# Verification and certification report form for CDM programme of activities

**(Version 03.0)**

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

| BASIC INFORMATION | | |
|---|---|---|
| **Title and UNFCCC reference number of the programme of activities (PoA)** | Nepal Biogas Support Program-PoA (UNFCCC no:9572) | |
| **Version number(s) of the PoA-DD(s) to which this report applies** | 14.0 | |
| **Version number of the verification and certification report** | 2.0 | |
| **Completion date of the verification and certification report** | 06/04/2020 | |
| **Monitoring period number and duration of this morning period** | 01/08/2018 to 30/01/2020 | |
| **Number and version number of the monitoring report to which this report applies** | 03 | |
| **Coordinating/managing entity (CME)** | Alternative Energy Promotion Centre (AEPC) | |
| **Host Parties** | Host Parties of the PoA | Is this a host Party to a CPA covered in this report? (yes/no) |
| | Nepal | Yes |
| **Applied methodologies and standardized baselines** | AMS.I.E. Switch from Non-Renewable Biomass for Thermal Applications by the User (version 04) | |
| **Mandatory sectoral scopes** | Sectoral Scope 1: Energy Industries (renewable/non-renewable sources) | |
| **Conditional sectoral scopes, if applicable** | NA | |
| **Estimated amount of GHG emission reductions or GHG removals for this monitoring period in the included CPAs covered in this report** | 812,641 $tCO_{2e}$ | |
| **Certified amount of GHG emission reductions or GHG removals for this monitoring period for the included CPAs covered in this report** | 725,885 $tCO_2$ e | |
| **Name and UNFCCC reference number of the DOE** | EPIC Sustainability Services Private Limited (E-0062) | |
| **Name, position and signature of the approver of the verification and certification report** |  K.Suryanarayana Murthy, Managing Director | |

## SECTION A. Executive summary

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EPIC Sustainability Services Private Limited (EPIC) has been contracted by Alternative Energy Promotion Centre (AEPC) to undertake the sixth periodic independent verification of the registered CDM programme of activity titled “Nepal Biogas Support Program-PoA” (UNFCCC reference number: 9572), covering 1 to 9 CPA’s. The objective of this verification are to verify and certify emission reductions reported for project activity for the monitoring period of 01/08/2018 to 30/01/2020 (first and last day included); and to verify that the data reported are complete and transparent. This report summarizes the findings of the verification of the project, performed on the basis of UNFCCC criteria for CDM, as well as criteria given to provide for consistent project operations, monitoring and reporting. UNFCCC criteria refer to the Kyoto Protocol, the CDM rules and modalities as agreed in the Bonn Agreement, the Marrakech Accords and the CDM Executive Board’s decisions. The verification team has, based on the recommendations in the Validation and Verification Standard for Programme of activities, Version 2.0[/1/], employed a risk-based approach in the verification, focusing on the identification of significant risks and reliability of project monitoring and generations of CERs. The verification is not meant to provide any consulting towards the client. However, stated request for clarifications and/or corrective actions may provide input for improvement of the project design.

The scope of the verification is the independent and objective review and ex-post determination of the monitored reductions in GHG emission by the project activity. The verification is based on the validated and approved project design document PoA-DD[/2/] version 14.0 dated 13/01/2013 (hereinafter referred to as PoA-DD), corresponding validation report[/3/], CPA-DD’s (CPA 1 to CPA 9), corresponding validation reports[/4/], previous monitoring reports[/5/] and its corresponding verification reports[/6/]. These documents were reviewed against the requirements of the Kyoto Protocol, the CDM Modalities and Procedures and related rules and guidance. The PoA involves the implementation of biogas applications at individual households in Nepal.

The programme of activities reduces GHG emissions due to displacing firewood by biogas from animal waste and human excreta. Only the replacement of non-renewable biomass is counted as emission reduction under CDM for this project. This verification covers CPA-1, CPA-2, CPA-3, CPA-4, CPA-5, CPA-6, CPA-7, CPA-8 and CPA-9. Target group under the Biogas Support Program (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 programmes in Nepal including this POA. The verification team determines the conformity of the actual project activity and its operation with the registered PoA-DD and CPA-DDs. The verification team has, by means of a desk review and an on-site visit, assessed that all physical features of the proposed CDM programme of activity are in place, and that the project participants have operated the CDM project activity as per the PoA-DD and the CPA-DD. Thus the verification team has concluded that the project activity was implemented and operated as per PoA-DD, and that all physical features of the project are in place and comply with para 270 to 273 of VVS-PoA.

The verification team, based on the site visit and document review, was able to conclude that the project activity has been implemented as per the PoA-DD and the CPA-DDs. The start date of this monitoring period is 01/08/2018 which is in line with the UNFCCC project webpage considering the end date of the previous monitoring period. CDM-PoA-VCR-FORM Version 03.0 Page 4 of 39 The monitoring report for this monitoring period is reviewed for compliance with the monitoring plan of the PoA-DD and the CPA-DD’s.

The project activity was registered by applying the small scale methodology AMS.I.E version4.0 and the verification was carried out in accordance with the applied methodology. It was confirmed during the site visit that the project activity during the current periodic verification is in accordance with the applicability criteria of the methodology. It is the responsibility of EPIC to express an independent GHG verification opinion on the GHG emissions reductions and on the calculation of GHG emission reductions from the project for this monitoring period based on the reported emission reduction in the monitoring Report.

EPIC’s verification approach was based on the requirements as defined under the Kyoto Protocol, Marrakech accord, as well as those defined by the CDM Executive board. EPIC’s approach was risk-based, drawing on an understanding of the risks associated with reported GHG emissions data and the controls in place to mitigate these. The examination includes assessment of evidence relevant to the amounts and disclosures in relation to the project’s GHG emission reductions for this monitoring period. The verification team has planned and performed the work to obtain the information and explanations that is considered necessary to provide sufficient evidence for it to give reasonable assurance that the amount of calculated GHG emission reductions for this monitoring period were fairly stated.

## SECTION B. Verification team, technical reviewer and approver

### B.1. Verification team members

| No. | Role | Type of resource | Last name | First name | Affiliation (e.g. name of central or other office of DOE or outsourced entity) | Involvement in | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Desk/document review | On-site inspection | Interview(s) | Verification findings |
| 1. | Team Leader | IR | D | Siddaramu | EPIC, Central office, Bangalore | √ | √ | √ | √ |
| 2. | Technical Expert | ER | Sujan | Adhikari | | √ | √ | √ | √ |

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

| No. | Role | Type of resource | Last name | First name | Affiliation (e.g. name of central or other office of DOE or outsourced entity) |
|---|---|---|---|---|---|
| 1. | Technical reviewer | IR | Vijayaraghavan | Radhamadhavan | EPIC, Central office, Bangalore |

## SECTION C. Application of materiality in conducting the verification

### C.1. Consideration of materiality in planning the verification

| No. | Risk that could lead to material errors, omissions or misstatements | Assessment of the risk | | Response to the risk in the verification plan and/or sampling plan |
|---|---|---|---|---|
| | | Risk level | Justification | |
| 1. | Errors in manual transfer of records from handwritten information to excel spread sheets (including misstatements & omissions) | Medium | Likely human error during data transfer and ineffective QA/QC procedures | During document review and on-site visit, complete review of the data transfer process and the cross-check mechanism followed by the PP needs to be checked |
| 2 | Operational percentage of digesters for each of the 8 CPA"s under monitoring | Medium | Monitoring process is not complicated, but involvement of untrained personnel for BUS survey may give erroneous data | Following will be checked:-<br>➢ Survey procedures<br>➢ Selection of survey personnel<br>➢ Trainings provided to the survey personnel (training modules, attendance sheet etc.,)<br>➢ Cross check of BUS reports information with actual site data |

### C.2. Consideration of materiality in conducting the verification

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In line with Guidelines for Application of materiality in verification, a reasonable level of assurance is defined for the verification of the project by complete verification of all the values indicated in the emission reduction spread sheet and the referred documents, at the document review stage and onsite visit

| Parameter | Verification approach | Error identified | Findings reference | Correction | Extrapolated error for population size (Qty and %) |
|---|---|---|---|---|---|
| P - The share of digesters operational, "%" | Acceptance sampling | Yes | CAR Applicable | No | Impact (Materiality threshold not exceeded) |

The identified/selected materiality threshold for the PoA under current monitoring period is 5% as PoA is small scale in accordance with para 308 of CDM VVS for PoA, Version 2.0. As per the on-site verification audit plan, visits to households were planned between 26/02/2020 to 05/03/2020. However, due to a strike called (https://ekantipur.com/news/2020/03/03/158322344593125624.html), the last two days site visit was cancelled and these households were interviewed over phone on 04/03/2019. Apart from this deviation from the audit plan, no major revision to the overall plan.

## SECTION D. Means of verification

### D.1. Desk/document review

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The verification was performed primarily based on the review of the monitoring report[7], PoA-DD, CPA-DDs, its corresponding validation reports and the supporting documentation. This process included review of data and information presented to verify their completeness and review of the monitoring plan and monitoring methodology, paying particular attention to the frequency of measurements, and the QA/QC procedures, and an evaluation of data management and the QA/QC system in the context of their influence on the generation and reporting of emission reduction. The monitoring report version01 (hereinafter referred to as initial MR) submitted by the project participant and additional background documents related to the emission reductions are reviewed as an initial step of the verification process. The subsequent step involved the identification of corrective action requests and clarification requests (CAR and CL) which are presented in Appendix 4 of this report. A complete list of all documents and records reviewed is as attached in Appendix 3 of this report.

## D.2. On-site inspection

| Duration of on-site inspection: 26/02/2020 to 05/03/2020 | | | | |
|---|---|---|---|---|
| **No.** | **Activity performed on-site** | **Site location** | **Date** | **Team member** |
| 1. | The verification team conducted visits to the project site to confirm the information and to resolve issues identified in the document review. An on-site assessment was conducted as a part of verification activity and involved:<br>➢ an assessment of the implementation and operation of the CDM programme of activity as per the PoA-DD and the CPA-DD's<br>➢ a review of information flows for generating, aggregating and reporting of the monitoring parameters<br>➢ interviews with relevant personnel to confirm that the operational and data collection procedures are implemented in accordance with the Monitoring Plan<br>➢ a cross-check between information provided in the MR and data from other sources<br>➢ a check of the monitoring equipment including calibration performance, and observations of monitoring practices against the requirements of the PoA-DD and the applied methodology<br>➢ a review of calculations and assumptions made in determining the GHG data and ERs, and<br>➢ an identification of QA/QC procedures in place to prevent, or identify and correct, any errors or omissions in the reported monitoring parameters Digestors of Nepal | Digestors in localities of Dhading, Lamjung, Tanahun, Palpa, Kaski, Rupandehi, Nawalparasi, Chitwan, Darchula and Sankhuwasabha districts of Nepal covering Hill, Terai and Remote Hill regions | 26/02/2020 to 05/03/2020 | Dr D Siddaramu and Mr Sujan Adhikari |

## D.3. Interviews

| No. | Interviewee | | | Date | Subject | Team member |
|---|---|---|---|---|---|---|
| | **Last name** | **First name** | **Affiliation** | | | |
| 1. | Pokhrel | Prem Kumar | Climate and Carbon Financing Expert, AEPC | 26/02/2020 - 05/03/2020 | Performance of project activity - Project Implementation MR, CER sheets, Sampling, Monitoring, Data management and reporting, QA/QC systems, logistics, interactions with Biogas end users and Biogas companies, Internal quality, Documentation, Record keeping, Customer complaints | Dr.D.Siddaramu and Mr.Sujan Adhikari |
| 2. | Dhakal | Nawa Raj | Director, AEPC | 05/03/2020 | Performance of project activity - Project | |
| 3. | Laudari | Raju | Assistant | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | Director, AEPC | | Implementation, correctness of data captured in the Monitoring, Data management and reporting, QA/QC – Subsidy check list, double counting etc | |
| 4. | Thapa | Rana Bahadur | Sr. Officer, AEPC | | | |
| 5. | Ghimire | Mukesh | Sr. Officer, , AEPC | | | |
| 6. | Thapa | Lawa Kumar | Socio-economist, AEPC | | | |
| 7. | Khanal | Ishwar Chandra | Planning Officer, AEPC | | | |
| 8. | 10 Biogas companies[1] | | Biogas digestors implementation Companies | 26/02/2020 - 05/03/2020 | Construction, Agreements, complaint management, Repairs, User trainings, spares availability, interactions with the end users, scheduled inspections | |
| 9. | Neupane | Bibek Kanta | Sustainable Energy and Technology Management P. Ltd. (SETM) Kathmandu, Nepal | 05/03/2020 | Modalities of user survey carried out, training to enumerators etc | |
| 10. | 66 sampled HH's and 10 non-sampled HH's | Sampled and non-sampled households | Biogas households | 26/02/2020 - 03/03/2020 (During onsite visit) | Status of Biogas digester operation and its usage, operation and maintenance, and availability of trained personnel, down times, (if any), reasons for non-usage, cattle availability, fuels used for cooking, no of persons in house, spares availability etc | |
| 11. | 41 households over telephone | | | 04/03/2020 (Telephonic interview) | | |

[1]

1. Bageshwori Gobargas Company Pvt.Ltd. (BGG)
2. Bhrikuti Gobargas Company Pvt. Ltd. (BRI)
3. Dipsikha Urja Bikas Company Pvt. Ltd. (DUV)
4. Gandaki Gobargas Company Pvt. Ltd. (GGK)
5. Himal Energy Development Pvt. Ltd. (HED)
6. Janta Urja Bikas Company Pvt. Ltd. (JGG)
7. Marsyangdi Gobargas tatha Urja Bikas Pvt. Ltd. (MUC)
8. Public Biogas tatha Urja Bikas Company Pvt. Ltd. (PGC)
9. Pragati Bioenergy Pvt. Ltd. (PGG)
10. Rastriya Gobargas Nirman Tatha Sewa Pvt. Ltd. (RGG)

## D.4. Sampling approach

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The verification team used acceptance sampling approach for checking the operational status of the biodigestors. A sample size of 61 was required, based on an AQL of 0.5% and UQL of 0.5%, the producer risk used is 5% and consumer risk used was 5%. In accordance with the para table on page no.11 of "Sampling and surveys for CDM project activities and programmes of activities", version 07.0[/8/]

However, the verification team visited 66 households (and an additional 10 non-sampled households) in localities of Dhading, Lamjung, Tanahun, Palpa, Kaski, Rupandehi, Nawalparasi, Chitwan, Darchula and Sankhuwasabha districts of Nepal covering Hill, Terai and Remote Hill regions. It was observed that 01 HH (i.e., PGG10220-Sunita Bhujel, Lamjung) was not working during the visit) and all other i.e., 60 were working in good condition and no discrepant records were observed with the published MR and survey sample records. Apart from this an additional of 41 HH's were contacted through phone and found working in good condition except 01 HH (i.e., HED01812 - Ambika Tamang, Chitwan) and no discrepant records were observed with the published MR and survey sample records. Thus PP's set of records has been accepted. Refer Appendix 5 for HH's and CPA details.

## D.5. Clarification requests, corrective action requests and forward action requests raised

| Areas of verification findings | No. of CL | No. of CAR | No. of FAR |
|---|---|---|---|
| **General** | | | |
| Compliance of the monitoring report with the monitoring report form | - | - | - |
| Remaining forward action requests from validation and/or previous verifications | - | - | FAR01, FAR02 and FAR03 |
| CPAs considered for verification and covered in this report | - | - | - |
| **Programme of activities** | | | |
| Compliance of the programme implementation with the registered PoA-DD | - | - | - |
| Implementation and operation of the management system | - | - | - |
| Post-registration changes | - | - | - |
| • Corrections | - | - | - |
| • Inclusion of a monitoring plan | - | - | - |
| • Permanent changes to the registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines, or other methodological regulatory documents[2] | - | - | - |
| • Changes to the programme design | - | - | - |
| • Addition of CPA inclusion template | - | - | - |
| • Change of coordinating/managing entity | - | - | - |
| • Changes specific to afforestation and reforestation activities | - | - | - |
| **Component project activities** | | | |
| Compliance of the CPA implementation with the included CPA design document | - | - | - |
| Post-registration changes | - | - | - |
| • Temporary deviations from registered monitoring plan, applied methodologies, standardized baselines or other methodological regulatory documents | - | - | - |
| • Corrections | - | - | - |
| • Changes to the start date-of the crediting period | - | - | - |
| • Inclusion of a monitoring plan | - | - | - |
| • Permanent changes to the registered monitoring plan, or permanent deviation of monitoring from | - | - | - |

[2] Other standards, methodologies, methodological tools and guidelines (to be) applied in accordance with the applied (selected) methodologies are collectively referred to as the other (applied) methodological regulatory documents).

| | | | |
|---|---|---|---|
| the applied methodologies, standardized baselines, or other methodological regulatory documents | | | |
| • Changes to the project design | - | - | - |
| • Changes specific to afforestation and reforestation activities | - | - | - |
| Compliance of the registered monitoring plan with applied methodologies and standardized baselines | - | - | - |
| Compliance of monitoring activities with the registered monitoring plan | - | - | - |
| • Data and parameters fixed ex ante or at renewal of crediting period | - | - | - |
| • Data and parameters monitored | - | - | - |
| • Implementation of sampling plan | - | - | - |
| Compliance with the calibration frequency requirements for measuring instruments | - | - | - |
| Assessment of data and calculation of emission reductions or net removals | - | - | - |
| • Calculation of baseline GHG emissions or baseline net GHG removals by sinks | - | - | - |
| • Calculation of project GHG emissions or actual net GHG removals by sinks | CL03 | - | - |
| • Calculation of leakage GHG emissions | - | - | - |
| • Summary of calculation of GHG emission reductions or net GHG removals by sinks | - | - | - |
| • Comparison of actual GHG emission reductions or net GHG removals by sinks with estimates in included CPA | CL09 | - | - |
| • Remarks on difference from estimated value in included CPA | - | - | - |
| Assessment of reported sustainable development co-benefits | - | - | - |
| Global stakeholder consultation | - | - | - |
| Others (please specify) | | | |
| 1. Operational and Non-operational biodigestors | CL01, CL02 | - | - |
| 2. Double counting | CL04 | - | - |
| 3. QA/QC procedures | CL05 | - | - |
| 4. User survey and Survey questionnaires | CL06, CL08 and CL10 | - | - |
| 5. Operational percentage of biogas digestors | CL07 | - | - |
| 6. Records/documents for verification | - | CAR01 and CAR02 | - |
| **Total** | 10 | 02 | 03 |

## SECTION E. Verification findings

### E.1. General

### E.1.1. Compliance of the monitoring report with the monitoring report form

| | |
|---|---|
| **Means of verification** | As per VVS-PoA version 2.0, the verification team has determined whether the monitoring report was completed using the valid version of the applicable monitoring report form. The verification team has checked whether all the sections of the monitoring report follows the guidelines provided in the template itself |
| **Findings** | There is no CAR/CL raised in this section. |
| **Conclusion** | The verification team has concluded that the monitoring report was completed using the valid version (i.e., CDM-PoA-MR-FORM, version 03)[/9/] of the applicable monitoring report form and is followed the guidelines given in the template itself. |

### E.1.2. Remaining forward action requests from validation and/or previous verifications

>>

This is the sixth verification and the verification team has reviewed the validation report and previous verification reports and observed that there is 02 open issues i.e., 02 FARs from the fifth verification and 01 FAR from CPA-9 inclusion. Verification team has not raised any FARs during this verification process.

### E.1.3. CPAs considered for verification and covered in this report

| Title and UNFCCC reference number of the CPA included in the PoA as of the end of this monitoring period | Is the CPA considered for this verification? (yes/no) | The date when the CPA was included | Version of the PoA-DD | Confirmation that a request for issuance including the CPA has been published for the previous monitoring period (Y/N) |
|---|---|---|---|---|
| Nepal Biogas Support Program-CPA 1: 20,000 digesters (9572-0001) | Yes | 31 Jan 2013 | 14.0 | Y |
| Nepal Biogas Support Program - CPA 2: 19,927 digesters (9572-0002) | Yes | 08 May 2014 | 14.0 | Y |
| Nepal Biogas Support Program - CPA 3: 19,959 digesters (9572-0003) | Yes | 08 May 2014 | 14.0 | Y |
| Nepal Biogas Support Program - CPA 4: 19,970 digesters (9572-0004) | Yes | 08 May 2014 | 14.0 | Y |
| Nepal Biogas Support Program - CPA 5: 19,842 digesters (9572-0005) | Yes | 25 Aug 2014 | 14.0 | Y |
| Nepal Biogas Support Program - CPA 6: 18,504 digesters (9572-0006) | Yes | 08 Jul 2015 | 14.0 | Y |
| Nepal Biogas Support Program - CPA 7: 18,392 digesters (9572-0007) | Yes | 08 Jul 2015 | 14.0 | Y |
| Nepal Biogas Support Program - CPA 8: 19,445 digesters (9572-0008) | Yes | 01 Feb 2017 | 14.0 | Y |
| Nepal Biogas Support Program - CPA 9: 17,304 digesters (9572-0009) | Yes | 15 May 2019 | 14.0 | Y |

## E.2. Programme of activities

### E.2.1. Compliance of the programme implementation with the registered programme design document

<table>
<tr><td>Means of verification</td><td>The verification team determined the conformity of the actual project activity and its operation with the registered project design document. EPIC has, by means of a desk review and an onsite visit, assessed that all physical features of the proposed CDM project activity proposed in the PoA-DD and CPA-DDs are in place, and that the PP/CME has operated the CDM project activity as per the registered PDD.</td></tr>
<tr><td>Findings</td><td>There is no CAR/CL raised in this section.</td></tr>
<tr><td>Conclusion</td><td>The verification team determines the conformity of the actual project activity and its operation with the approved project design document. The verification team has, by means of a desk review and an on-site visit, assessed that all physical features of the proposed CDM project activity proposed in the PoA-DD and CPA-DDs are in place, and that the project participants have operated the CDM project activity as per the PoA-DD and CPA-DDs. Biogas digestors are installed at various locations across Nepal.<br><br>Technical details of digesters:- The technologies used in this CPAs are household biogas digesters with a sludge and gas holding capacity range of up to 10 $m^3$ . The different sizes of the digesters that are included in the programme are of 2, 4, 6, 8 and 10 $m^3$. The programme uses only one uniform design i.e., GGC 2047 model across all the 9 CPAs, this is confirmed through physical inspections of the installed bio digesters, interview with the households and the technology suppliers. Further, the owner’s name, size of the plant, installation date and its operational status, ID number, utilisation of other fuels in the house were verified through interview and visual observation. This information is also verified to be in line with the biogas user survey report. Detail of CPAs implemented under Nepal Biogas Support Program PoA covered in this MR period:-<br><br>
<table>
<tr><th>Ref</th><th>CPA title</th><th>Number of Digesters</th><th>Construction Start Date</th><th>Construction End Date</th></tr>
<tr><td>9572-0001</td><td>Nepal Biogas Support Program- CPA 1: 20,000 digesters</td><td>20,000</td><td>22/06/2007</td><td>18/03/2009</td></tr>
<tr><td>9572-0002</td><td>Nepal Biogas Support Program – CPA 2: 19,927 digesters</td><td>19,927</td><td>19/03/2009</td><td>09/03/2010</td></tr>
<tr><td>9572-0003</td><td>Nepal Biogas Support Program – CPA 3: 19,959 digesters</td><td>19,959</td><td>10/03/2010</td><td>19/02/2011</td></tr>
<tr><td>9572-0004</td><td>Nepal Biogas Support Program – CPA 4: 19,970 digesters</td><td>19,970</td><td>20/02/2011</td><td>28/02/2012</td></tr>
<tr><td>9572-0005</td><td>Nepal Biogas Support Program – CPA 5: 19,842 digesters</td><td>19,842</td><td>29/02/2012</td><td>23/05/2013</td></tr>
<tr><td>9572-0006</td><td>Nepal Biogas Support Program – CPA 6: 18,504 digesters</td><td>18,504</td><td>24/05/2013</td><td>04/04/2014</td></tr>
<tr><td>9572-0007</td><td>Nepal Biogas Support Program – CPA 7: 18,392 digesters</td><td>18,392</td><td>05/04/2014</td><td>31/12/2014</td></tr>
<tr><td>9572-0008</td><td>Nepal Biogas Support Program – CPA 8: 19,445 digesters</td><td>19,445</td><td>01/01/2015</td><td>08/04/2016</td></tr>
<tr><td>9572-0009</td><td>Nepal Biogas Support Program - CPA 9: 17,304 digesters</td><td>17,304</td><td>09/04/2016</td><td>12/07/2018</td></tr>
<tr><td>Total</td><td></td><td>173,343</td><td></td><td></td></tr>
</table>
<br>Contract signed between BSP Nepal and AEPC[10] (as national service provider for</td></tr>
</table>

| | |
|---|---|
| | installation of bio digesters in households across Nepal), database maintained by BSP Nepal (construction date information) and the construction progress report issued by BSP Nepal to AEPC were reviewed for the implementation of the bio-digesters.<br><br>Thus the verification team has concluded that the project activity was implemented and operated as per registered PoA-DD/CPA-DD's. The verification team, based on the site visit and document review, was able to conclude that the project activity has been implemented as per the PoA-DD/CPA-DD's and that all physical features of the project are in place. |

### E.2.2. Implementation and operation of the management system

| | |
|---|---|
| **Means of verification** | The verification team carried out onsite visits for the CPAs and interviewed key personnel and several households (sampled and non-sampled). Interviewees included the CME, project developer and the company who takes care of maintenance activity. It was established that the programme management system has been implemented and operated as described in the registered PoA-DD and CPA-DDs. |
| **Findings** | There is no CAR/CL raised in this section. |
| **Conclusion** | Based on document review, interview of management personnel, stakeholder interview, on-site verification, the verification team confirms the implementation and operation of the management system included in the registered PoA-DD and CPA-DDs. |

### E.2.3. Post-registration changes

#### E.2.3.1. Corrections

>> There are no corrections in this monitoring period; however there were some corrections previously (Refer MR p10 of 22).

#### E.2.3.2. Inclusion of a monitoring plan

>> Not applicable

#### E.2.3.3. Permanent changes to the registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines, or other methodological regulatory documents

>> Not applicable

#### E.2.3.4. Changes to the programme design

>> Not applicable

#### E.2.3.5. Addition of CPA inclusion template

>> Not applicable

#### E.2.3.6. Change of coordination/managing entity

>> Not applicable

#### E.2.3.7. Changes specific to afforestation and reforestation activities

>> Not applicable

## E.3. Component project activities

### E.3.1. Compliance of the CPA implementation with the included CPA design document

| | |
|---|---|
| **Means of verification** | As per VVS version 2.0, the verification team determined the conformity of the actual project activity and its operation with the registered project design document. The verification team has, by means of a desk review and an onsite visit, assessed that all physical features of the proposed CDM project activity proposed in the PoA-DD and CPA-DDs are in place, and that the project participants have operated the |

| | |
|---|---|
| | CDM project activity as per the PoA-DD. |
| **Findings** | There is no CAR/CL raised in this section. |
| **Conclusion** | The verification team determines the conformity of the actual project activity and its operation with the approved PoA-DD and CPA-DDs. CPA-1 to CPA-9 were also confirmed to be operational in accordance with the registered CPA-DDs. The verification team has, by means of a desk review and an on-site visit, assessed that all physical features of the proposed CDM project activity proposed in the PoA-DD and CPA-DDs are in place, and that the project participants have operated the CDM project activity as per the PoA-DD and CPA-DDs.<br><br>Assessment of double counting: National Service Provider (NSP) registers all households that implement a digester under its BSP program, since the digester implementation, under the project, is done through subsidy scheme, BSP does not allow more than one digester to be implemented per household. Each digestor implemented under the CPA is given a unique identification code (biogas digestor code), the plant completion report also captures the GPS coordinates and the PoA database[11] captures the details of the digestors along with the geographical identification. The registration procedure of the BSP database does not allow double entries, and the system rejects if the same unique code is entered twice. This has been demonstrated by the CME to the verification team. BSP database is the basis for the disbursement of the subsidy and thus remains a credible source to check double counting of digesters. Moreover, all the digesters implemented under all CPAs of the PoA are centrally maintained by the CME, thus the possibility of double counting of the digesters between and within CPAs is checked. It is also conformed from CME that, all the biogas digestors that are implemented under subsidy programme comes under BSP only. The verification team has also checked the unique identity number engraved on the pipe of digesters, for all the digestors visited during the site visit and found it to be consistent with the data base maintained. |

### E.3.2. Post-registration changes

#### E.3.2.1. Temporary deviations from the registered monitoring plan, applied methodologies, standardized baselines or other methodological regulatory documents

>> There is no temporary deviation for this monitoring period to the registered monitoring plan or applied methodology or any methodological regulatory documents in the PoA-DD and CPA-DDs.

#### E.3.2.2. Corrections

>> There are no corrections in this monitoring period, however during first periodic verification PRC correction related to information of distribution of biogas digesters across different ecological zones in CPA-1 was sought and the same was approved on 22nd June 2015. The total number of biogas plants included in CPA-1 for this crediting period is 20,000. However, one biogas which was found abandoned during last verification in Ilam district was not considered for ER calculation. So, total plants considered for the ER calculation for this monitoring period is 19,999.

#### E.3.2.3. Changes to the start-date of the crediting period

>> Not applicable

#### E.3.2.4. Inclusion of a monitoring plan

>> Not applicable

#### E.3.2.5. Permanent changes to the registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines, or other methodological regulatory documents

>> Not applicable

#### E.3.2.6. Changes to the project design

>> Not applicable

### E.3.2.7. Changes specific to afforestation and reforestation activities

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

### E.3.3. Compliance of the registered monitoring plan with applied methodologies and standardized baselines

| | |
|---|---|
| **Means of verification** | The verification team determined whether the registered monitoring plan is in accordance with the applied methodology including applicable tools. |
| **Findings** | There is no CAR/CL raised in this section. |
| **Conclusion** | The verification team was is able to confirm that the monitoring plan contained in the PDD is in accordance with the small scale methodology AMS.I.E version 4.0/12/ and its applicable tools. The monitoring report for this monitoring period is in compliance with the monitoring plan of the PoA-DD/CPA-DD. The project activity was registered by applying the small scale methodology AMS.I.E version 4.0 and the verification was carried out in accordance with the applied methodology. It was confirmed during the site visit that the project activity during the current periodic verification is in accordance with the applicability criteria of the methodology. |

### E.3.4. Compliance of monitoring activities with the registered monitoring plan

### E.3.4.1. Data and parameters fixed ex ante or at renewal of crediting period

| | |
|---|---|
| **Means of verification** | The verification team has determined whether all ex-ante parameters used for emission reduction calculation stated in the registered monitoring plan are used appropriately as per the registered PDD. |
| **Findings** | There is no CAR/CL raised in this section. |
| **Conclusion** | The following data and parameters fixed ex-ante were checked by the verification team to be in line with registered CPA-DD (for CPA-1, CPA-2, CPA-3, CPA-4, CPA-5, CPA-6, CPA-7, CPA-8 and CPA-9s): |

| Parameter | Description | Value |
|---|---|---|
| $NCV_{biomass}$ TJ/tonne | Net calorific value of the non-renewable biomass that is substituted | 0.0156 TJ/tonne, taken from IPCC/13/ |
| $EF_{projected\_fossil\ fuel}$ $tCO_2/TJ$ | Emission factor for the projected fossil fuel consumption in the baseline | 81.6 $tCO_2/TJ$, taken from approved small scale methodology AMS I.E. (version 4.0) |
| $f_{NRB,y}$ % | 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 | 86%, taken from "Default values of fraction of non-renewable biomass for Least Developed Countries and Small Island Developing States (version 01.0)" EB 67 Annex 22/14/ |
| $Q_{NRBrepl}$ Tonne per year and appliance | Quantity of woody biomass that is substituted or displaced in tonnes per year and appliance | 3.33<br>Calculated<br><br>-As per paragraph 6 (a) of the methodology $B_y$ *represents: The estimated average annual consumption of woody biomass per appliance (tonnes/year) derived from surveys or historic information.*<br>-As per SSC WG clarification SSC 543 the estimate can be fixed ex-ante |
| $N_{s,r}$ | Number of digesters in | Taken from CPA database (BSP |

| | | | |
|---|---|---|---|
| | Numbers | each size category (in $m^3$) and region (Terai, Hill and, if available, Remote Hill or Mountain) implemented under the each CPAs | Database). The registration procedure of the BSP database avoids double counting of digesters and the registration of digesters that have not been commissioned. The BSP database is the basis for subsidy disbursement. The data used to maintain this database is gathered according to defined procedures, making it a reliable source of information. |

### E.3.4.2. Data and parameters monitored

| | |
|---|---|
| **Means of verification** | The verification team has determined whether the registered monitoring plan has been properly implemented and followed by the PP that the monitoring has been carried out in accordance with the registered monitoring plan. |
| **Findings** | There is no CAR/CL raised in this section. |
| **Conclusion** | As per the registered monitoring plan, "P" the share of digesters operational (based on the total number implemented using non-renewable biomass) is the only parameter that needs to be monitored. This parameter is the weighted average calculated value across all ecological zones obtained from annual biogas users survey/15/. Survey procedures adopted in determining the monitored value is verified to be as per the applicable standards and relevant requirement. QA/QC procedures followed for the MR period is appropriate |

| CPA and its monitored value | Source |
|---|---|
| CPA1 - 75.71%<br>CPA2 - 88.27%<br>CPA3 - 80.22%<br>CPA4 - 85.73%<br>CPA5 - 93.86%<br>CPA6 - 79.31%<br>CPA7 - 81.76%<br>CPA8 - 90.16%<br>CPA9 - 95.55% | BUS Report 2018/19/15/ (i.e., 10 February - 05 April 2019 for CPA-1 to CPA-8 and between 20 May 2019 - 31 May 2019 for CPA-9) |

As per the QA/QC procedure for the parameter detailed in the registered PoA-DD and CPA-DD's, "The Internal Quality Control system samples 5% of the digesters that are newly implemented, 2.5% of the digesters that are two year in operation and 2.5% of the digesters that have been operational for three years as part of the Internal Quality Control System". Survey of those households were conducted from 10 February - 05 April 2019 for CPA-1 to CPA-8 and between 20 May 2019 - 31 May 2019 for CPA-9. The enumerators were trained on structured questionnaire for 3 days. Enumerators were mobilized in a group of two persons. Having accumulated the data collected during the survey, the consultant analyzed the data using appropriate tools and prepared the "Biogas User Survey" report for individual CPAs.

Conclusion: Review of BUS (Biogas User Survey) reports confirms that the values are correct, and it is further confirmed that the same values are applied in the revised ER spread sheet (Version 2.0)/16/ and MR (Version 03)/17/. As per the QA/QC procedure for the parameter detailed in the registered PoA-DD, the internal quality control system shall sample 5% of the digesters that are newly implemented, 2.5% of the digesters that are in operation for two years and 2.5% of the digesters that are in operation for three years. If, for the digesters listed in the CPA, the outcome of this survey is a lower percentage than the outcome of the operation report (as e.g. included to BUS), the lower of the two values is used. After the three years after sales service is over, this value will depend on the performance report or other monitoring reports. Since the After Sales Service (ASS) period of three years is already over for CPA-1, CPA-2, CPA-3, CPA-4, CPA-5, CPA-6, CPA-7, CPA-8 and CPA-9 the values of the emission reduction monitoring survey (BUS) has been taken for emission reduction calculation. It is confirmed by

| | |
|---|---|
| | the verification team that the QA/QC procedures as defined in the registered PoA-DD/CPA-DD are compiled for this monitoring period. Further, the conformation of replacing non-renewable biomass was also detailed in the MR, whose information is sourced from the BUS survey. The verification team accepts the information provided related to replacement of non-renewable biomass, on-site visit and interaction with the households confirms the same. |

### E.3.4.3. Implementation of sampling plan

| | |
|---|---|
| **Means of verification** | The verification assessed whether the compliance of the sampling efforts and surveys with the registered sampling plan in accordance with the Guideline for sampling and surveys for CDM project activities and programme of activities"/18/ version 4.0, if PP had applied a sampling approach to determine data and parameters monitored. |
| **Findings** | There is no CAR/CL raised in this section. |
| **Conclusion** | The parameter "P", "the share of digesters operational (based on the total number implemented using non-renewable biomass)", is determined through sampling. Ex-post Monitored parameter through survey mainly includes identification of non-operational biogas plants and assessment of Non Renewable source of biomass. The Biogas Users Survey (BUS) is carried out annually for each CPA, for the current MR period the survey is carried out for all the nine CPAs (01 to 09)<br><br>Sample size was determined using stratified random sampling in consistent with the monitoring plan of the registered PoA-DD, respective CPA-DDs (01 to 09), and the Guidelines for sampling and surveys for CDM project activities and programme of activities. The sampling was performed within the level of precision of 10% and a confidence level of 90%. The verification team has reviewed the sampling approach through onsite visit interview and by the review of the methodology followed by the surveying entity (Sustainable Energy and Technology Management Pvt. Ltd (SETM)). The sampling method adopted in all the individual survey of the 9 CPA"s is verified to be in compliance with the guideline. The sample size is calculated using stratified random sampling technique and the resulting sample are proportionately distributed among various sizes of the biogas plant belonging to each of the three strata i.e., i) Hill, ii) Remote Hill and iii) Terai. First, the minimum sample required for each CPAs were calculated using the equation given in annex 4 of PoA-DD and then the samples were proportionately allocated for each stratum.<br><br>a) Sample size calculation - Sample size was calculated using equation given in annex 4 of PoA-DD, the value of "p", (the proportion of biogas digester expected to be operational) is taken from the observed operational status of biogas plants in remote hills, hills and Terai, in the previous biogas user survey for each CPA. However, to avoid non-response and answer bias, the sample size is enlarged to 135 for each CPA, instead of the required minimum.<br><br>b) Allocation of samples - Samples are allocated in two different ways to maintain the representativeness within the CPA. First, samples are allocated proportionally to ecological belts and development regions 1 based on proportion of biogas installed in these two areas. Secondly, sample were allocated to size of biogas (i.e., 2, 4, 6, 8, 10 $m^3$). First samples were proportionately allocated to the cluster and later the distribution of samples among different size of the digester was ensured. Samples allocated in each development regions and ecological belts is also almost equivalent to the proportion of Biogas plants installed in each regions and belts.<br><br>c) Selection of districts and primary sampling units One district from each cluster from the ecological zone/development region matrix was selected randomly while selecting the districts. The sample is drawn randomly and distributed proportionately to the number of digester per ecological zones, regions, and digester size. While selecting the primary sampling unit and households the CME has used "randbetween" function in Excel. The verification team has reviewed the screenshots for the same for the conformance.<br><br>The samples in the development regions, size of digesters are adjusted for the ease of the accessibility and data collection by the CME, but this has been kept in- |

line with the minimum sample required for the CPA and the minimum proportionate sample for each stratum (Remote Hill, Hill and Terai). For instance, minimum sample required for each stratum of the CPA-1 are calculated as 1, 38 and 46 respectively for Remote Hill, Hill and Terai (as reviewed from sample calculation sheet). Number of sample adjusted for Remote Hill, Hill and Terai are 4, 58 and 73 respectively which comply with the minimum required sample for each stratum as per PoA-DD.

Thus, it is confirmed by the verification team that the CME has applied stratified random sampling approach for the current monitoring period, and this is verified to be as per the applied monitoring methodology and the PoA/CPA-DD.

The verification team has reviewed the correctness of the samples in the BUS report by the independent agency "Sustainable Energy and Technology Management P. Ltd." (SETM) for all the 9 CPA's for the current MR period. It is confirmed that the survey has been carried out as per EB Guidelines for sampling and surveys for CDM project activities and programme of activities. The age, educational qualifications, prior experience in conducting similar survey's and training to the enumerators, questionnaire used in the survey were verified by the verification team.

| CPA's | Total no of Biogas Plants installed | Weighted average operational status | Survey period | Samples surveyed |
|---|---|---|---|---|
| **CPA-1** | 20,000 | 75.71% | 10/02/2019 – 05/04/2019 for CPA-1 to CPA-8 and between 20/05/2019 – 31/05/2019 for CPA-9 | 135 |
| **CPA-2** | 19,927 | 88.27% | | 135 |
| **CPA-3** | 19,959 | 80.22% | | 135 |
| **CPA-4** | 19,970 | 85.73% | | 135 |
| **CPA-5** | 19,842 | 93.86% | | 135 |
| **CPA-6** | 18,504 | 79.31% | | 135 |
| **CPA-7** | 18,392 | 81.76% | | 135 |
| **CPA-8** | 19,445 | 90.16% | | 135 |
| **CPA-9** | 17304 | 95.55% | | 135 |

As per the registered CPA-DD"s the CPA implementer has to conduct biennial monitoring but they have done annual monitoring and adequately considered 135 samples.

Reliability and precision calculation:

The verification team has verified the sample size calculation spread sheets with the monitored data, where the actual achieved precision is calculated against the guidelines outlined under "Standard for sampling and surveys for CDM project activities and programme of activities", and confirm that the calculation of achieved reliability was done correctly. The verification team confirmed from the sample size calculation spread sheet that the required precision was kept 10% during sample size calculation.

The section 3.1 of the BUS (Biogas User Survey) 2018-19 for each of the CPAs are checked and found that the sampling error calculated by the survey firm is less than 10% for all the CPAs, which is the acceptable as the PP took 90/10 confidence level.

| CPA's | Precision achieved (%) | Is required precision achieved? (<10%) |
|---|---|---|
| **CPA-1** | 8.1 | Yes |
| **CPA-2** | 5.1 | Yes |
| **CPA-3** | 7.0 | Yes |
| **CPA-4** | 5.5 | Yes |
| **CPA-5** | 3.6 | Yes |
| **CPA-6** | 7.2 | Yes |

| | | | |
|---|---|---|---|
| | **CPA-7** | 6.3 | Yes |
| | **CPA-8** | 4.5 | Yes |
| | **CPA-9** | 3.0 | Yes |

From the above table, it is conformed that sampling was performed within the desired level of precision of 10% and a confidence level of 90%, for the monitored parameters, and therefore the survey results were directly used in the ER calculations.

Thus the verification team concluded that the sampling requirements are adequately met and accepted the results as presented in the monitoring BUS reports.

It is observed that, all the biogas digesters sold are registered under BSP Nepal database and their operational performance is monitored through field surveys of a random sample of the installed digesters in the households. The biogas production in the digester is not required to be metered. The number of digesters in operations is determined in terms of %, it is calculated by identifying the no of digesters that are operational against the no of digesters that are sold. This approach is verified to be as per the validated PoA-DD and CPA-DD's.

### E.3.5. Compliance with the calibration frequency requirements for measuring instruments

| | |
|---|---|
| **Means of verification** | Not applicable as there is no monitoring equipment involved as per the registered monitoring plan in the PoA-DD and CPA-DD |
| **Findings** | There is no CAR/CL raised in this section. |
| **Conclusion** | The project activity does not involve any monitoring instruments that require calibration; hence no further assessment is done. |

### E.3.6. Assessment of data and calculation of emission reductions or net removals

### E.3.6.1. Calculation of baseline GHG emissions or baseline net GHG removals by sinks

| | |
|---|---|
| **Means of verification** | The verification team assessed whether the data and calculations of baseline emission resulting from the registered PDD is correct. The verification team has checked whether calculations of baseline GHG emissions have been carried out in accordance with the formulae and methods described in the registered monitoring plan. |
| **Findings** | CL03 was raised in this section. |
| **Conclusion** | In line with AMS-I.E. version 04, para 04, the emission reductions for the project activity under a CPA are calculated as the following:<br><br>$ER_y = B_y . f_{NRB.y} . NCV_{biomass} . EF_{projected.\ fodssilfuel}$<br><br>Where<br>$ER_y$ Emissions Reductions during the year y ($tCO_{2e}$)<br>$B_y$ Quantity of woody biomass that is substituted or displaced in tonnes<br>$f_{NRB.y}$ Default value of fraction of non-renewable biomass for Nepal, (86% fixed ex-ante)<br>$NCV_{biomass}$ Net calorific value of the non-renewable woody biomass that is substituted (IPCC default for wood fuel, 0.0156 TJ/tonne. (Updated IPCC value)<br>$EF_{projected.fossilfuel}$ Emission factor for substitution of non-renewable woody biomass by similar consumers. Use a value of 81.6 $tCO_2/TJ$. (Fixed Ex-ante)<br><br>Following option a) of paragraph 6, $B_y$ is "calculated as the product of the number of appliances multiplied by the estimate of average annual consumption of woody biomass per appliance (tonnes/year)".<br><br>In the case of the present CPA, "the number of appliances" as deducted from the internal records (commissioning report / database) is corrected with the share of digesters actually in operation.<br><br>The "average annual consumption of woody biomass per appliance (tonnes/year)" |

| | |
|---|---|
| | is the biomass substituted or displaced, which is fixed ex- ante at 3.33 tonnes/year per appliance.<br><br>Thus, $B_y$ is calculated as follows:<br>$B_y = N_{sr} \times P \times Q_{NRBrepl.}$<br><br>Where<br>$N_{sr}$ The number of appliances. The parameter refers to the number of digesters in each size and category and is hence unitless.<br>P Performance of digesters as the share of digesters implemented that is actually operational, determined through survey methods (%)<br>$Q_{NRBrepl.}$ Average quantity of biomass replaced per appliance and year (tonnes/year)<br><br>The emission reduction (without accounting leakage) for each CPA are:<br><br>CPA-1: 82,870.80 $tCO_2e$<br>CPA-2: 96,272.60 $tCO_2e$<br>CPA-3: 87,634.63 $tCO_2e$<br>CPA-4: 93,702.72 $tCO_2e$<br>CPA-5: 1,01,935.45 $tCO_2e$<br>CPA-6: 80,318.31 $tCO_2e$<br>CPA-7: 82,301.41 $tCO_2e$<br>CPA-8: 95,960.01 $tCO_2e$<br>CPA-9: 43,098.57 $tCO_2e$<br><br>The total no of digesters percentage that were non-operational as per the BUS survey for the year 2018/19, for all the 9 CPAs, (177 out of 1215 households surveyed, which works out to be 14.56%. The operational % observed by the verification team during the site visit is on the higher side, thus the value considered in each of the CPA's is deemed as conservative. Calculations, applied formulae and method for calculation of baseline emissions are in accordance with the registered monitoring plan and are in line with the requirements of the applied methodology.<br><br>Further, the assessment of data and the calculation of baseline emission reduction in the MR and the CER excel sheet have been verified as per the set of supporting documents listed in Appendix 3. Hence, the verification team confirms that the baseline emissions for the current monitoring period calculated as 725,885 $tCO_2$ is in order |

### E.3.6.2. Calculation of project GHG emissions or actual net GHG removals by sinks

| | |
|---|---|
| **Means of verification** | The verification team assessed whether the data and calculations of project emission resulting from the registered PDD is correct. The verification team has checked whether calculations of project GHG emissions have been carried out in accordance with the formulae and methods described in the registered monitoring plan. |
| **Findings** | There is no CAR/CL raised in this section. |
| **Conclusion** | Non consideration of project emission for the project activity is as per the monitoring plan of validated PoA-DD and CPA-DD's. |

### E.3.6.3. Calculation of leakage GHG emissions

| | |
|---|---|
| **Means of verification** | The verification team assessed whether the data and calculations of leakage emission resulting from the registered PDD is correct. The verification team has checked whether calculations of leakage GHG emissions have been carried out in accordance with the formulae and methods described in the registered monitoring plan. |
| **Findings** | There is no CAR/CL raised in this section. |

| | |
|---|---|
| **Conclusion** | The PP has adopted a leakage factor of 5% of the baseline emissions as per the adopted methodology. The verification team confirms that the value adopted and the calculations are in order. The respective leakage emission for each CPA is calculated as:<br><br>**CPA UNFCCC reference number** / **Leakage GHG emissions ($tCO_2e$)**<br>9572-0001: 4,143.73<br>9572-0002: 4,813.63<br>9572-0003: 4,381.73<br>9572-0004: 4,685.14<br>9572-0005: 5,096.77<br>9572-0006: 4,015.92<br>9572-0007: 4,115.07<br>9572-0008: 4,798.00<br>9572-0009: 2,154.93<br>**Total: 31,252**<br><br>Hence, the verification team confirms that the leakage emissions for the current monitoring period calculated as **31,252** $tCO_2$ is in order |

### E.3.6.4. Summary of calculation of GHG emission reductions or net GHG removals by sinks

| | |
|---|---|
| **Means of verification** | The verification team assessed whether the data and calculations of GHG emission reductions achieved resulting from the project activity. The verification team has checked whether calculations of GHG emission reduction have been carried out in accordance with the formulae and methods described in the registered monitoring plan. |
| **Findings** | CL09 was raised in this section. |
| **Conclusion** | The verification team analysed all factors and issues that constitute the basis for emission reductions from the project activity for the current monitoring period. The verification team checked the formulae and data used in the emission reduction calculations and confirms that the same are correct. No lack of evidence and missing data were detected during this monitoring period.<br>The verification team confirms that all assumptions, emission factors and default values have been correctly justified. All the emission factors and default values are explicitly mentioned in the monitoring report. According to the registered PoA-DD and registered monitoring plan as explained in sec E.3.5.1 to E.3.5.3 above, no project emissions are associated with the project activity. Therefore, the net emission reductions ER = 725,885 $tCO_{2e}$ |

| **Title and UNFCCC reference number of the CPA** | **Baseline emissions or baseline net GHG removals by sinks ($tCO_2e$)** | **Project emissions or actual net GHG removals by sinks ($tCO_2e$)** | **Leakage ($tCO_2e$)** | **GHG emission reductions or net GHG removals by sinks ($tCO_2e$)** | | |
|---|---|---|---|---|---|---|
| | | | | **Amount achieved before 1 January 2013** | **Amount achieved from 1 January 2013** | **Amount achieved in the entire monitoring period** |
| 9572-0001 | 82,870.80 | 0 | 4,143.54 | 0 | 78,727 | 78,727 |
| 9572-0002 | 96,272.60 | 0 | 4,813.63 | 0 | 91,458 | 91,458 |
| 9572-0003 | 87,634.63 | 0 | 4,381.73 | 0 | 83,252 | 83,252 |
| 9572-0004 | 93,702.72 | 0 | 4,685.14 | 0 | 89,017 | 89,017 |
| 9572-0005 | 101,935.45 | 0 | 5,096.77 | 0 | 96,838 | 96,838 |
| 9572-0006 | 80,318.31 | 0 | 4,015.92 | 0 | 76,302 | 76,302 |
| 9572-0007 | 82,301.41 | 0 | 4,115.07 | 0 | 78,186 | 78,186 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 9572-0008 | 95,960.01 | 0 | 4,798.00 | 0 | 91,162 | 91,162 |
| 9572-0009 | 43,098.57 | 0 | 2,154.93 | 0 | 40,943 | 40,943 |
| **Total** | **625,036** | 0 | **31,252** | **0** | **725,885** | **725,885** |

### E.3.6.5. Comparison of actual GHG emission reductions or net GHG removals by sinks with estimates in included CPA

| | |
|---|---|
| **Means of verification** | The verification team has determined the CER achieved during this monitoring period with the estimated value and reason for increase if any. |
| **Findings** | There is no CAR/CL raised in this section. |
| **Conclusion** | The total number of ERs achieved during the monitoring period is 725,885 tCO2e. In summary, verification team confirms that actual emission reduction is lower than the estimate of the registered (included)/approved CPA-DD for the current monitoring period. |

| Title and UNFCCC reference number of the CPA | Actual values achieved by the CPAs during this monitoring period | Value estimated in ex ante calculation in the included CPA-DD(s) |
|---|---|---|
| 9572-0001 | 78,730 | 92918 |
| 9572-0002 | 91,458 | 99445 |
| 9572-0003 | 83,252 | 99584 |
| 9572-0004 | 89,017 | 99686 |
| 9572-0005 | 96,838 | 98915 |
| 9572-0006 | 76,302 | 92432 |
| 9572-0007 | 78,186 | 91870 |
| 9572-0008 | 91,162 | 96936 |
| 9572-0009 | 40,943 | 40855 |
| **Total** | **725,885** | **812641** |

### E.3.6.6. Remarks on difference from estimated value in included CPA

| | |
|---|---|
| **Means of verification** | The verification team has determined the CER achieved during this monitoring period with the estimated value and reason for increase if any. |
| **Findings** | There is no CAR/CL raised in this section. |
| **Conclusion** | The ex-ante determined value is on the higher side in comparison to the actual value, this variation is due to the reported lesser operational status of the bio digesters in all the 9 BUS reports. Since the actual values are less than ex-ante values no further explanations is deemed necessary. |

### E.3.7. Assessment of reported sustainable development co-benefits

| | |
|---|---|
| **Means of verification** | NA |
| **Findings** | NA |
| **Conclusion** | NA |

### E.3.8. Global stakeholder consultation

| | |
|---|---|
| **Means of verification** | The project MR was webhosted on UNFCCC website |
| **Findings** | There is no CAR/CL raised in this section. |
| **Conclusion** | The project MR was webhosted on UNFCCC website from 05/02/2020 for the 6th monitoring https://cdm.unfccc.int/Issuance/index.html |

## SECTION F. Internal quality control

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After the completion of assessment by the verification team all the relevant documentation is submitted to a qualified, Independent Technical reviewer as part of EPIC" internal quality control system. A Technical reviewer team is appointed to review the draft final verification report (Draft FVR). The comments made by the Technical reviewer team are taken into consideration and incorporated in the final FVR. The technical

reviewer team assesses whether all the reporting requirements have been fulfilled and whether all the issues raised were closed satisfactorily by the verification team with justification. The technical review process can also raise issues in this regard which is resolved further by the verification team to the satisfaction of the technical reviewer. The technical reviewer team either accepts or rejects the report made by the verification team. The final report (after resolutions of all findings) is then submitted to the Head-operations for review and approval.

## SECTION G. Verification opinion

>>

EPIC Sustainability Services Private Limited (EPIC) has been contracted by AEPC to undertake the sixth periodic independent verification of the registered CDM programme of activity titled “Nepal Biogas Support Program-PoA” (UNFCCC reference number: 9572). The objectives of this verification are to verify and certify emission reductions reported for programme of activity for the monitoring period of 01/08/2018 to 30/01/2020 (first and last day included) covering CPAs 1 to 9; and to verify that the data reported are complete and transparent.

The verification team determines the conformity of the actual project activity and its operation with the registered project design document. EPIC has, by means of a desk review and an on-site visit, assessed that all physical features of the proposed CDM project activity proposed in the registered PoA-DD and CPA-DDs (CPA 01 to 09) are in place, and that the project participants have operated the CDM project activity as per the registered PoA-DD and CPA-DDs. Thus the verification team has concluded that the project activity was implemented and operated as per registered PoA-DD and CPA-DDs, and that all physical features of the project are in place.

The verification team, based on the site visit and document review, was able to conclude that the project activity has been implemented as per the approved PoA-DD and CPA-DDs. The start date of this monitoring period is 01/08/2018 which is in line with the UNFCCC project webpage considering the end date of the previous monitoring period. The monitoring report for this monitoring period is in compliance with the monitoring plan of the approved PoA-DD and CPA-DDs. The project activity was registered by applying the small scale methodology AMS I-E version 4.0 and the verification was carried out in accordance with the applied methodology. It was confirmed during the site visit that the project activity during the current periodic verification is in accordance with the applicability criteria of the methodology. The management of project participants is responsible for the preparation and reporting of GHG emissions data, and the reported GHG emission reduction on the basis set out within the project monitoring plan.

The development and maintenance of records and reporting procedures in accordance with the monitoring plan, including the calculation and determination of GHG emission reduction from the project is the responsibility of the management of the project. It is the responsibility of EPIC to express an independent GHG verification opinion on the GHG emissions reductions and on the calculation of GHG emission reductions from the project for this monitoring period based on the reported emission reduction in the monitoring Report.

EPIC’s verification approach was based on the requirements as defined under the Kyoto Protocol, Marrakech accord, as well as those defined by the CDM Executive board. EPIC"s approach was risk-based, drawing on an understanding of the risks associated with reported GHG emissions data and the controls in place to mitigate these. The examination includes assessment of evidence relevant to the amounts and disclosures in relation to the project’s GHG emission reductions for this monitoring period. The verification team has planned and performed the work to obtain the information and explanations that is considered necessary to provide sufficient evidence for it to give reasonable assurance that the amount of calculated GHG emission reductions for this monitoring period were fairly stated.

## SECTION H. Certification statement

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EPIC Sustainability Services Private Limited (EPIC has carried out the sixth verification of the emission reductions that have been reported for the PoA titled “Nepal Biogas Support Program PoA” (UNFCCC reference number: 9572), covering CPA 01 to CPA 09 for the 01/08/2018 to 30/01/2020. The project participants are responsible for the collection of data in accordance with the monitoring plan and the reporting of GHG emissions reductions from the project activity.

EPIC takes responsibility for issuance of an independent verification statement on the reported GHG emission reductions from the project activity. The verification was done on the basis of the baseline and

monitoring methodology AMS-I E, Version 4.0, the validated PoA-DD and CPA-DD's and the monitoring report, version 3.0 dated 01/04/2020.

The verification included checking whether the provisions of the monitoring methodology and the monitoring plan were consistently and appropriately applied and the collection of evidence supporting the reported data. The emission reductions are calculated correctly and EPIC could certify that the emission reductions from the CDM PoA 9572 "Nepal Biogas Support Program-PoA" during the period 01/08/2018 to 30/01/2020 is 725,885 tonnes of $CO_2$ equivalent.

# Appendix 1. Abbreviations

| Abbreviations | Full texts |
|---|---|
| AEPC | Alternative Energy Promotion Centre BSP Biogas Sector Partnership |
| BUS | Biogas User Survey |
| CAR | Corrective Action Request |
| CDM | Clean Development Mechanism |
| CER | Certified Emission Reductions |
| CME | Coordinating Managing Entity |
| $CO_2$ | Carbon Dioxide |
| $CO_{2e}$ | Carbon Dioxide Equivalent |
| CL | Clarification Request |
| DOE | Designated Operational Entity |
| ESSPL | EPIC Sustainability Services Private Limited |
| FAR | Forward Action Request |
| GHG | Greenhouse gases |
| IPCC | Intergovernmental Panel on Climate Change |
| MoV | Means of Verification |
| NA | Not applicable |
| NRB | Non Renewable Biomass |
| PCP | Project Cycle Procedure |
| PDD | Project Design Document |
| PP | Project Participant |
| PS | Project Standard |
| QA/QC | Quality Assurance/Quality Control |
| SETM | Sustainable Energy and Technology Management P. Ltd. |
| UNFCCC | United Nations Framework Convention on Climate Change |
| VVS-PoA | Validation and Verification Standard-Programme of Activities |

# Appendix 2. Competence of team members and technical reviewers

The following verification team has been assigned to carry out the verification of the project

| Name | Dr D Siddaramu | Mr. Sujan Adhikari | Mr. Vijayaraghavan Radhamadhavan |
|---|---|---|---|
| **Role** | Team Leader Auditor | Host country expert | Technical Reviewer |
| **Competence in relevant sectors** | Sector 1 and Sector 13 Sector 1 | Sector 1 and Sector 13 | Sector 1 and Sector 13 |
| **Responsibility** | Document review, onsite, DVR preparation, DVR resolution Document review, DVR preparation, DVR resolution, FVR preparation | Document review, onsite, DVR preparation, DVR resolution | Technical Review |

**Dr. D Siddaramu,** is a M.Sc., Ph.D in Environmental Science, with over 17 years of experience. A qualified Clean Development Mechanism (CDM) Lead Auditor, successfully registered more than 30 projects with United Nations Framework Convention on Climate Change (UNFCCC) and Verified Carbon Standard registry (VCS) registry; well versed with both National and International legal regime. Has hands on experience in Environmental Impact Assessment (EIA) studies pertaining to different Ecosystem; monitoring, collection & analyzing environmental samples and conducting socioeconomic surveys; data analysis. He has undergone extensive training on CDM validation and verification and is a qualified auditor in accordance with procedures of EPIC sustainability services Pvt. Ltd.

**Mr. Sujan Adhikari,** has 10 years of experience working in the field of renewable energy technologies in various capacities. He has been extensively involved in project planning, installation and execution of biogas and solar PV projects. He has served as Energy Head in implementing energy projects such as large size biogas plants and as Project coordinator to design/implement/coordinate waste to energy (biogas), micro-small hydro projects (100kW to 7MW) in Nepal. He has led multi-disciplinary team of Engineers, Sociologists and Environmental experts assigned to conduct pre-feasibility, feasibility studies and design of waste to energy (biogas), hydropower projects. He is a qualified Technical Expert under CDM validation and verification services for Sectoral Scope 1 in accordance with procedures of EPIC Sustainability Services Pvt. Ltd.

**Mr. R. Vijayaraghavan** holds BE in Mechanical Engineering, M. Tech in Energy Conservation and Management and MBA in Technology Management. He is certified as Energy Auditor by Bureau of Energy Efficiency (BEE), Government of India. He has 15 years of working experience in energy sector including 9 years as validator. He has successfully completed around hundred CDM, VCS/GS projects. He has been qualified as Technical Reviewer for Sectoral Scope 1 and 13.

# Appendix 3. Documents reviewed or referenced

| No. | Author | Title | References to the document | Provider |
|---|---|---|---|---|
| 1 | UNFCCC | Validation and Verification Standard for Programme of activities, Version 2.0 | | UNFCCC |
| 2 | PP | PoA-DD | | PP |
| 3 | DoE | PoA validation report | | Third party |
| 4 | PP | CPA-DD's (CPA 1 to CPA 9) | | PP |
| 5 | DoE | 09 CPA validation reports | | Third party |
| 6 | DoE | Previous verification reports | | Third party |
| 7 | PP | Initial monitoring report, version01 | | PP |
| 8 | UNFCCC | Sampling and surveys for CDM project activities and programmes of activities", version 07.0 | | UNFCCC |

| | | | | |
|---|---|---|---|---|
| 9 | UNFCCC | CDM-PoA-MR-FORM, version 03 | | UNFCCC |
| 10 | PP | Contract signed between BSP Nepal and AEPC | | PP |
| 11 | PP | PoA database | | PP |
| 12 | UNFCCC | AMS.I.E version 4.0 | | UNFCCC |
| 13 | IPCC | IPCC data base | | Third party |
| 14 | UNFCCC | Default values of fraction of non-renewable biomass for Least Developed Countries and Small Island Developing States (version 01.0) EB 67 Annex 22 | | UNFCCC |
| 15 | Third party | Annual biogas users survey / BUS Report 2018/19 | | Third party |
| 16 | PP | ER spread sheet | | PP |
| 17 | PP | Final MR, Version 03 | | PP |
| 18 | UNFCCC | Guideline for sampling and surveys for CDM project activities and programme of activities, version 4.0 | | UNFCCC |
| 19 | PP | MoU between households and PP for ownership of GHGs | | PP |
| 20 | Third party | Filled in Questionnaires | | Third party |
| 21 | PP | Document to support Technical life of biogas digesters | | PP |
| 22 | PP | Training records of field staff/enumerators | | PP |

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

**Table 1. Remaining FARs from validation and/or previous verification**

| **FAR ID** | 01 | **Section no.** | Document Review | **Date:**17/03/2020 |
|---|---|---|---|---|
| **Description of CL** | | | | |
| FAR01 dated 10/06/2019<br>As no site visit has been performed during the validation of the renewal of crediting period and all validation of technical data of equipment has been done based on documents, pictutes and interview, the verifier shall reconfirm the technical data | | | | |
| **Project participant response** | | | | **Date:**23/03/2020 |
| As the technologies implemented under the CPAs of particular interests are retroactively installed before the inclusion of those CPAs, the technologies implemented are in-line with the registered CPA-DD which where validated by DOE during the inclusion. The installation/implementation date of the digesters in each CPAs can be verified from the registered CPA-DDs. Also, this FAR is raised during crediting period renewal of the PoA, this will be applicable for the CPAs included during the second crediting period (31-01-2020 to 30-01-2027) not for this monitoring period. | | | | |
| **Documentation provided by project participant** | | | | |
| See CPA-DDs (CPA-1 to CPA-9):<br>https://cdm.unfccc.int/ProgrammeOfActivities/poa_db/7BSCYZMH2U05TWXFJKELND18PRQ96O/viewCPAs | | | | |
| **DOE assessment** | | | | **Date:** 25/03/2020 |
| The clarification by PP/CME is acceptable, the technical details of Bio-digestors were checked, the details match with that presented in CPA-DD. Hence accepted, however this FAR01 is kept open to be checked during CPAs inclusion in the second crediting period by DoE. | | | | |

| **FAR ID** | 02 | **Section no.** | Document Review | **Date:**17/03/2020 |
|---|---|---|---|---|
| **Description of CL** | | | | |
| FAR01 dated 01/08/2019<br>The digestor DGG00471 (Khagendra Kumar Khadka) of CPA-1 in Ilam district, was found to be abandoned during the DoE verification field visit for Monitoring period no: 05, it shall not be accounted for in the ER calculations in the future verifications and it has to be excluded from the CME database at the time of "crediting period renewal", if the status remains the same at that point of time | | | | |
| **Project participant response** | | | | **Date:** 23/03/2020 |
| During the crediting period renewal of the crediting period of the CPA-1, the digester mentioned in the FAR is removed from the database and mentioned in the approved CPA-DD. Please see footnote 1 of the approved CPA-DD for CPA-1 for 2nd crediting period. Also, this has been excluded from the ER calculation (instead of 20,000 plants in the CPA, only 19,999 plants are accounted. This has been mentioned in the temporary corrections under section C.3.2 of the revised MR. Please see the revised MR and ER calculation sheet. | | | | |
| **Documentation provided by project participant** | | | | |
| 1. Approved CPA-DD for second crediting period: https://cdm.unfccc.int/ProgrammeOfActivities/cpa_db/3K6X5YZ2MFRPCQDU19TBJ8AL47NSGO/view<br>2. Revised MR: Clean and Track change<br>3. Revised ER calculation sheet: ER Calculation sheet_PoA 9572_MP6_V2.xlsx | | | | |

| DOE assessment | Date: 25/03/2020 |
|---|---|
| The clarification by PP/CME is acceptable, the digestor DGG00471 (Khagendra Kumar Khadka) of CPA-1 in Ilam district is not included in the database and has been excluded from the ER calculation (instead of 20,000 plants in the CPA, only 19,999 plants are accounted). Hence FAR02 is closed. | |

| FAR ID | 03 | Section no. | Document Review | Date:17/03/2020 |
|---|---|---|---|---|
| **Description of CL** | | | | |
| FAR02 dated 01/08/2019<br>The provision to capture the status of digestors that are “abandoned or cannot be put back into use” in the user survey questionnaire will be implemented by the CME and it shall be reviewed from the Monitoring period number 7 | | | | |
| **Project participant response** | | | | **Date:** 23/03/2020 |
| For the monitoring number 7, this provisioned is clearly mentioned in the section 7; sub-section 3 of the “REQUEST FOR PROPOSALS” document for hiring the third party to conduct the user survey. Please see the “Request for Proposal” published in the AEPC’s website for this particular PoA. | | | | |
| **Documentation provided by project participant** | | | | |
| 1. Request for Proposal for Biogas User Survey: SD#1_RFP-Selection of Consulting Services for_ Conducting _Biogas User’s Survey 2019_20 for Nepal Biogas Support Programme - PoA.pdf<br>https://www.aepc.gov.np/uploads/docs/rfp-selection-of-consulting-services-for-conducting-biogas-users-survey-201920-for-nepal-biogas-support-programme-poa-1574344282.pdf | | | | |
| **DOE assessment** | | | | **Date:** 25/03/2020 |
| PP/CME has made provision to capture the status of digestors that are “abandoned or cannot be put back into use” in the user survey questionnaire. The user survey questionnaire was checked and found ok, hence FAR03 is closed. | | | | |

**Table 2. CL from this verification**

| CL ID | 01 | Section no. | Document Review | Date: 17/03/2020 |
|---|---|---|---|---|
| **Description of CL** | | | | |
| PP/CME to clarify, how and on what basis is the the value of operational and non-operational percentage of biogas digestors are arrived. | | | | |
| **Project participant response** | | | | **Date:** 23/03/2020 |
| As mentioned in the registered PoA-DD, the operational status of the biogas digesters are determined through stratified sampling approach. Those sampled households were asked whether the biogas is in continuous operation or not. The surveyor also checks visual looks of the biogas digesters and the stoves whether the stove is burning or not. These parameters determine the operational status. For the non-operational systems, if the digesters is not operational during the survey, that is counted as non-operational systems. As stipulated in the PoA-DD, the stratified sample will be taken for the Terai, Hills and Remote Hills and identified the operational percentage in each stratum. “Guidelines for sampling and surveys for CDM project activities and programme of activities" Annex 5, EB 69” has been referred by the PoA-DD (See annex 4 of the registered PoA-DD for the monitoring period). Using those operational percentage for the strata identified from the survey, the stratified overall proportion for the whole population is calculated using weighted average value of the operational status as specified in para 63 (eq.6) of the “Guidelines for sampling and surveys for CDM project activities and programme of activities" Annex 5, EB 69”. See section E.3 of the monitoring report for detail. | | | | |
| **Documentation provided by project participant** | | | | |
| The Guidelines for sampling and surveys for CDM project activities and programme of activities can be accessed in: https://cdm.unfccc.int/filestorage/r/n/S9J6CIEN84WGU1KQBA2MRFH0ZO5LX3.pdf/eb69_repan05.pdf?t=SXF8cTdtcnRnfDB4ZCXR4ZdBpaBweDumUd67 | | | | |

| DOE assessment | Date: 25/03/2020 |
|---|---|
| The clarification by PP/CME on what basis is the the value of operational and non-operational percentage of biogas digestors are arrived is acceptable. The same has been detailed in the registered PoA-DD. Hence CL01 is closed | |

| CL ID | 02 | Section no. | Document review | Date: 17/03/2020 |
|---|---|---|---|---|
| **Description of CL** | | | | |
| The following biogas user's households we're found not working.<br>1. HED01812 - Ambika Tamang, Chitwan (checked over phone) and<br>2. PGG10220 - Sunita Bhujel, Lamjung<br>Clarify whether this is been taken into account in the user survey and how in ER calculations? | | | | |
| **Project participant response** | | | | **Date:** 23/03/2020 |
| The operational status of the biogas digesters are based on the biogas user survey using stratified random sampling approach as stipulated in PoA-DD (See annex 4 of the registered PoA-DD). As per PoA-DD, CPA wise monitoring is stipulated. The emission reduction calculation for this monitoring period are based on the operational status. The operational % during the monitoring period ranges from 75.71% in CPA-1 to 95.55% in CPA-9. These values have been used for the emission reduction calculation. So, PP hereby confirm that the non-operational biogas plants are not considered in the ER calculation conservatively using the principle of sampling and survey. | | | | |
| **Documentation provided by project participant** | | | | |
| The registered PoA-DD applicable for this MP can be accessed in:<br>https://cdm.unfccc.int/filestorage/a/6/T50IO9S41AHCEPL3WVMYXJ8ZRUBGK7.pdf/PoA_DD_31%20jan.pdf?t=Nkt8cTdtczBifDCtnYe8QS4UpGcm7rlEdjRW | | | | |
| **DOE assessment** | | | | **Date:** 25/03/2020 |
| The clarification by PP/CME on the non-working biodigestors and the confirmation that these biodigestors not used for ER calculations is acceptable. Hence CL02 is closed. | | | | |

| CL ID | 03 | Section no. | Document review | Date: 17/03/2020 |
|---|---|---|---|---|
| **Description of CL** | | | | |
| During the site visit to the individual households, it was observed and confirmed that<br>1. Few households use LPG as a supplement fuel for cooking in addition to biogas and<br>2. The availability of biogas is low during cold seasons<br>PP/CME to clarify how this is accounted in the emission reduction calculations | | | | |
| **Project participant response** | | | | **Date:** 23/03/2020 |

1. From the field visit to the household it was evidenced that the first priority of the Biogas users are always biogas as it is free of cost. The bio-digesters are designed to provide the gas to meet the households' daily needs. In accessible areas, it was found that few household kept the LPG as a Supplement (back-up) when there is some function and required to cook additional food than as usual. Also, though the baseline is non-renewable biomass, CME opted to use default emission factor (81.6 $tCO_{2eq}$/TJ) given in AMS I.E (version 4) which accounts the 50% coal, 25% Kerosene and 25% LPG (See footnote 1 of the methodology AMS I.E. version 4) rather than using the default emission factor of fuel-wood (which is 112 tCO2/TJ, See the table 1.4 of 2006 IPCC Guidelines for National Greenhouse Gas Inventories). Since the default value used has already accounted the LPG and use of LPG as a back-up is negligible, it is not accounted separately the use of LPG as back-up during emission reduction calculation. CME is in the opinion that the calculation is conservative.
2. The availability of Biogas is less during cold season. While in the field visit, the people has also mentioned that even in the cold season, their requirement of cooking food for their particular family has been met by the gas which is designed for and the less gas is generally last for only one month. So, for the additional food if they have to cook during the winter, they sometime need alternate fuel for cooking. Since biogas digesters are designed for the cooking food for the family and accordingly "Quantity of woody biomass that is substituted or displaced" is fixed-ex-ante, CME is in the opinion that this has been considered in annual average woody biomass that is substituted or displaced and not necessary to account this event separately while doing emission reduction calculation. Same approach had been followed in last 5 verifications of this PoA.

**Documentation provided by project participant**

1. AMS I.E version 4: https://cdm.unfccc.int/filestorage/M/I/6/MI6Z47XJAVRTKN3BWSQ1Y8FD2E9ULG/EB60_repan20_%20AMS-I.E_ver04.pdf?t=RnV8cTdtczc4fDBzfynmQOXHangbpGktRFtx
2. IPCC Guideline: https://www.ipccnggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf

| **DOE assessment** | **Date:** 25/03/2020 |
|---|---|
| The clarification by PP/CME on the few households using LPG as a supplement fuel for cooking in addition to biogas and on the availability of biogas low during cold seasons on how this is accounted in the emission reduction calculations is accepted. Hence CL03 closed | |

| **CL ID** | 04 | **Section no.** | Document review | **Date:** 17/03/2020 |
|---|---|---|---|---|

**Description of CL**

During the site visit in the areas visited there were biogas installed and operational much earlier than the project, PP to clarify

1. How project HHs are identified & monitored and
2. What is the procedure adopted to avoid double counting

| **Project participant response** | **Date:** 23/03/2020 |
|---|---|

1. As responded in CL 1 above, stratified sampling approach was followed to identify the households under each CPAs. The random sample was taken using “Rand” function in excel to identify the households in each strata. A questionnaire was developed (as did in last 5 monitoring of PoA) and employed to get the data on operational status of biogas plants, confirming the use of non-renewable biomass and other socio-economic and sustainable development parameters related to the CPAs. The enumerators were employed to gather the data from individual households to complete the Biogas User Survey for this monitoring period. Before employing the enumerators, orientation was provided to them to collect and monitoring the data/parameters of interest. Since Biogas User Survey is the main tool for the monitoring for this PoA, Biogas User Survey Report is prepared incorporating the surveyed data. To avoid biasness of the survey, third party consultant was used employed for the survey.
2. The actual information of the digesters and other information are is reflected in the registered database for each CPA and validated by the DOE during inclusion. See the database of all CPAs under UNFCCC link under PoA (9572). To avoid double counting, the name of the biogas owner along with address and the unique dome gas pipe number for the Biogas is provided for each biogas. Since all the biogas digesters are bundled in the CPAs retroactively and also validated by the validating DOE and also verified by the verifying DOE in previous verification, the database provided are unique (with unique ID for each biogas). So, drawing the sample from each CPA avoids the double counting due to already set database and the unique ID of the biogas plants.

**Documentation provided by project participant**

Biogas database for all the CPAs are given in ER calculation sheet for each CPAs which can be accessed in: https://cdm.unfccc.int/ProgrammeOfActivities/poa_db/7BSCYZMH2U05TWXFJKELND18PRQ96O/viewCPAs. However, the database of all CPAs is also provided separately as SD#5.

| **DOE assessment** | **Date:** 25/03/2020 |
|---|---|

The clarification by PP/CME on the biogas installed and operational much earlier than the project, how project HHs are identified & monitored and the procedure adopted to avoid double counting is acceptable. Hence CL04 is closed.

| **CL ID** | 05 | **Section no.** | Document review | **Date:**17/03/2020 |
|---|---|---|---|---|

**Description of CL**

What are the QA/QC procedures adopted by CME/PP to check the accuracy/effectiveness and conservativeness of the Biogas user survey conducted.

| **Project participant response** | **Date:** 23/03/2020 |
|---|---|

Being a government entity, CME always put its effort to provide the neutral, unbiased and accurate results from the user survey as the outcome of the survey is not only for CDM/GS but to report the socio-economic impacts of Biogas in the society. So, CME carefully starts the process with caution. Before conducting the survey, CME follows competitive process to select appropriate third party consultants for the survey and selection process is very rigorous. After selection of the consultants, CME discuss with the consultant and provides the feedback on questionnaires and jointly involved in orientation to the enumerators. In between, CME keeps close coordination with consultant. Once the draft report is received, few sample households are checked through phone call to know if the information provided in the questionnaires are correct and the visit of the survey team. CME also checks if the survey met the given reliability/precision. In this way, the Biogas User Survey reports are finalized. Same approach has been followed for the previous verification of the PoA.

**Documentation provided by project participant**

N/A

| **DOE assessment** | **Date:** 25/03/2020 |
|---|---|

The QA/QC procedures adopted by CME/PP to check the accuracy/effectiveness and conservativeness of the Biogas user survey conducted is acceptable. Hence CL05 is closed

| **CL ID** | 06 | **Section no.** | Document review | **Date:**17/03/2020 |
|---|---|---|---|---|

| Description of CL | |
|---|---|
| Random review of filled in survey questionnaires reveal that; “the size of digesters, the date of construction, phone number” information in questionnaire are not matching with the PoA database. PP/CME to explain the effectiveness of the QA/QC process followed in relation to conduct of survey and assessment of its results | |
| **Project participant response** | **Date:** 23/03/2020 |
| The information put in the questionnaires are all based on perception of the households using biogas. The actual construction date, size of the digesters and other information are the ones incorporated in the commissioning report which is reflected in the registered database for each CPA and validated by the DOE during inclusion. See the database of all CPAs under UNFCCC link under PoA (9572). Further, the main parameter of interest during monitoring is percentage of digester operational and the confirmation of use of NRB which is visible in the site for calculating the emission reduction and confirming the use of NRB. The emission reduction calculation and the confirmation of NRB in the case of this PoA is not associated with the size of the bio-digester. So, there might be some typo error in filled in survey questionnaire on size and date but this deviation has no any impact on ER calculation and confirmation of NRB for this monitoring period. Before conducting the survey, CME followed competitive process to select appropriate third party for the survey and selection process is very rigorous. After selection of the consultants, CME provides the feedback on questionnaires and jointly involved in orientation to the enumerators. Once the draft report is received, few sample households are contacted to know if the information provided in the questionnaires are correct and the visit of the survey team. CME also checks if the survey met the given reliability/precision. In this way, the Biogas User Survey reports are then finalized. Same approach has been followed for the previous verification of the PoA. | |
| **Documentation provided by project participant** | |
| Biogas database for all the CPAs are given in ER calculation sheet for each CPAs which can be accessed in: https://cdm.unfccc.int/ProgrammeOfActivities/poa_db/7BSCYZMH2U05TWXFJKELND18PRQ96O/viewCPAs. However, the database of all CPAs is also provided separately as SD#5. | |
| **DOE assessment** | **Date:** 25/03/2020 |
| The clarification is accepted, hence CL06 is closed | |

| CL ID | 07 | Section no. | Document review | Date:17/03/2020 |
|---|---|---|---|---|
| **Description of CL** | | | | |
| Clarify, the value of operational percentage of biogas digestors (i.e., The weighted average operational status of biogas considering the operational % of all strata) of CPA 8 is indicated as 90.16% in MR, but, in the BUS report it is 81.76%. | | | | |
| **Project participant response** | | | | **Date:** 23/03/2020 |
| The weighted average operational status of biogas is calculated considering the operational % of all strata. Actually, the value of operational status of 81.76% is for the CPA-7. If we use the operational data for each stratum of the CPA-8 to calculate the stratified proportion as specified in para. 63 (eq.6) of the “Guidelines for sampling and surveys for CDM project activities and programme of activities" Annex 5, EB 69” gives the result of 90.16%. This has been accurately given in section 3.1 of the Biogas User Survey Report for CPA-8 and same has been used while calculating the emission reduction. | | | | |
| **Documentation provided by project participant** | | | | |
| See SD#3.8 for Biogas User Survey Report of CPA-8 | | | | |
| **DOE assessment** | | | | **Date:** 25/03/2020 |
| The clarification is accepted, hence CL07 is closed | | | | |

| CL ID | 08 | Section no. | Document review | Date:17/03/2020 |
|---|---|---|---|---|
| **Description of CL** | | | | |
| During the site visit few HH’s did not confirm the user survey and enumerators visit. PP/CME to clarify | | | | |
| **Project participant response** | | | | **Date:** 23/03/2020 |

| |
|---|
| For this monitoring period, user survey was done in Feb-March 2019 (almost one year before the field verification). Such response from few households was due to the different family members of the corresponding households as respondent during user survey and the verification field visit now. However, this has no any impact in ER calculation. The ER calculation depends on the monitoring parameters given in the PoA-DD and CPA-DD which are monitored in user survey reports. Furthermore, CME also closely monitors the user survey activity; CME hereby confirms that the data provided are unbiased and real. |
| **Documentation provided by project participant** |
| N/A |
| **DOE assessment** **Date:** 25/03/2020 |
| The clarification is accepted, hence CL08 is closed |

| **CL ID** | 09 | **Section no.** | Document review | **Date:**17/03/2020 |
|---|---|---|---|---|
| **Description of CL** | | | | |
| The amount of GHG emission reductions estimated ex-ante is indicated as 812641 $tCO_{2e}$ and 725,888 $tCO_{2e}$are the achieved GHG emission reductions by all CPAs covered in this monitoring report in this monitoring period. CME/PP to clarify, as the present monitoring period is for 18 months, then why to compare that with 12 months to the CPA-DD. Accordingly justify for increase or decrease of CER's | | | | |
| **Project participant response** | | | | **Date:** 23/03/2020 |
| As per the information required by the Monitoring Report, the ex-ante emission reduction indicated as 812,641 tCO2eq is the value calculated for the monitoring period (1 August 2018-30 January 2020). Please see the cover page of the MR and section F.5.1 of the MR for calculation of ex-ante for the monitoring period. So, it is justifiable to compare the emission reduction achieved during monitoring period and the corresponding ex-ante emission reduction for the monitoring period. Since, total emission reduction achieved during this monitoring period is less than ex-ante estimate; the ER calculation is conservative as the operational % varies in this monitoring period than in ex-ante. Also, the section F.6 of the MR requires the justification for increase in ER calculation, so the justification as mentioned in the section F.6 is not applicable. | | | | |
| **Documentation provided by project participant** | | | | |
| Revised MR: Clean and Track change | | | | |
| **DOE assessment** | | | | **Date:** 25/03/2020 |
| The clarification is accepted, hence CL09 is closed | | | | |

| **CL ID** | 10 | **Section no.** | Document review | **Date:**17/03/2020 |
|---|---|---|---|---|
| **Description of CL** | | | | |
| Under subsection (d) of Section E.3 (page no.18), it is mentioned that "…….*Once the draft report was received, AEPC also checked the database against the filled in questionnaire in a sample basis and provided the feedback to the third party for correction and preparation of final report. So, the efforts were made to ensure the quality of data collected, data entry and data analysis for minimizing the data discrepancies.*" Clarify<br>1. What correction were identified in the filled questionnaires and<br>2. Was there any correction in the questionnaires of the current monitoring period? If so submit the questionnaires highlighting the portions corrected | | | | |
| **Project participant response** | | | | **Date:** 23/03/2020 |
| 1. For the quality assurance/quality control of the survey, this is the standard approach to minimize the inconsistency in the questionnaires filled in by enumerators. But in this monitoring period, no such inconsistency was observed during the review of draft report as this is the sixth periodic survey done for the Biogas PoA.<br>*2.* As mentioned above, this is the standard approach to be followed during the survey. No inconsistency was observed in this monitoring period. The sub-section (d) of section E.3 of the MR is corrected appropriately. | | | | |

| Documentation provided by project participant | |
|---|---|
| Revised MR: Clean and Track change | |
| **DOE assessment** | **Date:** 25/03/2020 |
| The clarification is accepted, hence CL10 is closed | |

**Table 3. CAR from this verification**

| CAR ID | 01 | Section no. | Document review | Date: 17/03/2020 |
|---|---|---|---|---|
| **Description of CAR** | | | | |
| The PP to submit the following records/documents for verification<br>1) MoU between households and PP for ownership of GHGs/19/<br>2) User survey documents/records<br>3) Filled in Questionnaires/20/<br>4) Biogas database of all the CPAs<br>5) Grievance mechanism records (if any) | | | | |
| **Project participant response** | | | | **Date:** 23/03/2020 |
| 1) The MoU signed by households for the emission reduction right transfer are attached which is in Nepali (See SD#2_ER Right Transfer Agreement-sales agreement.pdf).<br>2) User Survey Reports for CPA-1 to CPA-9 are attached (See documents SD#3.1, SD#3.2, SD#3.3, SD#3.4, SD#3.5, SD#3.6, SD#3.7, SD#3.8 and SD#3.9)<br>3) Sample filled in questionnaires are attached as SD#4<br>4) Biogas database for all the CPAs are given in ER calculation sheet for each CPAs which can be accessed in: https://cdm.unfccc.int/ProgrammeOfActivities/poa_db/7BSCYZMH2U05TWXFJKELND18PRQ96O/viewCPAs<br>However, the database of all CPAs are also provided separately as SD#5.<br>5) The PoA consists of a grievance mechanism and is also uploaded in AEPC's website as well both in Nepali and English Language. The notice can be accessed in: https://www.aepc.gov.np/uploads/docs/l-b-b-aa-b-b-1544451317.pdf. The technical issues are addressed by the owners and/or the local companies. Since no any grievances are received, the records are not available for this monitoring period. | | | | |
| **Documentation provided by project participant** | | | | |
| *-ER Right transfer: SD#2*<br>*-Biogas User Survey Reports:* SD#3.1, SD#3.2, SD#3.3, SD#3.4, SD#3.5, SD#3.6, SD#3.7, SD#3.8 and SD#3.9<br>-Sample Filled in questionnaire: SD#4<br>-Biogas database for all CPAs: SD#5 | | | | |
| **DOE assessment** | | | | **Date:** 25/03/2020 |
| The requested documents are submitted, checked and found ok, hence CAR01 is closed | | | | |

| CAR ID | 02 | Section no. | Document review | Date: 17/03/2020 |
|---|---|---|---|---|
| **Description of CAR** | | | | |
| The PP to submit the following records/documents for verification<br>1) Document to support Technical life of biogas digesters/21/ and<br>2) Training records of field staff/enumerators/22/ | | | | |
| **Project participant response** | | | | **Date:** 23/03/2020 |

| |
|---|
| 1. Operational lifetime of the biogas digester is taken as 20 years which is substantiated through a document and is provided with this package. This has been validated by validating DOE during PoA registration and the inclusion of CPAs. This document is in Nepali (Please see page 2, 2nd Para of SD# 6).<br>2. The training records of the enumerators for the survey is given in Biogas User Survey reports. See Annex 2 and Annex 4 of SD#3.1 to SD#3.9). |
| **Documentation provided by project participant** |
| *-Documents for operational life of biogas: SD#6*<br>*-Biogas User Survey Reports:* SD#3.1, SD#3.2, SD#3.3, SD#3.4, SD#3.5, SD#3.6, SD#3.7, SD#3.8 and SD#3.9 |

| **DOE assessment** | **Date:** 25/03/2020 |
|---|---|
| The requested documents are submitted, checked and found ok, hence CAR02 is closed | |

**Table 4. FAR from this verification**

| **FAR ID** | NIL | **Section No.** | Document review | **Date:** 17/03/2020 |
|---|---|---|---|---|
| **Description of FAR** | | | | |
| - | | | | |
| **Project participant response** | | | | **Date:** DD/MM/YYYY |
| - | | | | |
| **Documentation provided by project participant** | | | | |
| | | | | |
| **DOE assessment** | | | | **Date:** DD/MM/YYYY |
| - | | | | |

# Appendix 5. Total number of households visited CPA wise

| District | CPA1 | CPA2 | CPA3 | CPA4 | CPA5 | CPA6 | CPA7 | CPA8 | CPA9 | Total | Eco-zone |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Sample Visited** | | | | | | | | | | | |
| Dhading | - | - | 5 | - | - | - | - | - | - | 5 | HI |
| Lamjung | - | - | - | 4 | - | 4 | - | 4 | 6 | 18 | HI |
| Tanahun | - | 4 | - | - | 4 | - | - | - | - | 8 | HI |
| Palpa | - | - | - | - | - | - | 4 | - | - | 4 | HI |
| Kaski | 5 | - | 1 | - | - | - | - | - | - | 6 | HI |
| Rupandehi | - | - | 4 | - | - | - | - | 4 | - | 8 | TE |
| Nawalparasi | - | - | - | - | 5 | 2 | - | - | - | 7 | TE |
| Chitwan | - | - | - | - | 1 | - | 5 | - | 5 | 11 | TE |
| **Sub-total** | **5** | **4** | **10** | **4** | **10** | **6** | **9** | **8** | **11** | **67** | |
| **Sample Phone Called** | | | | | | | | | | | |
| Lamjung | - | - | - | 2 | - | 1 | - | - | - | 3 | HI |
| Tanahun | - | - | - | - | - | - | - | - | - | 0 | HI |
| Nawalparasi | - | 7 | - | 5 | - | - | 3 | - | - | 15 | TE |
| Chitwan | 5 | - | - | - | - | - | - | - | - | 5 | TE |
| Makwanpur | - | - | - | - | - | - | - | 4 | - | 4 | HI |
| Parsa | - | - | - | - | - | 5 | - | - | - | 5 | TE |
| Darchula | - | - | - | - | 3 | - | - | - | - | 3 | RH |
| Sankhuwasabha | - | - | - | - | - | 1 | 2 | - | 3 | 6 | RH |
| **Sub-Total** | **5** | **7** | **0** | **7** | **3** | **7** | **5** | **4** | **3** | **41** | |
| Total sample covered | 10 | 11 | 10 | 11 | 13 | 13 | 14 | 12 | 14 | 108 | |

- - - - -

**Document information**

| *Version* | *Date* | *Description* |
|---|---|---|
| 03.0 | 31 May 2019 | Revision to:<br>• Ensure consistency with version 02.0 of the "CDM validation and verification standard for programmes of activities" (CDM-EB93-A08-STAN);<br>• Make structural and editorial improvements. |
| 02.0 | 29 December 2017 | Revision to align with the requirements of the "CDM validation and verification standard for programme of activities" (version 01.0). |
| 01.0 | 5 June 2015 | Initial publication. |

Decision Class: Regulatory
Document Type: Form
Business Function: Issuance
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