who have detailed knowledge of process uncertainty/error bands.</i>	<i>Having investigated the residual risks, the conclusions should be noted here. Errors and uncertainties are highlighted.</i>

The basic structure of this project specific monitoring parameters verification protocol for the periodic verification is described in Table 3-3.

Table 3-3: Table A-2; Structure of the project specific Monitoring parameters periodic verification checklist

Table A-2: Periodic verification checklist				
Checklist Item	Reference	Verification Team Comments	Draft Conclusion	Final Conclusion
<i>The checklist items in Table A-2 are linked to the various requirements the monitoring of the project should meet. The checklist is organised in various sections as per the requirements of the topic and the individual project activity. It further includes guidance for the verification team.</i>	<i>Gives reference to the information source on which the assessment is based on.</i>	<i>The section is used to elaborate and discuss the checklist item in detail. It includes the assessment of the verification team and how the assessment was carried out. The reporting requirements of the VVS shall be covered in this section.</i>	<i>Assessment based on evidence provided if the criterion is fulfilled (OK), or a CAR, CL or FAR (see below) is raised. The assessment refers to the draft verification stage.</i>	<i>In case of a corrective action or a clarification the final assessment at the final verification stage is given.</i>

3.5. Desk review

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

- the last revision of the PoA-DD and CPA-DD including the monitoring plan^{/PoA-DD//CPA-DD/},
- the last revision of the validation report^{/VAL/},
- documentation of previous verifications^{/VER/}
- the monitoring report(s), including the claimed emission reductions for the project^{/MR/},
- the emission reduction calculation spreadsheet^{/XLS/}.
- The SD monitoring report

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

3.6. On-site assessment

As most essential part of the verification exercise it is indispensable to carry out an inspection on site in order to verify that the project is implemented in accordance with the applicable criteria. Furthermore the on-site assessment is necessary to check the

monitoring data with respect to accuracy to ensure the calculation of emission reductions. The main tasks covered during the site visit include, but are not limited to:

- The monitoring data were checked completely.
- An assessment of the implementation and operation of the registered component project activity as per the registered CPA-DD or any approved revision thereof;
- A review of information flows for generating, aggregating and reporting the monitoring parameters;
- The data aggregation trails were
- Interviews with relevant personnel to determine whether the operational and data collection procedures are implemented in accordance with the monitoring plan in the CPA-DD;
- A cross check between information provided in the monitoring report and data from other sources such as inventories, purchase records or similar data sources;
- A review of calculations and assumptions made in determining the GHG data and emission reductions;
- A detailed review of the implementation and monitoring of all SD indicators as per the registered GS PoA Passport
- An identification of quality control and quality assurance procedures in place to prevent or identify and correct any errors or omissions in the reported monitoring parameters.

Before and during the on-site visit the verification team performed interviews with the project participants to confirm selected information and to resolve issues identified in the document review.

Representatives of including the operational staff of the plant were interviewed. The main topics of the interviews are summarised in Table 3-4.

Table 3-4: Interviewed persons and interview topics

Interviewed Persons / Entities	Interview topics
Projects & Operations Personnel; Alternative Energy Promotion Centre (AEPIC)	- General aspects of the project - Technical equipment and operation - Changes since validation / previous verification - Monitoring and measurement equipment - Remaining issues from validation/ previous verification - Calibration procedures - Quality management system^{/QC/ISO/} - Involved personnel and responsibilities - Training and practice of the operational personnel - Implementation of the monitoring and sampling plans

Interviewed Persons / Entities	Interview topics
	- Monitoring data management - Data uncertainty and residual risks - GHG emission reduction calculation - Procedural aspects of the verification - Maintenance - Environmental aspects

The list of interviewees is included in chapter 7.4.

3.7. Draft verification reporting

On the basis of the desk review, the on-site visit, follow-up interviews and further background investigation the verification protocol is completed. This protocol together with a general project and procedural description of the verification and a detailed list of the verification findings form the draft verification report. This report is sent to the client for resolution of raised CARs, CLs and FARs.

3.8. Resolution of CARs, CLs and FARs

Nonconformities raised during the verification can either be seen as a non-fulfilment of criteria ensuring the proper implementation of a project or where a risk to deliver high quality emission reductions is identified.

Corrective Action Requests (CARs) are issued, if:

- Non-conformities with the monitoring plan or methodology are found in monitoring and reporting, or if the evidence provided to prove conformity is insufficient;
- Mistakes have been made in applying assumptions, data or calculations of emission reductions which will impair the estimate of emission reductions;
- Issues identified in a FAR during validation or previous verifications requiring actions by the project participants to be verified during verification have not been resolved.

The verification team uses the term Clarification Request (CL), which is issued if:

- information is insufficient or not clear enough to determine whether the applicable CDM requirements have been met.

Forward Action Requests (FAR) indicate essential risks for further periodic verifications. Forward Action Requests are issued, if:

- the monitoring and reporting require attention and / or adjustment for the next verification period.

For a detailed list of all CARs, CLs and FARs raised in the course of the verification pl. refer to chapter 4.

3.9. Final reporting

Upon successful closure of all raised CARs and CLs the final verification report including a positive verification opinion can be issued. In case not all essential issues could finally be resolved, a final report including a negative verification opinion is issued.

The final report summarizes the final assessments w.r.t. all applicable criteria.

3.10. Technical review

Before submission of the final verification report a technical review of the whole verification procedure is carried out. The technical reviewer is a competent GHG auditor being appointed for the scope this project falls under. The technical reviewer is 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 be confirmed or revised. Furthermore reporting improvements might be achieved.

3.11. Final approval

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

After this step the request for issuance can be started.

4. VERIFICATION FINDINGS

In the following paragraphs the findings from the desk review of the monitoring report(s)^{/MR/}, the calculation spreadsheet^{/XLS/}, PoA-DD^{/PoA-DD/}, CPA-DD^{/CPA-DD/}, the Validation Report^{/VAL/} and other supporting documents, as well as from the on-site assessment and the interviews are summarised.

The summary of CAR, CL and FAR issued are shown in Table 4-1:

Table 4-1: Summary of CAR, CL and FAR

Verification topic	No. of CAR	No. of CL	No. of FAR
A – Description of project activity	0	0	0
B – Implementation of project activity	0	0	0
C – Description of monitoring system	0	0	0
D – GHG Data and parameters & SD Indicators	1	1	0
E - Calculation of Emission Reductions	1	0	0
SUM	2	1	0

The following tables include all raised CARs, CLs and FARs and the assessments of the same by the verification team. For an in depth evaluation of all verification items it should be referred to the verification protocols (see Annex).

Finding	A1		
CPA-No:	All CPA s		
Classification	☒ CAR	☐ CL	☐ FAR
Description of finding <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	The CER sheets presented do not give a transparent procedure of calculations of the CERs also it is single combined sheets for all vintages.		
Corrective Action #1 <i>This section shall be filled by the PP. It shall address the corrective action taken in details. In case the MR is changed as part of the CA, the PP is requested to indicate the revised sections</i>	The CER sheets are now provided with a transparent calculation and the input parameters are materially same from the submitted CDM CER sheets for the second monitoring period. Also the calculations are provided only for GS CER verification for the second monitoring period with vintage wise break-up.		

Finding	A1		
as well as the new version No.	Changes in MR 1# ☐	Section(s):	New version No.:
	Changes in MR 2# ☐		
	Changes in XLS ☒	Worksheet(s):	New version No.:2
DOE Assessment #1 <i>The assessment shall encompass all open issues in annex A-1. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	The version 2 of the CER sheets is presented for GS CER monitoring period (01-08-2014 to 31-07-2015) and the input values are based on the CDM CER sheets submitted for second monitoring period for requesting issuance and also materially same. Hence CAR is closed.		
Conclusion <i>Tick the appropriate checkbox</i>	☐ To be checked during the next periodic verification ☐ Additional action should be taken (finding remains open) ☒ The finding is closed		

Finding	A2		
CPA-No:	All CPA s		
Classification	☒ CAR	☐ CL	☐ FAR
Description of finding <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	During the site visit some of the biogas digesters are affected due to the earthquake, and some are abandoned due to the destruction of house/ kitchen, please clarify how this is included in the ER calculations.		
Corrective Action #1 <i>This section shall be filled by the PP. It shall address the corrective action taken in details. In case the MR is changed as part of the CA, the PP is requested to indicate the revised sections as well as the new version No.</i>	The emission reduction monitoring survey was completed before the earthquake struck Nepal. Therefore the impact of the earthquake on houses and kitchen (or even the biogas digester) was not covered by the survey. Therefore it has not been adjusted in the current verification. However, in course of the ongoing verification, survey for the third MP (for FY 2015/16) has been completed. The results from the survey for third MP are therefore used to account the impact of the earthquake in the second monitoring period. From calculation, a total of 5,352 tCO ₂ e is reduced from the originally calculated value of 257734 tCO ₂ e emissions reductions for the PoA.		
	Changes in MR 1# ☒	Section(s): 2	New version No.:
	Changes in MR 2# ☐		
DOE Assessment #1 <i>The assessment shall encompass all open issues in annex A-1. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	Changes in XLS ☒	Worksheet(s):	New version No.:2
	A major earth quake struck Nepal on 25/04/2015 and for the down time during the period from 25/04/2015 to end of this monitoring period the PP took the BUS survey results of third survey for the next monitoring and accordingly adjusted 5,352 tCO ₂ e for this monitoring report. The VT checked the downtimes through the percentage of digesters affected by earth quake from the bus survey and the calculations and apportioning done in the ER sheets as appropriate. The total biogas digesters that were non-operational as per the bus survey of 2015-16 is 17 out of the 360 samples for all the five CPAs which works out be 4.7% But out of 91 samples checked by the VT during the site visit only 4 where non-operational due to earthquake (4.5%). Hence accepted.		
	☐ To be checked during the next periodic verification ☐ Additional action should be taken (finding remains open) ☒ The finding is closed		
Conclusion <i>Tick the appropriate checkbox</i>			

Finding	A1		
CPA-No:	All CPA s		
Classification	☐ CAR	☒ CL	☐ FAR
Description of finding <i>Describe the finding in unambiguous style; address the context (e.g. section)</i>	The MR submitted are for the retrospective labelling and GS CERs, please clarify how the survey results are taken into account.		
Corrective Action #1 <i>This section shall be filled by the PP. It shall address the corrective action taken in details. In case the MR is changed as part of the CA, the PP is requested to indicate the revised sections as well as the new version No.</i>	All the 4 MR are combined together to form a single monitoring report and the surveys are aligned to the CDM monitoring period. The single MR is revised to address the GS CERs 2nd monitoring period only.		
	Changes in MR 1# ☒	Section(s): All sections	New version No.:2
	Changes in MR 2# ☐		
	Changes in XLS ☐	Worksheet(s):	New version No.:2
DOE Assessment #1 <i>The assessment shall encompass all open issues in annex A-1. In case of non-closure, additional corrective action and DOE assessments (#2, #3, etc.) shall be added.</i>	One single MR is given for all CPAs for the GS CER 2 nd monitoring period and the accordingly BUS survey used for CDM monitoring period is taken into account for the corresponding GS monitoring periods, hence CL is closed		
Conclusion <i>Tick the appropriate checkbox</i>	☐ To be checked during the next periodic verification ☐ Additional action should be taken (finding remains open) ☒ The finding is closed		

5. SUMMARY OF VERIFICATION ASSESSMENTS

The following paragraphs include the summary of the final verification assessments after all CARs and CLs are closed out. For details of the assessments pl. refer to the discussion of the verification findings in chapter 4.

5.1. Involved Parties and Project Participants

The following parties to the Kyoto Protocol and project participants are involved in this project activity.

Table 5-1: Project Parties and project participants

Characteristic	Party	Project Participant
Non-Annex 1	Nepal	
Annex 1	Germany	atmosfair gGmbH

5.2. Implementation of the project

During the verification a site visit was carried out. On the basis of this site visit and the reviewed project documentation^{/CR/PCR/BSPDB/BUB/} (like construction progress report and Plant completion progress^{/CR/} for Bio digester installation) it can be confirmed that w.r.t. the realized technology, the project equipment, as well as the monitoring the project has been implemented and operated as described in the registered CPA-DD for all four CPA's involved in the current monitoring period. Details of which is given below:

Co-ordinating and Managing entity/Project Participants:	Alternative Energy Promotion Centre (AEPC)
Title of the PoA:	Nepal Biogas Support Program-PoA
UNFCCC registration number & date	9572- 31/03/2013
GS Registration number & Date	GS- 3110- 14/08/2015.
Applied Baseline and monitoring methodology:	AMS-I.E. ver. 4 - Switch from Non-Renewable Biomass for Thermal Applications by the User
Title of the CPA:	Nepal Biogas Support Program - CPA 4: 19,970 digesters. Nepal Biogas Support Program - CPA 3: 19,959 digesters. Nepal Biogas Support Program - CPA 2: 19,927 digesters Nepal Biogas Support Program- CPA 1: 20,000 digesters
CDM - CPA reference number/	

incl. date: CPA-4 CPA-3 CPA-2 CPA-1	9572-0004 / 08/05/2014 9572-0003 / 08/05/2014 9572-0002 / 08/05/2014 9572-0001 / 31/01/2013
CPA start date: CPA-4 CPA-3 CPA-2 CPA-1	20/02/2011 10/03/2010 19/03/2009 22/06/2007
CPA start of operation:	First digester of CPA-1 implemented on 22/06/2007 First digester of CPA-2 implemented on 19/03/2009 First digester of CPA-3 implemented on 10/03/2010 First digester of CPA-4 implemented on 19/02/2011
GS Reference number and inclusion date CPA-4 CPA-3 CPA-2 CPA-1	GS3116 - 14/08/2015 GS3114 - 14/08/2015 GS3113 - 14/08/2015 GS3109 - 14/08/2015
CPA implementer	Alternative Energy Promotion Centre (AEPC)
Project Scale:	Small Scale
Location of the CPA:	Nepal
CPA crediting period: CPA-4 CPA-3 CPA-2 CPA-1	08/05/2014 - 07/05/2021 (Renewable) 08/05/2014 - 07/05/2021 (Renewable) 08/05/2014 - 07/05/2021 (Renewable) 31/01/2013 - 30/01/2020 (Renewable)
Reported monitoring Period verified in this CDM verification:	01/08/2014 – 31/07/2015
Reported monitoring Period verified for GS CER issuance in this verification:	01/08/2014 – 31/07/2015

Verification team has checked the contract signed between AEPC and BSP Nepal for conducting the service of national service provider for installation of biogas plant in households across rural areas of Nepal.

For the first monitoring period of this POA which includes CPA-1, CPA-2, CPA-3 and CPA-4 the project involves installation and operation of biogas plants of sizes 2, 4, 6, 8, and 10 m³, which are in operation at across various districts of Nepal. The construction date of these bio-digesters starts from database maintained by BSP Nepal for all the Biodgiesters^{/BSPDB/}. The construction date is also referred as the operational date is checked from the construction progress report issued by BSP Nepal to AEPC^{/CR/}. The same was checked during the site visit and the random check from the database. Further based on the physical inspection of biogas plants and interviews with the technology suppliers, contractors and household it was confirmed that the technology employed in the project is as same as discussed in the

registered CDM POA-DD, GS PoA DD and respective CPA-DDs. In addition, individual households were interviewed during the site visit to confirm the owners name, size of the plant, operational date and operational status of the plant, UID no and other fuel used apart from the Biogas. This is also in line with the biogas user survey report conducted by surveying agency.

5.3. Project history

During the validation the validating DOE has not raised any issues that could not be closed or resolved during the validation stage. For this purpose no FARs is raised. No such issues were identified for this project. This was confirmed from table 4-1 of the POA validation reports^{VAL/}

During the on-site visit and the desk review process, the audit team reviewed different information from the operational system of the project, surveys reports, communications and other internal reports and records in order to identify changes or incidents during the operation of the project.

No events or situations occurred in the monitoring period that impacted the applicability of the methodology and monitoring plan.

There is no outstanding issue from the first monitoring period, No FARs raised during the first monitoring period.

5.4. Post registration changes

Post registration changes (PRC) is not applicable for this monitoring period, but during the first monitoring period PRC was observed with respect to CPA inclusion for CPA-1. CME has gone for corrections that do not affect project design and the post registration changes are in Appendix 1 of the CDM project standard. Project proponent submitted the revised CPA-DD and emission reduction sheet for CPA-1 and which was approved and by UNFCCC along with the issuance.

Under CPA-1 corrections in the ecological zones of biogas digesters implemented are required. Out of the 20,000 digesters (10,011 in terai, 9,873 in hills and 116 in remote hill) reported during registration. As verified by verification team it was noted that there have been some cross posting of ecological zones in the spreadsheet communicated during the registration of the PoA/CPA inclusion. Hence a correction is proposed for CPA-1 for which the number and identity of the digesters will remain the same however, they are distributed as 10,955 in Terai, 8,940 in Hills and 105 in Remote Hills. The rearrangement of the digesters across the ecological zones is presented in section B.1 (CPA-1) above. The re-arrangement of the digesters doesn't involve any changes in the CPA threshold and scale of the CPA. However, there is a slight revision in the ex-ante emission estimation (from 61,510 tCO₂ e to 61,889 tCO₂e) as the rearrangement of the digesters triggered the revision in emission reduction in each ecological zone category.

5.5. Compliance with the GS Monitoring plan

The monitoring system and all applied procedures are completely in compliance to the registered monitoring plan. Regarding the compliance with the monitoring plan, the verification team reviewed if:

- The monitoring of reductions in GHG emissions resulting from the proposed CDM Programme of Activity (PoA)/CPA were implemented in accordance with the monitoring plan contained in the registered POA-DDs/CPA-DDs.
- The monitoring plan and the applied methodologies had been properly implemented and followed by the project participants.
- All parameters stated in the monitoring plan and Sustainability monitoring plan, the applied methodologies and relevant CDM EB decisions had been sufficiently monitored and updated.
- The responsibilities and authorities for monitoring and reporting were in accordance with the responsibilities and authorities stated in the monitoring plan.

The monitoring system and all applied procedures are in compliance with the monitoring plan contained in the registered PoA-DDs, CPA-DDs and the applied methodology AMS-I.E. ver.04, based on the information included in the final monitoring reports (CDM and GS).

Thus, it is concluded by verification team that the monitoring plan as stipulated in registered PoA-DDs, and is observed to be followed in the project and the description of the monitoring system provided in the Monitoring Reports^{/MR/} is verified during onsite observation, verification of plant records^{/BUS//ISO/} and interview with the involved personnel in operation and maintenance of the CPA (s) and found to be appropriate by verification team. Thus monitoring system and all applied procedures are completely in compliance to the registered GHG and Sustainability monitoring plans.

5.6. Compliance with the monitoring methodology

The monitoring system is in compliance with the applied monitoring methodology AMS-I.E. ver.04 i.e. “Switch from Non-Renewable Biomass for thermal applications by the user”).

The verification team reviewed whether the registered monitoring plan was in accordance with the applied methodology and if any other monitoring aspect of the CPA (s) that is not specified in the methodology was identified.

- The verification team confirmed that the monitoring plan of the validated CDM Programme of Activity (PoA) and CPA is in accordance with the applied approved methodology AMS-I.E. ver.04 (“Switch from Non-Renewable Biomass for thermal applications by the user”) based on the following reasons:

- During the desk review monitoring parameters included in the applied methodology were compared with the ones included in the monitoring plan of the registered PoA-DD and CPA-DD, and they were found consistent.
- During the verification process no need was identified for revision of the monitoring plan.
- No other relevant aspects for monitoring not included in the methodology were identified.
- No deviations from the monitoring methodology were identified during the verification process.

Thus, it is concluded by verification team that the monitoring report and emissions reduction calculations are in line with the requirements of the validated monitoring plan as well as with the applied methodology. Thus, the reporting procedures correctly reflect the requirements of the monitoring plan.

5.7. Monitoring of Carbon (GHG) parameters

During the verification all relevant monitoring parameters (as listed in chapter D.7.1 of the CPA-DD) have been verified with regard to the appropriateness of the applied measurement / determination method, the correctness of the values applied for ER calculation, 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 (Annex I- Verification Protocol).

After appropriate corrections were carried out by the project participant 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.

The following data and parameters fixed ex ante or at renewal of crediting period were checked by the verification team to be in line with registered CPA-DD (s):

- (1) Net calorific value of the non-renewable biomass that is substituted; **NCV_{biomass}**
- (2) Emission factor for the projected fossil fuel consumption in the baseline; **EF_{projected_fossil fuel}**
- (3) Fraction of biomass used in the absence of the project activity in year y that can be established as non-renewable biomass using nationally approved methods; **f_{NRB,y}**
- (4) Number of digesters in each size category (in m³) and region (Terai, Hill and, if available, Remote Hill or Mountain) implemented under the CPA; **N_{s,r}**
- (5) Quantity of woody biomass that is substituted or displaced in tonnes per year and appliance; **Q_{NRBrepl}** and

And there is only single ex-post monitoring parameter required to be monitored is which is “The share of digesters operational (based on the total number implemented

using non renewable biomass)¹; **P** as per registered monitoring plan in POA-DD and CPA-DD (s). This monitoring parameter is calculated as the weighted average value across all ecological zones as sourced from the annual biogas users' survey. CPA wise results of BUS survey are as follows:

CPA Details	Value(s) of monitored parameter¹	Source of data
CPA-1 (BUS 2014/15)	98.98%	BUS Report 2014/15: CPA-1
CPA-2 (BUS 2014/15)	96.16%	BUS Report 2014/15: CPA-2
CPA-3 (BUS 2014/15)	97.21%	BUS Report 2014/14: CPA-3
CPA-4 (BUS 2014/15)	95.33%	BUS Report 2014/15: CPA-4

Verification team checked the Biogas User Survey (BUS) report for each CPA and confirmed that the value of the monitored parameter is correctly calculated and used for emission reduction calculations.

5.8. Monitoring report(s)

The GS monitoring report is submitted for verification along with CDM monitoring report submitted to UNFCCC EB for issued CERs during this second verification. The CME/PP/CPA implementer has carried out the requested corrections so that it can be confirmed that the GS monitoring report is complete and transparent and in accordance with the registered POA-DD/CPA-DD (s) and other relevant requirements. Final monitoring report^{MR/} is submitted for the issuance request.

5.9. Sampling

5.9.1. Implementation of the sampling plan

The Biogas Users Survey (BUS) intends to monitor the key parameters that were envisaged as monitoring parameters while designing the Program of Activities for individual CPA (s). For the first periodic CDM POA verification four CPA's are included. Such parameter mainly includes identification of non-operational biogas plants and assessment of non-renewable source of biomass.

Summary of main findings out of the Biogas Users Survey (BUS) conducted for CPA-1 (BUS 2013-14); CPA-2 (BUS 2013-14); CPA-3 (BUS 2013-14) and CPA-4 (BUS 2013-14) is given below:

¹ weighted average value across all ecological zones i.e. Terai; Hill and Mountain or Remote Hill in Nepal.

- **For CPA-1 (2012-13):** Biogas Users' survey, BUS 2012-13 for CPA-1 covers a total sample of 100 households from all 20,000 households (20,000 biogas plants installed in the CPA-1) within the CPA-1 for period 2012-13.
- **For CPA-1 (2013-14):** Biogas Users' survey, BUS 2013-14 for CPA-1 covers a total sample of 90 households from all 20,000 households (20,000 biogas plants installed in the CPA-1) within the CPA-1 for period 2013-14.
- **For CPA-2 (2013-14):** Biogas Users' survey, BUS 2013-14 for CPA-2 covers a total sample of 90 households from all 19,927 households (19,927 biogas plants installed in the CPA-2) within the CPA-1 for period 2013-14.
- **For CPA-3 (2013-14):** Biogas Users' survey, BUS 2013-14 for CPA-3 covers a total sample of 90 households from all 19,959 households (19,959 biogas plants installed in the CPA-3) within the CPA-3 for period 2013-14.
- **For CPA-4 (2013-14):** Biogas Users' survey, BUS 2013-14 for CPA-4 covers a total sample of 90 households from all 19,970 households (19,970 biogas plants installed in the CPA-4) within the CPA-1 for period 2013-14.

Sample size was determined using stratified random sampling in consistent with "Guidelines for sampling and surveys for CDM project activities and programme of activities, Version 04.0 for biogas plants under CPA-1 to CPA-4. The sampling was performed within the level of precision of 10% and a confidence level of 90%. This is in conformance with §10 of Standard for sampling and surveys for CDM project activities and programme of activities Version 04.0. The minimum sample sizes required for conducting the present Biogas User Surveys have been estimated with a margin of error not exceeding 10 percent of the population mean. This is in accordance with §10 of EB 86 Annex 4. The verification team has checked the sampling approach through the onsite visit interview and also by going through the methodology followed by the surveying entity i.e. **Square One Research and Training**. The sampling method used in all the BUS Survey is in compliance with the "Guidelines for Sampling and Surveys for Small-Scale CDM Project Activities" version 04.0 (EB 86 Annex 4) which is in effect at the time of the survey design.

The samples are allocated in two different ways to maintain the representativeness. First, samples are allocated proportionally to ecological belts and development regions based on proportion of biogas installed in these two areas and Secondly, sample are allocated to size of biogas (2, 4, 6, 8, 10 m³). First the samples were allocated proportionately to the cluster and later the distribution of samples among different sizes of the digesters was ensured. It represents the proportion of biogas digester implemented under the CPA (s) of the PoA. The verification team checked the BUS report to confirm the correctness of the samples for all CPA's involved in the current monitoring period.

The sample size is calculated from the total population of biogas units with 90/10 confidence/precision level. The same is in line with EB 86 Annex 4. The sampling plan is assessed as part of the BUS report for all the CPA's i.e. CPA-1; CPA-2; CPA-3 and CPA-4. The survey report of 2014-15 carried out by an independent third party,

Square One Research and Training, was checked by the verification team. It has been confirmed that the surveys have been done as per EB guidelines i.e. Guidelines for sampling and surveys for CDM project activities and programme of activities, version 04 (EB 86, Annex 4).

Results of the sampling for the CPA's included in the current monitoring period are as follows:

<i>CPA Details</i>	Total number of plants under CPA	Total number of sample (n)	Total number of sample (n) after oversampling
<i>CPA-1 (BUS 2013/14):</i>	20000	41	90
<i>CPA-2 (BUS 2013/14):</i>	19927	42	90
<i>CPA-3 (BUS 2013/14):</i>	19959	47	90
<i>CPA-4 (BUS 2013/14):</i>	19970	47	90

The stratified sampling approach is used by the PP which is as per Sampling plan given in the registered PoA DD, the proportion of the sample is taken according to the proportion of the biogas digesters disturbed across various ecological zones. Thus the sample selected is the representative of the population and also over sampling is done to counter any uncertainties. Also during the DOE site visit, it found that only 2 out of the 72 samples of PP were not found operating, which is 2.77%. Hence the 10% confidence level is met and further over sampling is not required. This is in line with paragraph 24 of Standard for Sampling and surveys for CDM project activities and programmes of activities, Version 05.0

Thus the sample size calculation is in line with the sampling requirements of EB 86 annex 4 as well as with annex 4 of the registered PoA DD. Verification team noted that all biogas digesters sold are registered under BSP Nepal database and their performance is monitored through field surveys of a random sample of the installed households. The biogas production of biogas plants is not metered. Through a sample survey, the number of systems out of order has been determined and the performance ratio is calculated by taking the percentage of the sold biogas digesters that are still operating. This is in compliance with the requirements of registered PoA-DD and CPA-DD hence was accepted by DOE.

5.9.2. Sampling approaches during verification

During the on-site verification, a sampling approach has been used to verify the reported values all the SD monitoring parameters. The verification team sampled the biogas digesters.

The sampling approach is conducted according to the “Guidelines for Sampling and Surveys for CDM Project Activities and Programme Activities” and the “Standard for Sampling and Surveys for CDM Project Activities and Programme Activities” applicable at the time of verification. Simple random sampling method has been

applied most ideal for verification of sampled parameters however, due to the size of the population and PP's respective calculated minimum sample sizes, acceptance sampling has been adopted for verification.

The verification team followed the notes in Appendix 5 of the Guideline: Sampling and surveys for CDM project activities and programmes of activities (version 04.0), esp. taking a sample of the PPs sample.

Using the equation as provided in the monitoring plan for the CPA-DD, a minimum sample of 49 for each CPA is calculated. However, as per applicable monitoring plan a sample size of 54 for each CPA is required. PP took 90 samples for each of the 4 CPAs to arrive at the share of digesters operational and to conclude status of the sustainability monitoring parameters.

The Verification team (VT) analysed the CDM monitoring report and GS monitoring report and on the basis of the data provided in it took the district and VDC level samples of the PP for the purpose of acceptance sampling. A sample of 36 (10% of the PP sample) was determined for acceptance sampling, with an Acceptable Quality Level of about 5.5%.

Accordingly, the VT handpicked the VDC with highest samples one each for hill and Terai regions for each CPA and super imposed those VDC on the map of Nepal to prepare the site visit plan. In order to minimize the travel distance and time, 2 VDC (which are far from the other VDCs) are removed and instead two VDC with second highest number of households sampled by the PP are selected for the site visit. Also one VDC to represent the remote hill was also included and thereby the VT visited 9 VDC during the site visit. In all the VDCs the VT randomly picked the sampled households by the PP as well as 2-3 non-sampled households for the verification. Altogether 91 households are visited (72 sampled and 19 non-sampled).

The DOE has therefore accepted the results as presented in the monitoring survey reports, and recorded in the monitoring report with a reasonable level of confidence.

5.10. ER Calculation

The CER sheets submitted for issuance request in CDM cycle during the second periodic verification is presented for verification by the PP for GS CER verification for this monitoring period without affecting the material information. During the verification mistakes in the ER calculation were identified. Corresponding findings were raised. A revised ER calculation was prepared by the PP and presented to the verification team. All raised issues were addressed appropriately so that all corresponding CARs could be closed out. Thus it is confirmed that the ER calculation is overall correct.

However after the BUS survey for this monitoring period (2014/2015) an Earth quake struck Nepal on 25/04/2015 and for the down time during the period from 25/04/2015 to end of this monitoring period the PP took the BUS survey results of third bus

survey (2015/2016) for the next monitoring and accordingly adjusted the emission reduction calculation for this monitoring report.

VT checked the downtimes through the percentage of affected digesters by earth quake from the bus survey and the calculations and apportioning done in the ER sheets. The total biogas digesters that were non-operational as per the bus survey of 2015/2016 is 17 out of the 360 samples for all five CPAs which works out be 4.7%. However, out of the 91 samples checked by the VT, during the site visit only 4 were not operational due to the earthquake, which accounts for 4.5%.

Thus the revised emission reduction due to the downtimes accounted for earth quake for each CPA is calculated by project proponent is considered as conservative

Therefore, emission reduction are calculated to be for the monitoring period is as follows

CPA	ERy (tCO ₂ e)	ERy (tCO ₂ e), adjusted due to earthquake
CPA-1	65,923	65,726
CPA-2	63,808	63,427
CPA-3:	64,611	62,106
CPA-4	63,396	61,127
Total	257,738	252,386

The following are the CER achieved vintage wise during the verified monitoring period

Year	2014 (tCO ₂ e)	2015 (tCO ₂ e)	Total (tCO ₂ e)
CPA-1	27,633	38,092	65,725
CPA-2	26,746	36,680	63,426
CPA-3	27,083	35,022	62,105
CPA-4	26,574	34,552	61,126
Total	108,036	144,346	252,382

5.11. Quality Management

Quality Management procedures^{/QC/BUB/IMS/ISO/} for collection and compilation of data, data storage and archiving, maintenance and training of personnel^{/TRG/} in the framework of this GS-CDM Programme of Activity (PoA) have been defined and all these parameters were cross checked during onsite visit and interview of client, site personnel and contractors^{/IM01/}. Quality Management system manual^{/ISO/} and QC Manual^{/QC/} were checked. The QMS manual is found integrated with ISO system. The

procedures defined can be assessed as appropriate for the purpose. No significant deviations thereof have been observed during the verification.

The monitoring system covers:

1. organizational structure^{/ORG/};
2. internal audits procedures^{/IMS/};
3. training plan^{/TRG/};
4. handling data procedures;
5. data collection, analysis and calculation procedures^{/SUR/};
6. data checking and storage procedures^{/SUR/};
7. roles and responsibilities.

The verification team was able to check the consistency of the procedures during the site visit interviews and document review during the site visit which includes:

- a) Plant Completion report; Database maintained by BSP Nepal for all the Biogas plants;
- b) Biogas plant owners/user's booklet issued by AEPC;
- c) Management system certificate;
- d) Field Trip Report Quality Control and Monitoring Department by BSP Nepal;
- e) Training provided by AEPC person and consultant team (responsible for BUS Survey) to the enumerators;^{/TRG/}
- f) Quality Standard manual prepared by BSP Nepal for the construction of Biogas plant in Nepal;
- g) Contract for the operation of the AEPC/NRREP NSP/RSC signed between AEPC and BSP Nepal for conducting the service of National Service provider for AEPC;
- h) Biogas User's Survey for the 2014-15 applicable for CPA-1 to CPA-4;
- i) Survey Questionnaire used by survey agency for the BUS Survey;
- j) Quality Standard manual prepared by BSP Nepal for the construction of Biogas plant in Nepal dated 2010 (Given to the companies and or end user)

Thus, it is concluded that the GHG data monitoring system are assessed as appropriate and all the monitoring procedures have been fully integrated in the project participant's quality management system.

5.12. Actual emission reductions during the first commitment period and the period from 1 January 2013 onwards

The MR(s) include(s) actual ER values achieved up to 31 December 2012 and actual values achieved from 1 January 2013 onwards as follows:

Table 5-2: Emission reductions before and after the end of 2012

	until 2012-12-31 ¹⁾	from 2013-01-01 ¹⁾	Sum
Emission reductions [tCO _{2e}]	-	252,382	252,382

¹⁾ Both days included

5.13. Comparison with ex-ante estimated emission reductions

The CDM MR in section H.5 includes a comparison of the calculated actual emission reductions with the ex-ante calculated values in the registered PoA-DD and CPA-DD.

The calculated value was found to be less than the ex-post determined value, thus no further justification was required. However, this marginal variation is due to change in the operational status of the Bio digesters in CPA-1 CPA-2, CPA-3, CPA-4 (2014/15). Verification team has checked the results of the all four Biogas Users' Survey reports conducted for these CPA's for the current monitoring period to confirm that the emission reduction as presented for CPA-1, CPA-2 CPA-3 and CPA-4 are correct and accurate.

5.14. Contribution to Sustainable Development

This section gives a detailed DOE assessment and opinion of the PoA's contribution to sustainable development during this monitoring period, as outlined in the sustainability monitoring plan of the project GS Passport. The Sustainable development parameters are monitored as indicated in the below table.

Table 5-1: Assessment of monitored SD Indicators:

No	Indicator	Parameter	Value	DOE verification Opinion on improvement/changes of key sustainable development indicators and mitigation measures
1	Air Quality	Reduction in smoke	CPA 1: 100% CPA 2: 100% CPA 3: 99% CPA 4: 98%	The BUS survey report submitted by the PP is checked by the verification team to as basis for the arrived results. During the on-site visit the VT randomly selected some of the 91 households (both surveyed and non-surveyed) and enquired

No	Indicator	Parameter	Value	DOE verification Opinion on improvement/changes of key sustainable development indicators and mitigation measures
				about the air quality and concluded that the project completely reduced the smoke and suspended air particles after the implementation of the biogas plant when compared with traditional cooking. All households indicated that smoke is reduced in kitchen and eye irritation is not there. Therefore, the conclusions of the monitoring team are deemed to be correct. The sampling plan for the indicator is annual by recording the experience during the BUS survey.
02	Soil Condition	Use of bio slurry manure	CPA 1: 97% CPA 2: 99 CPA 3: 100% CPA 4: 100%	The BUS survey report submitted by the PP is checked by the verification team as the basis for the arrived results. During the on-site visit the VT randomly selected 91 households (both surveyed and non-surveyed) and enquired about the usage of the slurry, and concluded that due to the implementation of the project, the entire slurry is used as organic manure in the field, most of the respondents indicated they are using as manure on the fields and some respondents (who have less agricultural fields/ lands or no lands) indicated that they used to sell the slurry as manure for others to use it as manure. The sampling plan for the indicator is annual by recording the actual disposal during the bus survey.
03	Livelihood of the Poor	Sanitation Access	Toilet constructed along with biogas unit CPA 1: 82% CPA 2: 76% CPA 3: 94% CAP 4: 88%	The BUS survey report submitted by the PP is checked by the verification team as the basis for the arrived results. During the verification, the users without any toilet access before the construction of biogas indicated that they wanted to have a toilet along with the biogas digesters. Those had toilet connected the toilet with the bio digesters and a few could not connect it because of the location of toilet and digesters. Thus the project improved the sanitation of the end users. The sampling plan for the indicator is annual recording based on the actual practice

No	Indicator	Parameter	Value	DOE verification Opinion on improvement/changes of key sustainable development indicators and mitigation measures
				during the bus survey.
04	Access to affordable and clean energy services	Continued Operational status of the bio digesters	CPA 1: 99% CPA 2: 94% CPA 3: 97% CPA 4: 96%	The BUS survey report submitted by the PP is checked by the verification team as the basis for the arrived results. During the verification the VT found that out of the 91 digesters 79 were still working and 7 were abandoned due to the earth quake and 5 were non-operational, thus around 94.4% of the digesters were operational during the time of verification. Thus the value of the parameter arrived by the PP is correct. Also during the verification interviews the households indicated that the operation of the stoves itself similar to the LPG stoves, click of the knob they start the cooking. During site visit the beneficiaries indicated that during rainy reason it is difficult for them to litter the firewood. Thus due to this project they are having good access to the clean and affordable energy.
05	Quality of Employment			Not Monitored for retrospective Labeling. It is also not required to be monitored as per GS passport.

The verification team can confirm that no changes to the registered SD parameters have occurred that may have an impact on Gold Standard qualification of this project activity

The verification team can also confirm that the project has achieved the mitigation/compensation measures as per the registered monitoring plan

5.15. Overall Aspects of the Verification

All necessary and requested documentation was provided by the project participants so that a complete verification of all relevant issues could be carried out.

Access was granted to all installations of the plant(s) as requested, which are relevant for the project performance and the monitoring activities.

No issues have been identified indicating that the implementation of the single component project activity and the steps to claim emission reductions are not

compliant with the GS/UNFCCC criteria and relevant guidance provided by the COP/CMP and the CDM EB (clarifications and/or guidance).

5.16. Grievances

The CME/PP/ CPA implementer has given telephone numbers of the AEPC office to all the users and other stakeholders also the biogas promoters association regional offices to contact directly and record their grievances.

Also in APEC website a provision for online contact and complaint logging is available and the contact information of the officials concerned is given. During the site visit the households indicated that the during the warranty period the biogas companies were responsible for repair works and attended well. The majority of grievances were minor repair works which were attended in First in First Out basis by the local trained personnel along with the spares. The same is verified from the continuous grievance input database maintained.

Thus the CME is having a grievance addressable mechanism to respond to the stakeholders concern.

5.17. Hints for next periodic Verification

No FARs was raised during the course of this (first) verification.

6. VERIFICATION AND CERTIFICATION STATEMENT

Alternative Energy Promotion Centre (AEPC) has commissioned the TÜV NORD JI/CDM Certification Program to carry out the 2nd periodic verification of the PoA: "Nepal Biogas Support Program-PoA", (UNFCCC PoA 9752 / GS 3110) with regard to the relevant requirements for GS/CDM project activities. The project reduces GHG emissions due to installation of biogas plants and decreased fuel wood consumption. This verification covers the emission reductions achieved by all the CPAs in its corresponding monitoring periods:

CPA No.	Monitoring period (MP):	
	From:	To:
CPA:1 CPA:2, CPA 3 and CPA 4	01/08/2014	31/07/2015

In the course of the verification 2 Corrective Action Requests (CAR) and 1 Clarification Requests (CL) were raised and successfully closed. No FARs have been raised to improve the monitoring system in the future. The verification is based on the draft monitoring report(s), revised monitoring report(s), the monitoring plan as set out in the registered CPA-DD(s), the validation report, emission reduction calculation spread sheet and supporting documents made available to the TÜV NORD JI/CDM CP by the project participant.

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 project design document.
- the monitoring plan is in accordance with the applied approved GS/CDM methodology.
- the monitoring system is in place and functional. The project has generated GHG emission reductions.
- the project contributes to sustainable development

As the result of the 2nd periodic verification, the verifier confirms that the GHG emission reductions are calculated without material misstatements in a conservative and appropriate manner. TÜV NORD JI/CDM CP herewith confirms that the PoA has achieved emission reductions in the above mentioned reporting period as follows:

Emission reductions: **252,382 tCO_{2e}**

Coimbatore, 02/03/2017



Mr. G Ezhilarasu

TÜV NORD JI/CDM Certification Program
Verification Team Leader

Essen, 02/03/2017



Stefan Winter

TÜV NORD JI/CDM Certification Program
Final Approval

7. REFERENCES

Table 7-1: Documents provided by the project participant(s)

Reference	Document			
/AEPC/	Contract for the operation of the AEPC/NRREP NSP/RSC signed between AEPC and BSP Nepal for conducting the service of National Service provider for AEPC includes annex detailed work plan including financial proposal.			
/BSPDB/	Database maintained by BSP Nepal for all the Biodgiesters including CPA-1 to CPA-4			
/BUS/	Biogas User’s Survey for the year 2014-15 and 2015-16 (to check earth quake affected) applicable for CPA-1 to CPA-4.			
/BUB/	• Biogas plant owners/user’s booklet issued by AEPC. • Plant Handover form signed by Bio digester owner.			
/CRI/	• Construction progress report issued by BSP Nepal to AEPC ref. no. BSPN/SA&D/2013/059 dated 05 August 2014. • Plant completion progress report by BSP Nepal			
/ERS/	Emission reduction right transfer/sales agreement between Biodigester owner and Construction company.			
/ER/	• Emission reduction sheet w.r.t to MR submitted for issuance request for second periodic CDM verification • Emission reduction sheet w.r.t to GS MR submitted for verification dated 04/07/2016 version 1 . • Emission reduction sheet w.r.t to GS MR submitted for verification dated 16/02/2017 version 3			
/ISO/	ISO certificate for ISO 9001:2008 issued dated 08/12/2012. Valid till 07/12/2015.			
/IMS/	ISO based internal Monitoring i.e. Field Trip Report Quality Control and Monitoring Department by BSP Nepal on sample basis for the Biodigester installed.			
/MR/	• Monitoring report of the POA project titled “Nepal Biogas Support Program-PoA” dated 14/12/2016 version 03 Details of the CPA’s included in the current monitoring period is given as: <table><tr><th>Ref</th><th>CPA Title</th><th>Inclusion date</th></tr></table>	Ref	CPA Title	Inclusion date
Ref	CPA Title	Inclusion date		

Reference	Document		
	9572-0004	<u>Nepal Biogas Support Program - CPA 4: 19,970 digesters.</u>	08 May 14
	9572-0003	<u>Nepal Biogas Support Program - CPA 3: 19,959 digesters.</u>	08 May 14
	9572-0002	<u>Nepal Biogas Support Program - CPA 2: 19,927 digesters</u>	08 May 14
	9572-0001	<u>Nepal Biogas Support Program- CPA 1: 20,000 digesters.</u>	31 Jan 13
	GS monitoring report for the PoA titled Nepal Biogas Support Program GS 3110 version 02 dated 16/02/2017		
/ORG/	Organisation Chart for the personnel involved in the GHG monitoring system.		
/Photo/	Still and video photographic evidences during the site visit		
/PCR/	Plant Completion report (generated by Oracle software) by BSP Nepal which includes GPS co-ordinates, technical details of digesters; details of end user/owner, construction date, total cost, subsidy no.; plant code/unique ID.		
/QC/	Quality Standard manual prepared by BSP Nepal for the construction of Biodigester in Nepal dated 2010 (Given to the companies and or end user)		
/SURI/	Survey Questionnaire used by survey agency for the BUS Survey for CPA-1 CPA-2 CPA-3 CPA-4.		
/TRG/	Training provided by AEPC person and consultant team (responsible for BUS Survey) to the enumerators (Annex-4 of the BUS Survey Report).		
/TS/	Quality Standard manual prepared by BSP Nepal for the construction of Biodigester in Nepal dated 2010 (Given to the companies and or end user)		

Table 7-2: Background investigation and assessment documents

Reference	Document
/AMS/	AMS-I.E version 04,, “Fehler! Kein Text mit angegebener Formatvorlage im Dokument.”
/CPM/	TÜV NORD JI / CDM CP Manual (incl. CP procedures and forms)
/IPCC/	1996 IPCC Guidelines for National Greenhouse Gas Inventories: work book 2006 IPCC Guidelines for National Greenhouse Gas Inventories: work

Reference	Document																														
	book																														
/KPI/	Kyoto Protocol (1997)																														
/MAI/	Decision 3/CMP. 1 (Marrakesh – Accords)																														
/MRT/	Monitoring Report Form (CDM-MR-FORM), Version 4.0																														
/PoA/	Registered POA-DD and included CPA-DDs for CDM project: “Nepal Biogas Support Program-PoA” , UNFCCC PoA project reference no 9572 <table><tr><th>Ref</th><th>CPA Title</th><th>Inclusion date</th></tr><tr><td>9572-0004</td><td><u>Nepal Biogas Support Program - CPA 4: 19,970 digesters.</u></td><td>08 May 14</td></tr><tr><td>9572-0003</td><td><u>Nepal Biogas Support Program - CPA 3: 19,959 digesters.</u></td><td>08 May 14</td></tr><tr><td>9572-0002</td><td><u>Nepal Biogas Support Program - CPA 2: 19,927 digesters</u></td><td>08 May 14</td></tr><tr><td>9572-0001</td><td><u>Nepal Biogas Support Program- CPA 1: 20,000 digesters.</u></td><td>31 Jan 13</td></tr></table> Registered GS POA-DD and included CPA-DDs for CDM project: “Nepal Biogas Support Program-PoA” , GS PoA project reference no 3110 <table><tr><th>Ref</th><th>CPA Title</th><th>Inclusion date</th></tr><tr><td>GS-3116</td><td><u>Nepal Biogas Support Program - CPA 4: 19,970 digesters.</u></td><td>14 Augt 2015</td></tr><tr><td>GS-3114</td><td><u>Nepal Biogas Support Program - CPA 3: 19,959 digesters.</u></td><td>14 Augt 2015</td></tr><tr><td>GS-3113</td><td><u>Nepal Biogas Support Program - CPA 2: 19,927 digesters</u></td><td>14 Augt 2015</td></tr><tr><td>GS-3109</td><td><u>Nepal Biogas Support Program- CPA 1: 20,000 digesters.</u></td><td>14 Augt 2015</td></tr></table>	Ref	CPA Title	Inclusion date	9572-0004	<u>Nepal Biogas Support Program - CPA 4: 19,970 digesters.</u>	08 May 14	9572-0003	<u>Nepal Biogas Support Program - CPA 3: 19,959 digesters.</u>	08 May 14	9572-0002	<u>Nepal Biogas Support Program - CPA 2: 19,927 digesters</u>	08 May 14	9572-0001	<u>Nepal Biogas Support Program- CPA 1: 20,000 digesters.</u>	31 Jan 13	Ref	CPA Title	Inclusion date	GS-3116	<u>Nepal Biogas Support Program - CPA 4: 19,970 digesters.</u>	14 Augt 2015	GS-3114	<u>Nepal Biogas Support Program - CPA 3: 19,959 digesters.</u>	14 Augt 2015	GS-3113	<u>Nepal Biogas Support Program - CPA 2: 19,927 digesters</u>	14 Augt 2015	GS-3109	<u>Nepal Biogas Support Program- CPA 1: 20,000 digesters.</u>	14 Augt 2015
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GS-3109	<u>Nepal Biogas Support Program- CPA 1: 20,000 digesters.</u>	14 Augt 2015																													
/PSI/	CDM Project Standard (Version 9.0)																														
/PCPI/	Clean development mechanism project cycle procedure (Version 09.0)																														
/SSI/	- Standard for “Sampling and surveys for CDM project activities and programmes of activities” (version 05.0) - Guidelines for sampling and surveys for CDM project activities and programme of activities (version 04.0)																														
/VAL/	- Validation report for CDM PoA: “Nepal Biogas Support Program-PoA”, UNFCCC PoA project reference no 9572 dated 31/01/2013. - Validation reports for all CPAs included in the current monitoring period,																														

Reference	Document															
	Details of the CPA’s is given below:															
	<table><tr><th>Ref</th><th>CPA Title</th><th>Inclusion date</th></tr><tr><td>9572-0004</td><td><u>Nepal Biogas Support Program - CPA 4: 19,970 digesters.</u></td><td>08 May 14</td></tr><tr><td>9572-0003</td><td><u>Nepal Biogas Support Program - CPA 3: 19,959 digesters.</u></td><td>08 May 14</td></tr><tr><td>9572-0002</td><td><u>Nepal Biogas Support Program - CPA 2: 19,927 digesters</u></td><td>08 May 14</td></tr><tr><td>9572-0001</td><td><u>Nepal Biogas Support Program- CPA 1: 20,000 digesters.</u></td><td>31 Jan 13</td></tr></table>	Ref	CPA Title	Inclusion date	9572-0004	<u>Nepal Biogas Support Program - CPA 4: 19,970 digesters.</u>	08 May 14	9572-0003	<u>Nepal Biogas Support Program - CPA 3: 19,959 digesters.</u>	08 May 14	9572-0002	<u>Nepal Biogas Support Program - CPA 2: 19,927 digesters</u>	08 May 14	9572-0001	<u>Nepal Biogas Support Program- CPA 1: 20,000 digesters.</u>	31 Jan 13
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	9572-0001	<u>Nepal Biogas Support Program- CPA 1: 20,000 digesters.</u>	31 Jan 13													
	- Validation report for GS PoA: “Nepal Biogas Support Program-PoA”, GS PoA project reference no 3110. - Validation reports for GS inclusion for all CPAs included in the current monitoring period, Details of the CPA’s is given below:															
	<table><tr><th>Ref</th><th>CPA Title</th><th>Reg. date</th></tr><tr><td>GS-3116</td><td><u>Nepal Biogas Support Program - CPA 4: 19,970 digesters.</u></td><td>14 Augt 2015</td></tr><tr><td>GS-3114</td><td><u>Nepal Biogas Support Program - CPA 3: 19,959 digesters.</u></td><td>14 Augt 2015</td></tr><tr><td>GS-3113</td><td><u>Nepal Biogas Support Program - CPA 2: 19,927 digesters</u></td><td>14 Augt 2015</td></tr><tr><td>GS-3109</td><td><u>Nepal Biogas Support Program- CPA 1: 20,000 digesters.</u></td><td>14 Augt 2015</td></tr></table>	Ref	CPA Title	Reg. date	GS-3116	<u>Nepal Biogas Support Program - CPA 4: 19,970 digesters.</u>	14 Augt 2015	GS-3114	<u>Nepal Biogas Support Program - CPA 3: 19,959 digesters.</u>	14 Augt 2015	GS-3113	<u>Nepal Biogas Support Program - CPA 2: 19,927 digesters</u>	14 Augt 2015	GS-3109	<u>Nepal Biogas Support Program- CPA 1: 20,000 digesters.</u>	14 Augt 2015
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	GS-3109	<u>Nepal Biogas Support Program- CPA 1: 20,000 digesters.</u>	14 Augt 2015													
/GSP/	Gold standard passports for the GS PoA and Included CPAs (1-4)															
/VER/	Final Verification report, monitoring report and CER sheets submitted for the CDM issuance for the monitoring period 31-01-2013 to 31-07-2014. Final Verification report, monitoring report and CER sheets submitted for the CDM issuance for the monitoring period 01-08-2014 to 31-07-2015.															
/VVS/	CDM Validation and Verification Standard (Version 09.0)															
/GS/	GS Toolkit 4.5/4.6, GSR VII.a.5, GS Annex I, GS Annnex W															

Table 7-3: Websites used

Reference	Link	Organisation
/DNA-N/	Review of 10-year plan of Government of Nepal http://www.npc.gov.np/uploads/plans/20081228112759.pdf	Government of Nepal
/MoE/	http://www.moen.gov.np/	Ministry of Energy, Government of Nepal
/unfccc/	http://cdm.unfccc.int	UNFCCC
/ipcc/	www.ipcc-nggip.iges.or.jp	IPCC publications
/gs/	http://www.goldstandard.org/	Gold Standard Foundation
/AEPC/	www.aepc.gov.np	Alternate Energy Promotion Centre Nepal.

Table 7-4: List of interviewed persons

No.	Interviewee			Date	Subject	Team member
	Last name	First name	Affiliation			
1.	Rijal	Neelam Sharma	Program Officer AEPC	06-06-2016 to 14-06-2016	Project Implementation MR, CER sheets Sampling GS-Monitoring reports, SD monitoring, project financing BUS survey Project Implementation Sampling Monitoring Aspects Monitoring Aspects, logistics, Communications with Biogas end users and Biogas companies Focal point for verification	G Ezhilarasu
2	Porhkel	Prem Kumar	Program Officer AEPC	06-06-2016, 11-06-2016 to 14-06-2016	Sampling , Internal quality Documentation, Sampling Record keeping Customer complaints	G Ezhilarasu
3	Rana	B Thapa	Program Manager AEPC	14-06-2016	Finance obligations, Down times, training schedules, sampling,	G Ezhilarasu

No.	Interviewee			Date	Subject	Team member
	Last name	First name	Affiliation			
4	Prakash	Aryal	Senior Officer AEPC		repairs Government policies	
5	Suraj	Regmi	Program Officer AEPC			
6	Somanth	Bastola	Managing Director DUV	07-06-2016	Construction, Agreements, complaint management Repairs, User trainings, spares availability, interactions with the end users, scheduled inspections	G Ezhilarasu
7	Khaga	Raj	Technician DUV			
8	Madhav	Lamsal	Branch Manager RGG	08-06-2016		
9	Om	Bdr Rane	Senior Supervisor RGG			
10	Umesh	Wasti	Managing partner SID			
11	Dinesh	Kumar Mandal	Managing Director Jay	10-06-2016		
12	Om Narayan	Shrestha	Managing Director KAM	11-06-2016		
13	Bimal	Mokan	Local Representative ANB	12-06-2016		
				13-06-2016		
14	Julia	Hoffmann	atmosfair, Germany	10-6-2016 14-06-2016		
15	Various End Users (91 households)		Sampled and non-sampled house holds	06-06-2016 to 13-06-2016	Status of Biogas and its usage, Energy ladder for cooking, Problems faced for maintenance and availability of trained personnel, down times, (if any), reasons for non-usage, cattle availability , household numbers, spares availability etc	G Ezhilarasu

¹⁾ Means of Interview: (Telephone, E-Mail, Visit)

ANNEX

- A1:** Verification Protocol
- A2:** Statements of Competence of involved Personnel

ANNEX 1: PERIODIC VERIFICATION CHECKLIST – MONITORED PARAMETERS

Table Annex-1: (Project specific) GHG Verification Checklist:

Checklist (incl. guidance for the verification team)	Item	Refe- rence	Verification (Means and results of assessment)	Team	Comments	Draft Concl .	Final Concl .
A. P%			The share of digesters operational (based on the total number implemented using non-renewable biomass).				
a) Measurement / Determination method (VVS, §§ 389-393) <i>Describe how the monitoring parameter was measured / determined. Focus primarily on the original data level (ODL) but also describe the applied data aggregation trails (from ODL to data aggregation level zero (DAL0)).</i> <i>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.</i> <i>Assess whether the measurement / determination method is in line with the registered monitoring plan of the PDD and the applied methodology.</i>	/IM01/ /POA-DD/ /AMS/ /MR/ /BUS/	<i>Description:</i> The GS monitoring report took the share of bio-digesters operational during monitoring period directly from the CDM verified monitoring report. As per the POA-DD section E.7 and CPA-DD for all CPA's the Percentage of digesters implemented that is operational will be monitored annually on sample basis. The same is reported in Annual Biogas Users' Survey. As verified from the Biogas Users' Survey/BUS/ for the year 2014-15 submitted by the PP, it was confirmed that the Percentage of digesters implemented that is operational is calculated. <i>Verifier's action:</i> The operational status of the biogas digesters taken the GS monitoring report is materially same as the values mentioned in the verified CDM MR report. Both the MRs are checked by the VT <i>Conclusion:</i> Thus the value considered for ER calculations is correct. However CAR A1, CAR A2 and CL A1 are raised to ensure		CAR A1, CAR A2, CL A1	OK		

Checklist (incl. guidance for the verification team)	Item	Reference	Verification (Means and results of assessment)	Team	Comments	Draft Concl .	Final Concl .
			greater clarity.				
b) Accuracy and QA/QC Procedure (VVS, §§ 394-400) <i>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.</i> <i>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.</i> <i>Include calibration dates and information in validity of the installed monitoring equipment in the table in Annex 2.</i>			<i>Description:</i> Not applicable as no measuring equipment is used to determine the parameter P <i>Verifier’s action:</i> <i>Conclusion:</i>				
c) Correctness (VVS, §§ 389-393) <i>Determine whether the value given in the monitoring report is correct or determined in a conservative manner.</i> <i>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</i>	/IM01/ /POA-DD/ /AMS/ /DB/ /BUS/ /MR/	☒ Correct ☐ Not correct (initial assessment) <i>Description:</i> The BUS survey was basis for the estimating the share of bio digesters that were operational during the monitoring period.. <i>Verifier’s action:</i> Desk review of verified MR and annual biogas users’ survey conducted for all the CPA’s included in the current monitoring period were checked		OK	OK		

Checklist (incl. guidance for the verification team)	Item	Reference	Verification (Means and results of assessment)	Team	Comments	Draft Concl .	Final Concl .
	<i>be given. In case of mistakes / deviations pl. provide details and descriptions of the CARs raised.</i>		<i>Conclusion: The values applied for the monitoring period is correct.</i>				

Table Annex-2: (Project specific) SD Verification Checklist:

Checklist (incl. guidance for the verification team)	Item	Reference	Verification (Means and results of assessment)	Team	Comments	Draft Concl .	Final Concl .
A. Air Quality			Users' perception on smoke.				
a) Measurement / Determination method (VVS, §§ 389, 393, GS Annex I, GS Annex AC, GS Annex G) <i>Describe how the monitoring parameter was measured / determined. Focus primarily on the original data level (ODL) but also describe the applied data aggregation trails (from ODL to data aggregation level zero (DAL0)).</i> <i>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.</i> <i>Assess whether the measurement / determination</i>	/IM01/ /GSP/ /AMS/ /MR/ /BUS/	<i>Description:</i> The project is expected to reduce the smoke and improve the air quality in households across all CPAs as per the GS passports. The same is monitored through the sample survey and accordingly the BUS survey taken for the year 2014-2015 indicates that the following percentage of users indicated that the project achieved reduction in smoke CPA 1: 100%, CPA 2: 100%, CPA 3: 99%, CPA 4: 98% <i>Verifier's action:</i> The monitoring report and BUS surveys are checked along with GS passports. The survey is taken as per the procedure mentioned in the GS passport and question 5.1 is specifically included for the purpose in the survey questionnaire. Also the verification team during the site visit prepared a specific checklist list and almost all the users are indicated that the	OK	OK			

Checklist (incl. guidance for the verification team)	Item	Reference	Verification (Means and results of assessment)	Team	Comments	Draft Concl	Final Concl
	<i>method is in line with the registered monitoring plan of the PDD and the applied methodology.</i>		project reduces smoke and women users indicated that the project implementation eradicated smoke from kitchen and there by eye irritation. . <i>Conclusion:</i> Thus parameter improvement in air quality is assessed as positive,				
B. Soil Condition			Use of slurry as fertilizer				
a) Measurement / Determination method (VVS, §§ 389, 393, GS Annex I, GS Annex AC, GS Annex G) <i>Describe how the monitoring parameter was measured / determined. Focus primarily on the original data level (ODL) but also describe the applied data aggregation trails (from ODL to data aggregation level zero (DAL0)).</i> <i>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.</i> <i>Assess whether the measurement / determination method is in line with the registered monitoring plan of the PDD and the applied methodology.</i>		/IM01/ /GSP/ /AMS/ /MR/ /BUS/	<i>Description:</i> The project is expected to improve the soil condition due to the use of bio slurry as fertilizer. The same is monitored through the sample survey and accordingly the BUS survey taken for the year 2014 -2015 indicates that the following percentage of users indicated that the slurry is used as humus in agricultural fields CPA 1: 97% ,CPA 2: 99%, CPA 3: 100%, CPA 4: 100% <i>Verifier's action:</i> The monitoring report and BUS surveys are checked along with GS passports. The survey is taken as per the procedure mentioned in the GS passport and question 5.8 is specifically included for the purpose in the survey questionnaire. Also the verification team during the site visit prepared a specific checklist list and majority of users indicated that they are using the slurry as humus in the agriculture fields and there is a reduction in the usage of chemical fertilizers. The tiny farmers and landless users indicated that they used to sell the slurry to other farmers for agricultural usage as humus. <i>Conclusion:</i>			OK	OK

Checklist (incl. guidance for the verification team)	Item	Reference	Verification (Means and results of assessment)	Team	Comments	Draft Concl	Final Concl
			Thus parameter improvement in soil condition is assessed as positive,				
C. Livelihood of the Poor			Improved access to sanitation services				
a) Measurement / Determination method (VVS, §§ 389, 393, GS Annex I, GS Annex AC, GS Annex G) <i>Describe how the monitoring parameter was measured / determined. Focus primarily on the original data level (ODL) but also describe the applied data aggregation trails (from ODL to data aggregation level zero (DAL0)).</i> <i>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.</i> <i>Assess whether the measurement / determination method is in line with the registered monitoring plan of the PDD and the applied methodology.</i>	/IM01/ /GSP/ /AMS/ /MR/ /BUS/	<i>Description:</i> The project is expected to improve the sanitation access of the users due to the construction of toilets along with the bio-digesters. The same is monitored through the sample survey and accordingly the BUS survey taken for the year 2014 -2015 indicates that the following percentage of users indicated that the project improved the sanitation access CPA 1: 82%, CPA 2: 76%, CPA 3: 94%, CAP 4: 88% <i>Verifier’s action:</i> The monitoring report and BUS surveys are checked along with GS passports. The survey is taken as per the procedure mentioned in the GS passport and question 5.13, 5.14 and 5.15 is specifically included for the purpose in the survey questionnaire. Also the verification team during the site visit prepared a specific checklist list and users told that the toilets are constructed along with the bio digesters if they don’t have prior and if the toilet was already there they connected the toilet to the digesters and a very few users indicated that the due to the location and position of the old toilets and digesters they were not able to connect the toilet and digesters for practical difficulties. The majority of the users were off the opinion that the open defecation is considerably reduced.	OK	OK			

Checklist (incl. guidance for the verification team)	Item	Reference	Verification (Means and results of assessment)	Team	Comments	Draft Concl .	Final Concl .
			<i>Conclusion:</i> Thus parameter improvement in livelihood of the poor is assessed as positive,				
D. Access to affordable and clean energy services			Households using biogas plants				
a) Measurement / Determination method (VVS, §§ 389, 393, GS Annex I, GS Annex AC, GS Annex G) <i>Describe how the monitoring parameter was measured / determined. Focus primarily on the original data level (ODL) but also describe the applied data aggregation trails (from ODL to data aggregation level zero (DAL0)).</i> <i>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.</i> <i>Assess whether the measurement / determination method is in line with the registered monitoring plan of the PDD and the applied methodology.</i>	/IM01/ /GSP/ /AMS/ /MR/ /BUS/	<i>Description:</i> The project is expected to provide clean and continuous energy supply for cooking purposes across all CPAs as per the GS passports. The same is monitored through the sample survey and accordingly the BUS survey taken for the year 2014 -2015 indicates that the following percentage of users indicated that the project achieved continuous usage of the biogas stove, CPA 1: 99%, CPA 2: 94%, CPA 3: 97%, CPA 4: 96% <i>Verifier's action:</i> The monitoring report and BUS surveys are checked along with GS passports. The survey is taken as per the procedure mentioned in the GS passport and question 1.2 is specifically included for the purpose in the survey questionnaire. Also the verification team during the site visit prepared a specific checklist list and the majority of the biogas digesters are in operation for during the monitoring period. The users indicate that they are getting affordable energy and the operations of the stove are similar to that of the LPG stoves and by click of the knob they are able to lit the stoves. Apart from that they are able to do other livelihood activities like farming, dairying, and poultry from the time they used to spend for collecting firewood earlier. .					



Checklist (incl. guidance for the verification team)	Item	Reference	Verification (Means and results of assessment)	Team	Comments	Draft Concl .	Final Concl .
			<i>Conclusion:</i> Thus parameter access to affordable and clean energy services is assessed as positive,				



ANNEX 2: CALIBRATION DATES AND VALIDITY OF INSTALLED MONITORING EQUIPMENT

Monitoring equipment	Related monitoring parameter as per applicable registered monitoring plan	Serial number	Type	Accuracy or accuracy class	Previous calibration (last calibration before start of this monitoring period)	Calibration date(s) during this monitoring period	Validity of calibration (s)	Delay in calibration : yes/no	Period of delayed calibration
Not applicable No equipment is used for monitoring.	-	-	-	-	-	-	-	☐ No ☐ Yes	From: To:

ANNEX 3: STATEMENTS OF COMPETENCE OF INVOLVED PERSONNEL



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

Mr. Stefan Winter

SCHEME	STATUS	VALID UNTIL
CDM	Senior Assessor (Validation, Verification)	2017-07-27
VCS	Senior Assessor (Validation, Verification)	2017-07-27

Authorization status for technical areas within sectoral scopes:

CODE	TECHNICAL AREA	TR SUBCATEGORIES
1.1	Thermal energy generation	
1.2	Renewable Energy	1.2.1 Hydro 1.2.2 Wind 1.2.3 Geothermal 1.2.4 Solar 1.2.5 Tidal
2.2	Heat distribution	
3.1	Energy demand	
13.1	Waste handling and disposal	13.1.1 Waste management 13.1.2 Waste water management
13.2	Animal waste management	
15.2	Animal waste management	

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163_S01-F103_2014-07-28_rev3.doc



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

Mr. Ezhilarasu G.

SCHEME	STATUS	VALID UNTIL
CDM	Senior Assessor (Validation, Verification)	2017-02-06
VCS / ISO 14064-2	Senior Assessor	2017-02-06

Authorization status for technical areas within sectoral scopes:

CODE	TECHNICAL AREA
1.2	Renewable Energies
3.1	Energy Demand
13.1	Waste Handling and Disposal

130 – Rev. 3, Date: 2014-02-07

130_S01-VAB60-F20_2014-02-07_rev3.doc



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

Mr. Indrapal Parmar

SCHEME	STATUS	VALID UNTIL
CDM	Lead Assessor (Validation, Verification)	2018-01-06
VCS / ISO 14064-2	Lead Assessor	2018-01-06

Authorization status for technical areas within sectoral scopes:

CODE	TECHNICAL AREA	TR SUBCATEGORIES
1.2	Renewable Energies	

191 - Rev. 4, Date: 2015-01-07

191_S01-VAB60-F20_2015-01-07_rev4.doc

**Statement of Competence**

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

Mr. David Lubanga

SCHEME	STATUS	VALID UNTIL
CDM	Lead Assessor (Validation, Verification)	2018-10-20
VCS / ISO 14064-2	Lead Assessor	2018-10-20

Authorization status for technical areas within sectoral scopes:

CODE	TECHNICAL AREA
1.2	Renewables
3.1	Energy demand

251 - Rev. 4, Date: 2015-10-21

**Statement of Competence**

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

Mr. Stefan Winter

SCHEME	STATUS	VALID UNTIL
CDM	Senior Assessor (Validation, Verification) Technical Reviewer	2017-07-27
VCS	Senior Assessor (Validation, Verification) Technical Reviewer	2017-07-27

Authorization status for technical areas within sectoral scopes:

CODE	TECHNICAL AREA
1.1	Thermal energy generation
1.2	Renewables
2.1	Energy distribution
3.1	Energy demand
4.1	Cement and lime production
4.2	Paper
5.2	Caprolactam, nitric and adipic acid
9.1	Aluminium and magnesium production
9.2	Iron, steel and Ferro-alloy production
13.1	Solid waste and wastewater
13.2	Manure

163 - Rev. 4, Date: 2015-01-05

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