Verification and certification report form for GS project activities (Version 04.0)

BASIC INFORMATION	
Title and GS reference number of the project activity	Social Education and Development Society (SEDS) Biogas CDM project for the rural poor GS REF # GS849
Scale of the project activity	☐ Large-scale ☒ Small-scale
Version number of the verification and certification report	2.0
Completion date of the verification and certification report	12/07/2023
Monitoring period number and duration of this monitoring period	Monitoring period no: 6 Duration: 01/01/2020 to 31/12/2021 (Inclusive of both days)
Version number of the monitoring report to which this report applies	3
Crediting period of the project activity corresponding to this monitoring period	01/01/2018 to 31/12/2024.
Project participants	Social Education and Development Society (SEDS)
Host Party	India
Applied methodologies and standardized baselines	AMS. I.E. Switch from non-renewable biomass for thermal applications by the user. Version 7
Mandatory sectoral scopes	Sectoral Scope 3
Conditional sectoral scopes, if applicable	NA
Estimated amount of GHG emission reductions or GHG removals for this monitoring duration in the registered PDD	

SDG	Ex-ante Estimation
SDG 13	Emission Reduction of 15,749 tCO_2 per annum by implementing biogas plants.
SDG 3	i. 100% reduction in indoor air pollution ii.50% reduction of pathogen load in biogas slurry.
SDG 5	At least 50% reduction in time and drudgery to women due to project activity
SDG 7	5,000 biogas units constructed and 100% functionality of biogas units due to repairs and maintenance of biogas units and reduction of 2.85 t of fuelwood/HH
SDG 17	50% Carbon Funding to construct, repair, maintain and monitor the project

<table>
<tr><td>Certified amount of GHG emission reductions or GHG removals for this monitoring period</td><td>
<table>
<tr><th>SDG</th><th>Actual achieved values</th></tr>
<tr><td>SDG 13</td><td>12,786 tCO_2 for the year 2020
10,819 tCO_2 for the year 2021</td></tr>
<tr><td>SDG 3</td><td>i.100% families reported improved indoor air pollution and 100% reduction in health issues
ii.Reduction of 94% pathogen levels in slurry compared to dung</td></tr>
<tr><td>SDG 5</td><td>Reduction in 44% of time for cooking and 18.7 wage days/HH/yr for collection.</td></tr>
<tr><td>SDG 7</td><td>i.Construction and maintenance of 5,000 biogas units for 5,000 households.
ii.Maintenance of constructed biogas units leading to reduction 2.13 t of fuelwood/HH/Yr</td></tr>
<tr><td>SDG 17</td><td>Forward funding of Rs.89.83 million received for implementation, repair and maintenance and monitoring of the project activity</td></tr>
</table>
</td></tr>
<tr><td>Name of the VVB</td><td>4K Earth Science Private Limited</td></tr>
<tr><td>Name, position and signature of the approver of the verification and certification report</td><td>S. Jagajothi
 
Director</td></tr>
</table>

SECTION A. Executive summary

4K Earth Science Private Limited (4KES) has been commissioned by "Social Education and Development Society (SEDS)" to perform an independent verification of its registered GS VER project "Social Education and Development Society (SEDS) Biogas CDM project for the rural poor", GS Ref # GS849 for the reported GHG emission reductions for the given monitoring period 01/01/2020 - 31/12/2021 (both dates included). The GS VER projects must undergo independent third-party verification and certification of emission reductions as the basis for issuance of Verified Emission Reductions (VERs).

The objectives of this verification exercise are, by review of objective evidence, to establish that:

- The project activity has been implemented and operated as per the registered PDD and that all physical features (technology, project equipment, and monitoring and metering equipment) of the project are in place;
- Monitoring report and other supporting documents are complete;
- The actual monitoring systems & procedures and monitoring report conforms with the requirements of the approved monitoring plan and the approved monitoring methodology;
- The data is recorded and stored as per the monitoring methodology and approved monitoring plan.

Scope:
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 review of monitoring report, supporting information and

(a) The registered CDM/GS PDD
(b) The approved methodology mentioned in the GS PDD
(c) The registered monitoring plan
(d) Relevant decisions, clarifications and guidance from the CMP and the CDM Executive Board
(e) Applicable Gold Standard tool kit
(f) CDM Validation and Verification Standard (VVS)
(g) All information and references relevant to the project activity's resulting in emission reductions
(h) Information related to monitoring of SDG parameters

The project is assessed against the requirements of the Gold Standard for Global Goals requirements and related rules and guidance..

4KES has based on the GS requirements and recommendations in the latest version of CDM Validation and Verification Standard, employed a rule-based approach in the verification, focusing on the identification of significant reporting risks and the reliability of project monitoring.

Description of project:

The project activity is the installation of biogas plants (digesters) of 2m^3 capacity each for single households in Penukonda, Roddam, Somandepalli, Gorantla and Chilamathur Mandals of Anantapur District., Andhra Pradesh, India. The biogas units are fed by cattle dung generated from the households. The biogas stoves replaces the traditional fire wood stoves used for cooking and heating purposes.

In baseline situation, households uses traditional fire wood stove which is inefficient that uses non-renewable biomass for cooking. In the project situation the biogas stoves are used for cooking and hence completely avoiding the usage of traditional stoves which results in savings in non-renewable biomass. Thereby, it avoids the related CO_2 emission from the avoidance of non-renewable biomass in cooking. The PP installed 5,000 biogas units of 2 m^3 capacity each for single households and all the 5,000 units were commissioned.

Methodology:

4KES follows a rule-based verification approach, wherein, as a first step, the contract review is undertaken as per latest version of CDM Accreditation Standard. Subsequently, after the contract is signed, the Gold Standard Verification work plan of the project activity is made available at Gold Standard registry in accordance with Gold Standard rules.

A desk review of the project documentation is undertaken, which is followed by an onsite visit and interviews by the members of verification team in accordance with the latest version of CDM AS. The verification protocol

is filled by the verification team that is based on standard auditing practices and latest version of CDM VVS, to capture the assessment of applicable CDM & GS requirements viz., latest version of CDM Project Standard, applicable GS toolkit, registered GS-PDD applied methodology/ies and/or tools and recent decisions. The verification protocol provides transparent means to record the observations and compliances by the verification team members and the nonconformities (CARs/CLs), if any. The verification protocol is an internal document, and is available on request. After successful closure of findings (CARs/CLs), the draft verification report is prepared which went through Independent technical review as per 4KES internal procedures and the TR comments were given for any gaps in audit findings. After closure of the TR comments, final verification report is prepared then followed by final approval for the decision made. The approved verification report is given to PP which shall be submitted for request for issuance.

Following are the major milestones for the verification under consideration.

Verification contract	26/05/2022
On site verification	08/07/2022
Draft Verification Report	19/07/2022
Final Verification Report	12/07/2023

SECTION B. Verification team, technical reviewer and approver

B.1. Verification team member

No.	Role	Type of resource	Last name	First name	Affiliation (e.g., name of central or other office of VVB or outsourced entity)	Involvement in			
						Desk/document review	On-site inspection	Interviews	Verification findings
1.	Team Leader/ Verifier/ Technical Expert (1.1 & 13.2)	IR	S	Stalin	Central	X	X	X	X
2	Team Member	IR	Acharya	Swati	Central	X	X	X	X
3.	Local Expert	IR	S R	Anand	Central	X	X	X	X

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 VVB or outsourced entity)
1.	Technical reviewer (TA 1.1 & 13.2)	**IR**	Puratchikkanal	Ma Paa	Central
2.	Approver	**IR**	Jagajothi	S	Central

SECTION C. Application of materiality

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.	Wrong data collection/misinterpretation of household situation	Low	It's not complicated monitoring process. Appropriate trainings are conducted for the monitoring personnel.	By means of site visit check of actual situation to sample number of households.
2	Transfer of data from sampling survey sheet to ER sheet	Low	Possible human error during transfer of data to ER sheet.	Thorough cross-check required on the transfer of data from survey sheets to the ER sheet
3	Error in transferring the recorded data to ER Sheet	Low	Since the process of transferring data from monitoring database to ER calculations sheets is done mostly through copy and paste, there is a very less chance of discrepancies.	Consistency between monitoring database and ER sheet to be checked.
4	Error in ER calculations	High	The sample size was large, hence increasing the chances of error in ER calculation	The ER calculations were checked for accuracy.

C.2. Consideration of materiality in conducting the verification

The prescribed thresholds for materiality, as per §326 of CDM VVS for PA,

Prescribed range of ERs/annum	>500,000	300,000-500,000	<300,000	SSC PAs	MSC PAs
Prescribed Threshold	0.5%	1.0%	2.0%	5.0%	10.0%

The identified/selected materiality threshold for the project activity under current monitoring period is 5% as project activity is small scale project activity.

	MR Version (Draft)	**MR Version (Final)**
Emission reductions/annum	12,777 tCO_2e -2020 10,817 tCO_2e -2021	12,786 tCO_2e -2020 10,819 tCO_2e -2021
Identified Threshold	5.0%	5.0%

The impact of errors observed during verification for each monitoring parameter on the emission reduction calculation is provided below:

Parameter	**Verification approach**	**Error identified**	**Corrected**	**Extrapolated error for population size (Qty and %)**	**Within Threshold**
Date of commissioning of project device of type i	Complete data check against the project database	No error identified	NA	No Impact	Yes
$NCV_{biomass}$	Default value-Crosschecked against Methodology AMS-I.E. Version 07	No error identified	NA	No Impact	Yes
$BC_{PJ,HH,y}$	1% of logbook data are verified for the non-operating days. 1% of survey sheets are crosschecked for the parallel use data.	No error identified	NA	No Impact	Yes

B_y	Checked the calculation	No error identified	NA	No Impact	Yes

No error on the values of the monitoring parameters is found. The change in the emission reduction between draft and final MR is due to the correction in the ER calculation. Please refer the CARs & CLs raised in the Appendix 4.

SECTION D. Means of verification

D.1. Desk/document review

The verification is performed primarily as a desk review of the documents submitted at various stages of assessments. The review is performed by assessment team using verification protocols (checklists). The assessment team cross-checked the information provided in the MR and information from sources other than those used, if available, and also conducts independent background investigations. 4KES conducted a desk review, involving but not limited to,

- A review of the data and information presented to verify their completeness;
- A review of the monitoring plan and monitoring methodology, paying particular attention to the frequency of measurements, the quality of metering equipment including calibration requirements, and the quality assurance and quality control procedures;
- A review of calculations and assumptions made in determining the GHG data and emission reductions;
- An evaluation of data management and the quality assurance and quality control system in the context of their influence on the generation and reporting of emission reductions.

The list of documents reviewed is included in the section 'Appendix 3' of this report.

D.2. On-site inspection

Duration of on-site inspection: 08/07/2022				
No.	**Activity performed on-site**	**Site location**	**Date**	**Team member**
1.	Opening Meeting, Office Inspection, Verification of monitoring records, interviews and database inspection	SEDS office	08/07/2022	Stalin S, Swati Acharya Anand SR
2	Interview with monitoring team	Project Villages	08/07/2022	Stalin S, Swati Acharya Anand SR
3	Visit to sample beneficiary households	Beneficiary households	08/07/2022	Stalin S, Swati Acharya Anand SR

D.3. Interviews

No.	**Interviewee**			**Date**	**Subject**
	Last name	**First name**	**Affiliation**		
1		Nagamani	SEDS	08/07/2022	- General aspects of the project - Quality management system - Involved personnel and responsibilities
2		Tanveer	SEDS		
3	P.	Rasool	SEDS		
4	Rani	Radha	SEDS		
5	Padmanabha	Sudha	Fair Climate Network		
6		Govindamma	SEDS		

No.	Interviewee			Date	Subject
	Last name	First name	Affiliation		
7		Pakkerappa	SEDS		- Training and practice of the operational personnel - Implementation of the monitoring plan - Monitoring data management - Data uncertainty and residual risks - Procedural aspects of the Monitoring - Maintenance - Data analysis - Data transfer - General governance and implementation - Process and procedures ER Calculations
Beneficiary Details with Unit ID					
1	K. Varalakshmi		1362	08/07/2022	- Verification of monitored data - Awareness about ownership of CERs - Working condition of digester unit - SD parameters verification - Awareness about Grievance mechanism
2	K. Lakshmidevi		852	08/07/2022	
3	Rangamma		854	08/07/2022	
4	C. Lakshmidevi		850	08/07/2022	
5	G.Lakshmidevi		973	08/07/2022	
6	C. Saraswathamma		847	08/07/2022	
7	C. Vijayagowri		977	08/07/2022	
8	M. Mangamma		974	08/07/2022	
9	M. Parvathamma		860	08/07/2022	
10	M. Lakshminarasamma		1295	08/07/2022	
11	M. Leelavathi		1906	08/07/2022	
12	Hemalatha		964	08/07/2022	
13	A. C. Sudhamani		966	08/07/2022	
14	G Arunamma		1626	08/07/2022	
15	M. Bharathamma		1635	08/07/2022	
16	P Sowbagyamma		1628	08/07/2022	
17	G.Kanthamma		1809	08/07/2022	
18	V. Nagalakshmamma		1631	08/07/2022	
19	B. Obulamma		1641	08/07/2022	

Verification team cross verified parameters which are monitored through acceptance samples survey. Apart from acceptance sample survey explained below section, the other questions asked by the verification team and the summary of reply received from the stakeholders are given below:

Questions asked by Validation team	Summary of Response by Stakeholders/end users
Since when you are using the biogas system?	Validation team received varied responses from each household based on the implementation date
Is the biogas system being in operating condition now?	All the households visited reported operational condition.
How many cattle you have?	All end users confirmed having cattle varying from 2 – 8.
Are you aware that the project claims emission reduction and the ownership of the ERs are with SEDS?	All the end users aware that the all the rights of emission reduction are with SEDS as the bio digester was constructed by SEDS at free of cost. They also confirmed about the agreement signed with SEDS for giving away the emission reduction rights to SEDS.
Does the village volunteer visit your house regularly? For what purpose?	All the households confirmed that the village volunteer visit their households regularly to check the regular use of biogas stove and to record any non-operational days.

If you have any issue with the device/project, you contact whom?	All households confirmed that they have the contact details of the village volunteer and for any requirement they can easily contact village volunteer.
Are there any repairs done to your digester or stove? If yes what is the cost you paid for the repair?	Few households confirmed that their stoves/digesters are repaired during the monitoring period. Households reported various repairs done such as burner repair, gate-valve repair, dome re-plaster, gas pipe repair etc. All the households confirmed that the repairs are done free of cost or at nominal price depends on the type of repair.
Did you participate any training conducted by SEDS?	All households confirmed that the SEDS staff trained them on functioning of the biogas unit and on the slurry management during implementation and follow-up visits.
How the digester slurry is disposed?	All the households confirmed that the digester slurry is used as fertilizer for agriculture as trained by the SEDS staff. All the households confirmed that the use of chemical fertilizer is reduced due to the application of bio digester slurry.
If any issue with the biogas system or any grievances, to whom you will report to resolve the issue/ grievances?	All households confirmed that they have the contact details of the village volunteer and for any requirement they can easily contact village volunteer
How useful is the biogas system?	All households confirmed cooking in the biogas smokeless compared to old traditional wood stove. They also confirmed cooking in the biogas system is safer and operation of the system is easy. The households also mentioned that considerable amount of time saved due to the use of biogas system from fuel wood collection, cooking and cleaning utensils.
When you use fuel wood for cooking along with biogas, do you intimate to village volunteers?	All households confirmed they will intimate it when the village volunteers visit the households.
You have any concerns with the biogas system/project?	No households reported any concerns over the project.

D.4. Sampling approach

The PP conducted a 100% monitoring for the monitored parameters related to carbon emission reductions, in accordance with the approved PDD. No monitoring parameter has been determined by PP though sampling approach.

PP has conducted Kitchen test on sample basis in the non-project households to determine the fuel wood consumption of each cooking item during January 2021. This has been done once and fixed for the crediting period.

The kitchen test results have been conducted in 33 non-project households where only traditional stoves are used. Verification team checked the appropriateness of test results using the following steps:

- The Method of Kitchen test followed by PP is checked and found to be in accordance with established international/national procedures.
- The Kitchen test results have been crosschecked with the respective Kitchen test monitoring sheet and found no error
- The method of Kitchen test is simple and the PP's staffs are found to be capable of doing the test

It is also found that the total fuel wood consumption on each cooking item determined though kitchen test is in line with the baseline fuel wood consumption. Hence, the verification team accepts the Kitchen test result which was conducted during last verification and found acceptable.

Also, the following SDG parameters are monitored through annual sample survey

- SDG 3: Good Health and Wellbeing: Improvement of health problems due to reduction in smoke and better indoor air quality
- SDG 5: Gender equality: Reduction in drudgery of cooking – Save time

The sampling size is determined accordance with Annex 6 EB 67 “Guidelines for sampling and surveys for CDM project activities and programme of activities “which specifies the reliability requirements and describes appropriate sampling methods applicable to small-scale projects. The level of confidence and precision considered is 90/10. Thus, the sample size is calculated as 78 Nos (39 Nos for 2020 & 39 Nos the year 2021), which is adequate and acceptable to verification team.

The data is collected at the individual household level by monitoring staff who are responsible for recording the data in the monitoring database

VVB Sampling approach:

For the fuel wood consumption on each cooking item of traditional stoves in non-project households, the PP has conducted kitchen test on January 2021 on 33 non project households. The fuel wood consumption on each cooking item determined through the sample survey conducted by the PP and it is fixed for second crediting period. Verification team verified 100% test data sheets and checked the calculations. Hence the results arrived during the test conducted on January 2021 is appliable for the current monitoring period.

During the on-site verification a sampling approach has been used by the verification team to verify the reported values for the SD parameters which are determined through sample survey. Verification team has determined acceptance sample size for all the sample survey parameters based on the table provided under para 32 of standard “Sampling and surveys for CDM project activities and programmes of activities” version 9.0.

Parameters	Producers risk	Consumers risk	AQL	UQL	Sample size	Acceptance Number
SD Parameters monitored through sample survey	5%	10%	0.5%	20%	18	1

Accordingly, the verification team verified a total of 20 Samples, including 2 extra samples to cater to non-response. From the acceptance sample survey, it is found that the sample survey results of the PP for all the sample HHs were in line with VVB’s field survey results. Hence, the PP’s sample survey is found to be acceptable.

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

Areas of verification findings	No. of CL	No. of CAR	No. of FAR
Compliance of the monitoring report with the monitoring report form	-	-	-
Compliance of the project implementation and operation with the registered PDD	-	-	-
Post-registration changes	-	-	-
Compliance of the registered monitoring plan with the methodologies including applicable tools and standardized baselines	-	-	-
Compliance of monitoring activities with the registered monitoring plan	-	4	-
Compliance with the calibration frequency requirements for measuring instruments	-	-	-
Assessment of data and calculation of emission reductions or net removals	-	1	
Assessment of reported sustainable development co-benefits	-	2	-
Stakeholder Inputs & Legal Dispute	-	-	-
Others (please specify)	-	-	-
Total	-	7	-

SECTION E. Verification findings

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

Means of verification	The project is registered under GS4GG, and PP used GS monitoring report template, version 1.1. All the sections of the form were filled as per the GS4GG guidelines and gave all the relevant details.

Findings	No findings raised.
Conclusion	Monitoring report was found to be completed and using the valid version i.e., version 1.1 of the GS MR, hence the monitoring report is complying with the monitoring report form.

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

This is the 6th verification of the project activity. No FAR is raised in the previous verification report. Hence FARs are not applicable for this monitoring period.

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

Means of verification	The project aims to reduce the dependence of the rural communities on the non-renewable biomass. The project is implemented in the five Mandals of Anantapur district in Andhra Pradesh, India. The project is implemented in arid drought prone area wherein the biomass in itself is not abundant. The project activity involves replacement of traditional inefficient cook stoves with biogas plants. The biogas will substitute firewood and/or other fuels, which are used for daily cooking needs by the local population. In the longer term, the project will help to decrease the deforestation rate in the project area. Most of the households use inefficient cooking stoves with incomplete combustion, which leads to indoor emissions that pose severe health risks to the women and children, who are continuously exposed to the smoke during cooking. Under this Project activity 5,000 biogas units are implemented and size is of $2m^3$ As verified from site visit, PP has provided a unique identification number (Unit ID) for each biogas unit constructed which is also written on the digester. The project database includes all the details about digester like Name of the beneficiary, address, Unit ID, functioning date etc. Hence, the double counting of digester unit is avoided. Also, all the beneficiaries have signed end user agreements with PP though which they agree to transfer the VER rights to PP. This is confirmed form verification of sample end user agreements /14/ and interview with beneficiaries. Hence, double counting of emission reduction is avoided. The verification team determined the conformity of the actual project activity and its operation with the validated project design document. Verification team has, by means of a desk review and an on-site visit, assessed that all physical features of the GS project activity proposed in the revised & approved PDD/03/. During site visit, the verification team interviewed PP and beneficiary and confirmed that the ownership of the VER is transferred to SEDS. This was conveyed to stakeholders by PP during the stakeholder consultation meeting and during the construction of digester. After construction of digester an end user agreement is signed with each household in which the beneficiaries agree to transfer the VER ownership to SEDS. The same is confirmed form verification of end user agreements/14/. The verification team has checked the information in the monitoring report and compared against the approved PDD. During the onsite inspection, the verification team has checked the project locations, implementation, technology applied, project equipment, and monitoring system against the information in the approved PDD. Interviews with operational personnel and households and random samplings have been carried out
Findings	No Findings Raised.
Conclusion	The verification team has reviewed the project database, monitoring database, efficiency test details, and end user agreements. The verification team has observed at the site that all physical locations of the biogas units on sample basis and found that the details are correctly matching with the monitoring report and monitoring records maintained by PP. The type of the biogas provided and the

	locations are consistent with the approved PDD. Thus, the verification team has concluded that the project activity was implemented and operated as per approved PDD. The verification team, based on the site visit and document review, was able to conclude that the project activity has been commissioned and implemented as per the approved PDD and that all physical features of the project are in place.

E.4. Post-registration changes

E.4.1. Temporary deviations from the registered monitoring plan, applied methodologies, standardized baselines or other methodological regulatory documents[1]

No temporary deviation is sought for this monitoring period.

E.4.2. Corrections

There are no corrections in the project information and parameters fixed during registration in the current monitoring period.

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

There are no changes to the start date of the crediting period in this monitoring.

E.4.4. Inclusion of a monitoring plan

Monitoring plan was already included in the approved PDD. Hence, not applicable.

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

No permanent changes or deviation in the registered monitoring plan is sought.

E.4.6. Changes to the project design

No change in project design is sought for this monitoring period.

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

Not applicable

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

Means of verification	The verification team checked compliance of project monitoring plan with the applied methodology (AMS I.E, version 7) and including applicable tools.
Findings	No findings raised in this context.
Conclusion	All parameters stated in the monitoring plan and the applied methodology has been fulfilled in the current monitoring report. All baseline emission parameters have been verified and found satisfactory. The discussion regarding each parameter has been elaborated in the further sections of this report. The monitoring plan as mentioned in the registered PDD is in accordance with the applied methodology. In the opinion of the verification team, the monitoring report complies with the requirement of the registered PDD and applied methodologies in the context of the project activity.

[1] 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).

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

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

<table>
<tr><td>Means of verification</td><td>The verification team has checked the ex-ante parameters and data stated in Section D.1 of MR and compared with section B.6.2 of the registered PDD whether all parameters fixed ex-ante for the crediting period have been applied correctly.

<table>
<tr><th>Ex-ante Parameter</th><th>Value</th><th>Consistent with the PDD/3/ & the source mentioned in it</th></tr>
<tr><td>$f_{NRB,y}$</td><td>0.95</td><td>Yes</td></tr>
<tr><td>N_{HH}</td><td>5000 Nos</td><td>Yes</td></tr>
<tr><td>$BC_{BL,HH,y}$</td><td>2.85tonnes/year/family and 14,257 tonnes/year for 5000 families</td><td>Yes</td></tr>
<tr><td>Diversion of non-renewable biomass saved under the project activity by non-project households</td><td>2.85 x 0.95 = 2.71 t/yr for 365 days.
The biomass diversion is 2.85 – 2.71 = 0.14 t/family/yr.</td><td>Yes</td></tr>
</table>
</td></tr>
<tr><td>Findings</td><td>No finding raised in this context.</td></tr>
<tr><td>Conclusion</td><td>The values of ex ante fixed parameters have been verified from the registered PDD/3/. Same has been crosschecked with the source mentioned in the PDD and found to be consistent. The verification team confirms that the values used/applied are correct and justified. Also, the ex-ante values have been correctly applied in the calculation of emission reductions.</td></tr>
</table>

E.6.2. Data and parameters monitored

<table>
<tr><td>Means of verification</td><td>The verification team has determined whether the approved monitoring plan has been properly implemented and followed by the PP that the monitoring has been carried out in accordance with the approved monitoring plan; and determined whether all parameters including project emission parameters, baseline emission parameters and leakage parameters used for emission reduction calculation stated in the registered monitoring plan are monitored or used appropriately as per the registered PDD & Approved GS4GG transition annex.
During the verification all monitoring parameters listed in Section D.2 of MR were compared with section B.7.1 of the registered PDD have been verified with regard to the:
(i) appropriateness of the applied measurement / determination method,
(ii) the correctness of the values applied for ER calculation,
(iii) the accuracy, and applied QA/QC measures.

The monitored values are assessed as follows:

Date of commissioning of project device of type i (Actual date of commissioning of the project device.): This parameter is monitored as and when a digester is commissioned/started producing gas and the same is entered into the online monitoring database. The reported data is cross checked with the project database downloaded from the monitoring solution/14/. The Commissioning dates of all the project devices are verified to be correct.

$NCV_{biomass}$ (Net calorific value of the non-renewable woody biomass, briquettes or charcoal used in project devices): The NCV of biomass is taken from the applied methodology` which is based on the IPCC value. Verification team checked the methodology/6/ and 2006 IPCC Guidelines for National Greenhouse Gas Inventories/7/ and found to be correct. No update on the IPCC</td></tr>
</table>

	data is available. Hence, NCV value considered for the monitoring period (0.015 TJ/tonne) is correct. $BC_{PJ,HH,y}$ **(Average annual consumption of woody biomass per household in the pre-project devices during the project activity, if it is found that pre-project devices were not completely displaced but continue to be used to some extent**). This includes two components i. Fuel wood consumption from non-usage of biodigester ii. Fuel wood consumption from parallel use of fuel wood for cooking (i) The fuel wood consumption from non-usage of biodigester is calculated from the non-usage days that are monitored continuously though village volunteers. The non-usage of digesters occurred mainly due to the repairs in the stove and digesters. Also, non-usage due to other reasons such as houses not interested to use, migrated to another place, demolished are also recorded. When the biogas unit is not working, the beneficiaries report to the village level volunteer, who in turn reports to the biogas field worker of the project for the repair of the unit. The date when the plant stopped working and the date when the issue is fixed are noted down in the village level breakdown log book/18/ by the staffs/volunteers and the same will be entered into monitoring solutions/14/. The non-usage details are also collected and recorded when it is observed during the regular visit to end user households by village volunteers. Verification team randomly checked the breakdown log records/18/ and data in the monitoring solution/14/ and found to be matching with ER calculation sheet/2/. Verification team confirms the non-usage data reported in the MR non-usage days is found to be correct. The equivalent fuel wood consumption based on the non-usage days are calculated based on the baseline fuel wood consumption/day/household. The calculation is verified and found to be correct. Hence, verification team confirms that the fuel wood consumption form non-usage of biodigester reported in the monitoring report and ER calculation sheet (ie, 2144.582 tonnes or 0.43 tonnes/household) is found to be correct. (ii) The fuel wood consumption from parallel use of fuel wood for cooking is estimated based on the annual survey conducted in all the households. PP has conducted survey in all the households during the year 2020 and 2021/15/. In the survey, PP determined the fuel wood used for cooking specific items and frequency of the using fuel wood for cooking the specific items and the respective period. From this survey result, PP has determined the number of time that each household prepare the specific food items using the fuel wood in a year. The verification team randomly checked survey sheet/15/ and found that the details reported in the 'SEDS survey sheet - Fuelwood Use_2020-2021-analysis' is found to be correct Also, PP has conducted Kitchen test on sample basis in the non-project households to determine the fuel wood consumption of each cooking item. This is fixed for this 2nd crediting period. In January 2019, a pilot Kitchen test have been conducted in 10 non-project households in the project area where only traditional stoves are used. Then PP has determined the sample size for each of each cooking item from the mean and standard deviation derived from the pilot KT results. As verified from the sample size calculation for each of the cooking item, the maximum sample size required for KT @80% response rate is found to be 7 (ie, for the Fodder Preparation & hot water preparation). Since, the required sample size is less than 30, as per requirement para 30 of Standard: Sampling and surveys for CDM project activities and programmes of activities, v8, PP has conducted Student's t distribution test. PP has conducted iteration till there is no change in the value of maximum sample size n gives 20. However, based on the CDM review clarifications raised last monitoring period on January 2021 PP has conducted KT at 33 households. Hence the actual sample size considered by PP (ie, 33) is found to be adequate.

	Since the sample households are selected randomly from non-project households in the project area that uses fuel wood for cooking, the selected households are found representative of the population that uses fuel wood for cooking. Also the scope of the KT is to determine the fuel wood consumption for each cooking item and hence the selected sample population is found to be appropriate. The Kitchen test results have been crosschecked with the respective Kitchen test monitoring sheets/16/ and found no error. The reliability of the kitchen test results is found to be within 10% /16/. From kitchen test result, the average fuel wood use as proportion for each of the food item to the total fuel wood was determined. Also, verification team found that the total fuel wood consumption is in line with the baseline fuel wood consumption. Hence, the verification team accepts the Kitchen test result. From the Kitchen test result and the 'number of time that each household prepare the specific food items using the fuel wood in a year' determined from the annual survey, PP has determined the fuel wood consumption from parallel use of traditional wood stove for cooking. The calculation is verified and found to be correct. Hence the fuel wood consumption due to the parallel use of fuel wood reported in the monitoring report and ER calculation sheet (ie, 4986.84 tonnes or 0.997 tonnes/household) is found to be correct. Hence the total annual consumption of woody biomass in the pre-project devices during the project activity is 7131.427 tonnes or 1.43 tonnes/household. **B_y (Quantity of woody biomass that is substituted or displaced),** The quantity of fuel wood substituted are calculated based on the below formula: $B_y = N_{HH} \times (BC_{BL,HH,y} - BC_{PJ,HH,y})$ Verification team checked the ER calculation sheet and found that the **B_y** calculation provided in the ER sheet is found to be correct. Hence, the **B_y** value reported in the MR and ER calculation sheet (11,575 tonnes for 2020 and 9,794 for the year 2021) is found to be correct.
Findings	CAR 01 raised in this context and closed.
Conclusion	Corresponding to the §361 of VVS V2/12/, the team confirm that the monitoring has been carried out in accordance with the approved PDD/3/. The monitoring system is in compliance with the information flow for the parameters as mentioned in monitoring plan in approved PDD/3/. The monitored data for the parameters has been verified by checking the procedure for information flow and found to be complete and consistent.

E.6.2.1. Implementation of sampling plan

Means of verification	The verification team checked whether the PP has applied a sampling approach to determine the monitored values. Verification team found that all the parameters are monitored 100%. No monitoring parameter has been determined by PP though sampling approach. However, PP has conducted Kitchen test on sample basis in the non-project households to determine the fuel wood consumption of each cooking item during last verification. This is fixed and applicable for the whole 2nd crediting period as required by the registered PDD. This result is used to determine the parameter $BC_{PJ,HH,y}$. The Kitchen test results have been conducted in 10 non-project households where only traditional stoves are used. Since the parameter of interested is 'mean parameter, PP has estimated the sample size based on 90/10 confidence / precision level is calculated as per the below formula: The Kitchen test results have been crosschecked with the respective Kitchen test monitoring sheet/16/ and found no error. The KT procedure followed by PP were

	checked and found to be appropriate. Also, the total fuel wood consumption determined in the kitchen test is in line with the baseline fuel wood consumption. Hence, the verification team accepts the Kitchen test result. $n \geq \frac{1.645^2 V}{0.1^2}$ $where$ $V = \left(\frac{SD}{mean}\right)^2$ As per the Kitchen test results the sample size required for various food items @80% acceptance rate ranges from 2 to 7. The sample size calculation provided in Kitchen test result sheet/16/ is verified and found to be correct. However, as per para 30 of Standard: Sampling and surveys for CDM project activities and programmes of activities, Version 8," If the sample size calculation returns a value of less than 30 samples, a minimum sample size of 30 shall be chosen when the parameter of interest is a proportion. If the parameter of interest is a numeric mean value (i.e., not a proportion or percentage) the student's t-distribution shall be used if the resulting sample size is less than 30." Since the parameter of interest is a numeric mean, in line with the requirement, PP has conducted the student t-distribution calculation in the Kitchen performance test result excel sheet. As per the student T-distribution test, the sample size required for this kitchen test is found to be 20 (maximum of the different food items). However, PP has conducted KT in 33 households. Hence, the actual sample size considered by PP is found to be adequate. Verification team checked the PP's survey results. The achieved precision is for the fuel wood consumption for each food items is ranges from 1.83% to 5.90% which are within the required precision level of 10%. The Kitchen test results have been crosschecked with the respective Kitchen test monitoring sheet/16/ and found no error. The KT procedure followed by PP is checked and found to be appropriate. By means of the interview with the personnel involved n KT, the verification team confirmed that the persons understand the KT procedure and the KT was conducted appropriately. Also, the total fuel wood consumption is in line with the baseline fuel wood consumption. Hence, the verification team accepts the Kitchen test result which was conducted during last verification and results of the same is used for the calculations. For the GS Sustainability parameters, stratified random sampling approach was adopted, with biennial surveys. These were monitored by FCN Technical Team of Fair Climate Services Pvt. Ltd, in collaboration with the SEDS staff. The PP has conducted the survey on 22/12/2020 to 23/12/2020 by largely telephonically and few physically due to covid-19 pandemic and travel restrictions imposed in the country and 23/01/2022 to 29/01/2022 by physically. The sample size is determined in accordance with Annex 06, EB 67, "Guidelines for sampling and surveys for CDM project activities and programme of activities", which specifies the reliability requirements and describes appropriate sampling methods applicable to small-scale projects. The level of confidence and precision considered is 90/10. $n \geq \frac{1.645^2 N \times p(1-p)}{(N-1) \times 0.1^2 + 1.645^2 p(1-p)}$ The no of samples is calculated as 25 Nos for the year 2020 & 2021, based on 80% expected response rate, the no of samples is redetermined as 31 households. This is further apportioned to randomly selected villages and households on each Mandals where all the biogas units are installed. The final sample size is determined as 39 Nos each on year 2020 and 2021. Based on the verification team experience, the sample size considered for estimation of SDG parameters is found to be adequate and appropriate.
Findings	CAR 02, CAR 03 raised in this context and closed successfully.

Conclusion	Verification team concludes the following: • The sample size considered for all the parameters (which are monitored through sampling basis) are found to be appropriate. • The precision level achieved from the monitored data also confirms that the sample size considered for the monitoring is sufficient. • PP's sample population was selected in all the Mandals proportionally based on the number biogas units installed in the respective Mandals. • The sampling plan is implemented correctly in accordance with the approved PDD.

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

Means of verification	Not applicable as no monitoring equipment is involved.
Findings	NA
Conclusion	NA

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

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

Means of verification	The verification team has checked whether calculations of baseline GHG emissions calculation have been carried out in accordance with the formulae and methods described in the registered monitoring plan. In detail the following has been verified: Transparency: It has been checked whether the calculation of baseline emissions is fully traceable and, where used, the Excel calculation provides all calculation formulae. Parameter consistency: It has been checked whether all internal and external parameters and data used for the calculation are applied consistently in the monitoring report and the calculation spreadsheet. Correctness: It has been checked whether the applied formulae and methods for calculating baseline emissions are in accordance with the monitoring plan and the approved methodology. Completeness: It has been checked whether all calculations are complete and without omissions As per applied methodology, the emission reduction is calculated using the formula: $BE_y = B_y \times f_{NRB,y} \times NCV_{biomass} \times EF_{projected\_fossil\_fuel}$ Where: BE_y Baseline emissions during the year y in tCO2e $B_{y,savings}$ Quantity of woody biomass that is substituted or displaced in tonnes $f_{NRB,y}$ Fraction of woody biomass used in the absence of the project activity in year y that can be established as non-renewable biomass using survey methods or government data or approved default country specific fraction of non-renewable woody biomass (fNRB) values available on the CDM website. $NCV_{biomass}$ Net calorific value of the non-renewable woody biomass that is substituted (IPCC default for wood fuel, 0.015 TJ/tonne) $EF_{projected\_fossilfuel}$ Emission factor for the substitution of non-renewable woody biomass by similar consumers. (81.6 tCO2/TJ) Where the B_y is determined using the below formula:

	$B_y = N_{HH} \times (BC_{BL,HH,y} - BC_{PJ,HH,y})$ Emission reduction is adjusted with 0.95 factor for leakage (considering 5% leakage) as per the latest version of methodology AMS I.E, version 7) PP has submitted the calculation in the excel sheet/2/. The baseline calculation in the excel sheet is checked whether the calculation is in accordance with the formula given in the revised PDD/3/ and the selected methodologies/6/.
Findings	CAR 01 raised and closed.
Conclusion	The verification team confirms the following: • The calculations of baseline emission have been carried out in accordance with the equations and methods described in the registered monitoring plan and applied methodology. • The emission factor applied is an ex-ante value valid for the fixed crediting period. • Any assumptions used in emission or removal calculations have been justified. • Appropriate emission factor and other reference values have been correctly applied. It can be confirmed that the baseline calculation is overall correct. • The ER calculation sheet provided is clear, transparent and the calculations provided in the sheet are reproducible. Hence, the total baseline emissions reported in the monitoring report for the monitoring period is verified to be correct and the summary is given below:

Vintage	$\sum BE_{b,y}$ (tCO_2e)
2020(01/01/2020 to 31/12/2020)	13,458
2021 (01/01/2021 to 31/12/2021)	11,388
Total	**24,846**

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

Means of verification	There is no cultivation of biomass for the project activity. Hence a project emission is zero for the monitoring period.
Findings	No finding
Conclusion	No project emission reported.

E.8.3. Calculation of leakage GHG emissions

Means of verification	During the verification it has been checked whether leakage emissions have to be considered and in cases where leakage emissions have to be calculated, the respective calculation of leakage GHG emissions has been checked. Based on the methodology, B_y is multiplied by a net to gross adjustment factor of 0.95 to account for leakages, in which case leakage surveys is not required. Since PP has not conducted leakage survey, PP has considered 5% leakage as per the applied methodology (AMS I E version 7).
Findings	No findings
Conclusion	The PP has applied 0.95 leakage adjustment factor in B_{old} as per the applied methodology, AMS I.E, version 7 EB 60). Hence, the total leakage emissions reported in the monitoring report for the monitoring period is verified to be correct and the summary is given below:

Vintage	$\sum LE_{b,y}$ (tCO_2e)
2020 (01/01/2020 to 31/12/2020)	672
2021 (01/01/2021 to 31/12/2021)	569
Total	1,241

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

Means of verification	Section E.3 of MR demonstrate the summary of GHG emission reductions for the monitoring period and calculated according to the applied methodologies as follows: **$ERy = \sum BEb,y - \sum PEp,y - \sum LEp,y$** *Where* *ERy* Emission reduction for total project activity in year y (tCO_2e/yr) $BE_{p,y}$ Baseline emissions for baseline scenario b in year y tCO_2e/yr) $PE_{b,y}$ Project emissions for project scenario p in year y (tCO_2e/yr) $LE_{p,y}$ Leakage for project scenario p in year y (tCO_2e/yr) PP has submitted the calculation in the excel sheet/2/. The emission reduction calculation in the excel sheet is checked whether the calculation is in accordance with the formula given in the revised PDD/3/ and the selected methodologies/6/.
Findings	No findings
Conclusion	The verification team confirms the following: • The emission reduction is calculated as per the approved PDD and the applied methodology • The emission reduction value reported in the PDD is verified to be correct. • The summary of emission reduction is as below:

Vintage	$\sum BE_{b,y}$ (tCO_2)	$\sum PE_{b,y}$ (tCO_2)	$\sum LE_{b,y}$ (tCO_2)	ER* (tCO_2)
2020 (01/01/2020 to 31/12/2020)	13,458	-	672	12,786
2021(01/01/2021 to 31/12/2021)	11,388	-	569	10,819
Total	**24,846**	**-**	**1,241**	**23,605**

*rounded down values

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

Means of verification	The verification team has checked whether the MR includes a comparison of actual values of the monitoring period with the estimations in the registered PDD/3/. Section E.5 of the MR includes a comparison of the calculated actual emission reductions with the ex-ante calculated values in the registered PDD

Emission reduction estimated as per the PDD/3/	Actual emission reduction achieved as per Monitoring report/1/
31,498 tCO_2e for two years (15,749 tCO_2e/Year)	23,605t CO_2e

Hence, the actual emission reduction achieved during the monitoring period is 25.06 % less than the estimation in the PDD.

Findings	CAR 04 raised and closed.
Conclusion	The estimated emission reduction as per PDD and the actual emission reduction achieved for the monitoring period are correctly reported in the section E.5 of MR. The actual achieved emission reduction is 25.06 % less than the PDD estimation. Hence no justification is required.

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

Means of verification	The verification team has determined the VER achieved during this monitoring period with the estimated value and reason for increase if any.
Findings	No finding
Conclusion	The actual achieved emission reduction is lower than the PDD estimation. The actual achieved emission reduction is 25.06 % less than the PDD estimation. Hence no justification is required.

E.9. Assessment of reported sustainable development co-benefits

<table>
<tr><td>Relevant SDG</td><td>SDG 3: Good Health and Well-Being
Target 3.9. By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination</td></tr>
<tr><td>Parameter description</td><td>i. Continued improved indoor air condition and reduced respiratory problems especially for women and children.
ii. Reduction of pathogens in slurry compared to that of dung</td></tr>
<tr><td>Monitored Value</td><td>i. 100% families reported improved indoor air pollution and 100% reduction in health issues
ii. Reduction of 94% pathogen levels in slurry compared to dung.</td></tr>
<tr><td>Means of verification</td><td>Reduction indoor air pollution
This parameter is monitored biennial survey. Verification team checked all the sample survey sheets/16/ and found that the details related to decrease in smoke given in the MR is correct. Also, verification team conducted acceptance sample survey from the 20 households where the PP has conducted sample survey. All the 20 households confirmed that usage of biogas plants lead to reduction in smoke, reduction in eye irritation and reduction in Respiratory problem. Hence, the details provided in the MR are correct.
% Reduction in Bacterial count: The laboratory analysis has been done during the beginning of the crediting period. The laboratory test results/22/ were checked and found that there was decrease in the bacterial count of biogas slurry by 94% compared to that of dung. Thus, it has been accepted that the project activity reduces other pollutants and thereby improves cleanliness and sanitation. Hence the detail provided in the MR is correct</td></tr>
<tr><td>Findings</td><td>No findings raised.</td></tr>
<tr><td>Conclusion</td><td>The parameter is monitored appropriately, in accordance with the registered monitoring plan. The monitoring results were recorded consistently as per the approved frequency in the monitoring plan. All the monitored parameter values reported in the MR are found to be correct.

<table>
<tr><th>Baseline value</th><th>Project Value</th><th>Net Benefit</th></tr>
<tr><td>i. 100% of families report indoor air pollution and health issues</td><td>100% families reported improved indoor air pollution and 100% reduction in health issues</td><td>100% families reported improved indoor air pollution and 100% reduction in health issues</td></tr>
<tr><td>ii. Total bacterial count of 3.65 x 10^7 CFU/g</td><td>Total bacterial count of 0.225 x 10^7 CFU/g</td><td>Reduction of 94% pathogen levels in slurry compared to dung</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><td>Relevant SDG</td><td>SDG 5: GENDER EQUALITY
Target 5.4. Recognize and value unpaid care and domestic work through the provision of public services, infrastructure and social protection policies and the promotion of shared responsibility within the household and the family as nationally appropriate</td></tr>
<tr><td>Parameter description</td><td>Reduction in Hours for collection of woody biomass and cooking</td></tr>
<tr><td>Monitored Value</td><td>Reduction in 44% of time for cooking and 18 wage days for collection.</td></tr>
<tr><td>Means of verification</td><td>All the sample survey sheets/15/ are checked and found that the value provided in the excel sheet is consistent with the sample survey sheets. Also, verification team conducted acceptance sample survey during onsite audit and confirmed that the values determined by PP though sample survey is correct. As per the survey results there has been reduction of cooking time by nearly 44%. In the baseline scenario, nearly 3.98 hours per day was spent on cooking and 18.8 wage days /year/family for fuelwood collection which is now reduced to 2.23 hours/day for cooking and 0.1 wage day/year/family and hence the saved time is used for other</td></tr>
</table>

<table>
<tr><td></td><td>activities by women. There is improvement in living conditions of women as they need not keep blowing air to keep the fire going, which used to affect their lungs and eyes due to smoke and particulate matter. There are also improvements in terms of clearer homes; water savings; cleaner vessels without soot from fire; ease of cooking.</td></tr>
<tr><td>Findings</td><td>CAR 07 is raised and closed.</td></tr>
<tr><td>Conclusion</td><td>The parameter is monitored appropriately, in accordance with the registered monitoring plan. The monitoring results were recorded consistently as per the approved frequency in the monitoring plan. All the monitored parameter values reported in the MR are found to be correct.

<table>
<tr><th>Baseline value</th><th>Project Value</th><th>Net Benefit</th></tr>
<tr><td>3.98 hrs cooking/day and 18.8 wage days/year/family for fuelwood collection</td><td>2.23 hrs cooking/day and 0.1 wage day/year/family for fuelwood collection</td><td>Reduction in 44% of time for cooking and 18.7 wage days for collection</td></tr>
</table></td></tr>
</table>

<table>
<tr><td>Relevant SDG</td><td>SDG 7: Affordable and Clean Energy
Target 7.2. By 2030, increase substantially the share of renewable energy in the global energy mix</td></tr>
<tr><td>Parameter description</td><td>i. Number of biogas units constructed for the rural communities thereby reducing the use of fuelwood.
ii. ii. Number of biogas units repaired and maintained for continuous use of biogas units making them operational</td></tr>
<tr><td>Monitored Value</td><td>i. Construction of 5,000 biogas units for 5,000 households
ii. Maintenance of constructed biogas units leading to reduction 2.13 Tonnes of fuelwood/HH/Yr.</td></tr>
<tr><td>Means of verification</td><td>The number of biogas units installed and stoves repaired are taken from PP’s monitoring database/14/. Verification team checked database and found that the value provided (ie, 5000 biogas units) is correct. Of the 5000 biogas units installed, all of the units are functional and are rid of indoor air pollution due to construction and operation of biogas. All the sample survey sheets/15/ are checked and found that the value provided in the excel sheet is consistent with the sample survey sheets. Also, verification team conducted acceptance sample survey during onsite audit and confirmed that the information obtained by PP though sample survey is correct.
When the biogas unit is not working or under repair, the beneficiaries report to the village level volunteer, who in turn reports to the biogas field worker of the project for the repair of the unit. The same will be entered into breakdown logbook monitoring solutions/14/. This is monitored continuously by the PP to ensure that the biogas units are functional throughout the monitoring period. Verification team randomly verified the monitoring solution and found the values reported are correct and acceptable.</td></tr>
<tr><td>Findings</td><td>No findings raised.</td></tr>
<tr><td>Conclusion</td><td>The parameter is monitored appropriately, in accordance with the registered monitoring plan. The monitoring results were recorded consistently as per the approved frequency in the monitoring plan. All the monitored parameter values reported in the MR are found to be correct.

<table>
<tr><th>Baseline value</th><th>Project Value</th><th>Net Benefit</th></tr>
<tr><td>No Biogas plants in the baseline.

2.85 t/HH/yr is the fuelwood use</td><td>5000 Biogas plants constructed.

0.714 t/HH/yr is the fuelwood use in project scenario</td><td>5000 Biogas plants constructed.
Maintenance of constructed biogas units leading to reduction 2.13 t of fuelwood/HH/Yr</td></tr>
</table></td></tr>
</table>

<table>
<tr><td>Relevant SDG</td><td>SDG 17: Partnerships for the goals
Target: 17.3. Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning</td></tr>
<tr><td>Parameter description</td><td>Domestic/international carbon funding to construct and maintain biogas units</td></tr>
<tr><td>Monitored Value</td><td>100% forward funding of Rs.89.83 received for implementation, repair and maintenance and monitoring of the project activity.</td></tr>
<tr><td>Means of verification</td><td>Verification team checked the balance sheet of SEDS /21/ and found that PP received INR 80 million from various banks and other financial institutions till Dec 2021 for this project activity.
<table>
<tr><td>Carbon funding received overall</td><td>Carbon funding received in the monitoring period</td></tr>
<tr><td>Rs 89.83 million</td><td>Rs 89.83 million.</td></tr>
</table>
The carbon funding has been used for implementation, repair and maintenance and monitoring of the project activity and same is verified through the audited documents /financial records and found correct. Hence, the verification team confirms that the value reported in the MR is correct.</td></tr>
<tr><td>Findings</td><td>CAR 05 is raised and closed.</td></tr>
<tr><td>Conclusion</td><td>The parameter is monitored appropriately, in accordance with the registered monitoring plan. The monitoring results were recorded consistently as per the approved frequency in the monitoring plan. All the monitored parameter values reported in the MR are found to be correct.
<table>
<tr><th>Baseline value</th><th>Project Value</th><th>Net Benefit</th></tr>
<tr><td>No funding for the 5,000 biogas units in the baseline</td><td>Forward funding of Rs.89.83 million received for implementation, repair and maintenance and monitoring of the project activity.</td><td>Forward funding of Rs.89.83 million received for implementation, repair and maintenance and monitoring of the project activity.</td></tr>
</table></td></tr>
</table>

E.10. Stakeholder Inputs & Legal Dispute

<table>
<tr><td>Means of verification</td><td>Verification team verified the continuous input and grievance mechanism in place. PP has provided various options for the stakeholders continuous input and grievance viz. Grievance book at SEDS office, Telephone & email access and nominated village volunteers for each village/group of villages. The Verification team also interviewed the stakeholders/end users and confirms that they are aware about the grievance mechanism in place for this project activity.

The verification team checked the grievances register. All the inputs from stakeholders are related to repair and maintenance of biogas digester. PP attended all the cases and resolved the same. There are no other grievances reported by Stakeholders during the current or previous monitoring period. Verification team checked the repairs and replacement records and confirmed that all the cases are resolved by either repairing the digester and stove. The grievance register maintained at the SEDS office is verified and found that no other grievances received.</td></tr>
<tr><td>Findings</td><td>No findings raised in this context.</td></tr>
<tr><td>Conclusion</td><td>The verification team confirms the following:
The only grievances received from bio-digester users are related to repairs & maintenance of digesters & stoves. All the cases received during the monitoring period are attended and resolved during the monitoring period itself.
No other grievances received during the current or previous monitoring period</td></tr>
</table>

SECTION F. Internal quality control

The draft verification report prepared by team leader is reviewed by an independent technical reviewer (having competence of relevant technical area himself/herself or through an independent technical area expert) to confirm the internal procedures established by 4KES are duly followed and the verification report/opinion is reached in an objective manner and complies with the applicable Gold Standard & CDM requirements.

The technical review team is collectively required to possess the technical expertise of all the technical area/sectoral scope the project activity relates to. All team members of technical review team are independent of the verification team. The independent technical reviewer(s) may approve or reject the draft verification report. The findings may be identified even at this stage, which needs to be satisfactorily resolved, before submit final report to Client/Gold Standard. The final approval decision is taken by the Head of the DOE/Director.

The final decision is authorized by the Director, 4KES, once the report is finalized by the Head of the DOE/DOE Manager.

SECTION G. Verification opinion

The verification team confirms that the the evidence is of sufficient quantity, appropriate quality and reliable. The reported values, notation, units and sources in the monitoring report for all the monitoring parameters have been cross checked with the emission reduction sheet and monitoring report. During the course of verification and on-site visit, the data submitted by PP was cross verified with the values mentioned in the emission reduction sheet/2/ and monitoring report/1/. The procedure for data monitoring, recording, transfer and compilation was also verified and found in compliance with the monitoring plan as mentioned in the registered PDD/3/.

Evidences (Documents/interview/site visit) referred for verification of individual monitoring parameter and fixed parameters are defined in section E.6 above. It is confirmed by the assessment team that the reported emission reductions have been conservatively calculated. A list of referred documents for verification is also included in Appendix 3 of this report.

Based on the information seen and evaluated we confirm that the implementation of the project has resulted in **23,605tCO_2e** emission reductions during period 01/01/2020 to 31/12/2021.

SECTION H. Certification statement

4K Earth Science Pvt. Ltd. has been contracted by 'Social Education and Development Society (SEDS)' to undertake independent verification and certification for the greenhouse gas (GHG) emission reductions reported and the contribution to sustainable development indicators from the GS Project activity "Social Education and Development Society (SEDS) Biogas CDM project for the rural poor" and GS Reference Number GS849 for the monitoring period 01/01/2020 to 31/12/2021 (including both dates) in the Monitoring Report Version 01 (first version) dated 22/05/2022 and the Final Monitoring Report Version 03 dated 10/07/2023.

The verification is based on the registered PDD and GS Passport, GS transition Annex and he monitoring report for this project. Our verification approach was based on the requirements as defined under the Gold Standard requiments, Kyoto Protocol, Marrakech accord, as well as those defined by the CDM Executive Board.

The management of the 'Social Education and Development Society (SEDS)' is responsible for the preparation of the GHG emissions data and the reported GHG emissions reductions & monitoring of SD parameters on the basis set out within the project Final Monitoring Report Version 03 dated 10/07//2023. The calculation and determination of GHG emission reductions from the project is the responsibility of the management of the 'Social Education and Development Society (SEDS). The development and maintenance of records and reporting procedures are in accordance with the Monitoring Report Version 03 dated 10/07/2023.

In our opinion the GHG emissions reductions reported for the project activity are fairly stated in the Monitoring Report (final) 03 dated 10/07/2023. 4KES based on outcome of verification activities, certifies in writing that, during the monitoring period 01/01/2020 to 31/12/2021 (including both days), the registered GS CDM PA "Social Education and Development Society (SEDS) Biogas CDM project for the rural poor" in the registered

GS CDM PA achieved the verified amount of **23,605 tCO_2e** reductions in anthropogenic emissions by sources of greenhouse gases that would not have occurred in the absence of the PA

The Verified and certified impacts during the monitoring period 01/01/2020 to 31/12/2021 (including both dates) is stated below:

Sustainable Development Goals Targeted	SDG Impact	Achieved	Units/ Products
SDG 13	GHGs emissions reduction per year	Reduction of 12,786 tCO_2 in the year of 2020. Reduction of 10,819 tCO_2 in the year of 2021. Total emission reductions of 23,605 tCO_2	tCO_2
SDG 3	• Continued improved indoor air condition and reduced respiratory problems especially for women and children • Reduction of pathogens in slurry compared to that of dung	• 100% families reported improved indoor air pollution and 100% reduction in health issues • Reduction of 94% pathogen levels in slurry compared to dung	% %
SDG 5	Reduction in drudgery of cooking and ease of cooking	Reduction in 44% of time for cooking and 18.7 wage days for collection.	Number
SDG 7	• Construction and maintenance of biogas units for rural communities • Maintenance of constructed biogas units and elimination of use of firewood	• Construction and maintenance of 5,000 biogas units for 5,000 households. • Maintenance of constructed biogas units leading to reduction 2.13 t of fuelwood/HH/Yr.	Number T/HH/Year
SDG 17	Access to domestic or international carbon funding to implement clean technologies	Forward funding of Rs.89.83 million received for implementation, repair and maintenance and monitoring of the project activity	Rs

Appendix 1. Abbreviations

Abbreviations	Full texts
4KES	4K Earth Science Pvt. Ltd
BE	Baseline Emissions
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CDM EB	CDM Executive Board
CH4	Methane
CL	Clarification Request
CO2e	Carbon dioxide equivalent
EF	Emission Factor
ERs	Emission Reductions
FAR	Forward Action Request
FCN	Fair Climate Network
GHGs	Greenhouse Gas(es)
GS	Gold Standard
GVC	Gram Vikas Committees
GVK	Gram Vikas Kosh
GWP	Global Warming Potential
HH	Household
ISO	International Organization of Standardization
IPCC	Intergovernmental Panel on Climate Change
KP	Kyoto Protocol
LE	Leakage Emissions
MR	Monitoring Report
MP	Monitoring Plan
NCV	Net Calorific Value
NGO	Non-Governmental Organisation
PE	Project Emissions
PDD	Project Design Document
PS	Project Standard
PCIA	Partnership for Clean Indoor Air
PCP	Project Cycle Procedure
PP	Project proponent
SD	Sustainable Development
SDG	Sustainable Development Goal
SHG	Self Help Group
QA/QC	Quality Assurance/Quality Control
UNFCCC	United Nations Framework Convention on Climate Change
VER	Verified Emission Reduction
VVB	Validation and Verification Body
VVS	Validation & Verification Standard
WBT	Water Boiling Test

Appendix 2. Competence of team members and technical reviewers

Certificate of Competence							
Name	☒ Mr. ☐ Ms.	**Stalin S**					
Qualification Procedure		*Fulfils the requirement as per the appointment of personnel procedure of 4KES for Validation and Verification of CDM/VCS/GS/GHG Projects.*					
Appointed to work as:							
		CDM Validator/Verifier	**Team Leader**	**Team Member**	**Technical Expert**	**Technical Reviewer**	**Financial Expert**
Appointed		Yes	Yes	Yes	Yes	Yes	No
Appointed Date		30-04-2022					
Authorized to work as Technical Expert for:							
Authorized Technical Area		**Sectoral Scope**		**TA Code**	**Technical Area within the scope**		
		Energy industries (renewable - / non-renewable sources)		1.1	Thermal energy generation		
		Energy industries (renewable - / non-renewable sources)		1.2	Renewables		
		Energy Disribution		2.1	Energy Distribution		
		Energy demand		3.1	Energy demand		
		Waste handling and disposal		13.1	Solid waste and wastewater		
		Waste handling and disposal		13.2	Manure		
Authorized to work as Local Expert for:							
Country/Countries		India					
Compliance check by: Anand S. R.							

Certificate of Competence							
Name	☒ Mr. ☐ Ms.	**Anand S R**					
Qualification Procedure		*Fulfils the requirement as per the appointment of personnel procedure of 4KES for Validation and Verification of CDM/VCS/GS/GHG Projects.*					
Appointed to work as:							
		CDM Validator/Verifier	**Team Leader**	**Team Member**	**Technical Expert**	**Technical Reviewer**	**Financial Expert**
Appointed		No	No	Yes	No	No	No
Appointed Date		29-07-2019					
Authorized to work as Technical Expert for:							
Authorized Technical Area		**Sectoral Scope**		**TA Code**	**Technical Area within the scope**		
Authorized to work as Local Expert for:							
Country/Countries		India					
Compliance check by: Anand S. R.							

Certificate of Competence		
Name	☒ Mr. ☐ Ms.	**Ma Paa Puratchikkanal**

Qualification Procedure	*Fulfils the requirement as per the appointment of personnel procedure of 4KES for Validation and Verification of CDM/VCS/GS/GHG Projects.*					
Appointed to work as:						
	CDM Validator/Verifier	**Team Leader**	**Team Member**	**Technical Expert**	**Technical Reviewer**	**Financial Expert**
Appointed	Yes	Yes	Yes	Yes	Yes	No
Appointed Date	27-04-2021					

Authorized to work as Technical Expert for:			
Authorized Technical Area	**Sectoral Scope**	**TA Code**	**Technical Area within the scope**
	Energy industries (renewable - / non-renewable sources)	1.1	Thermal energy generation
	Energy industries (renewable - / non-renewable sources)	1.2	Renewables
	Energy demand	3.1	Energy demand
	Construction	6.1	Construction
	Waste handling and disposal	13.1	Solid waste and wastewater
	Waste handling and disposal	13.2	Manure
	Agriculture	15.1	Agriculture

Authorized to work as Local Expert for:	
Country/Countries	India and Sri Lanka
Compliance check by: Anand S. R.	

Certificate of Competence		
Name	☒ Mr. ☐ Ms.	**Swati S. Acharya**
Qualification Procedure		*Fulfils the requirement as per the appointment of personnel procedure of 4KES for Validation and Verification of CDM/VCS/GS/GHG Projects.*

Appointed to work as:						
	CDM Validator/Verifier	**Team Leader**	**Team Member**	**Technical Expert**	**Technical Reviewer**	**Financial Expert**
Appointed	No	No	Yes	Yes	No	No
Appointed Date	30-04-2022					

Authorized to work as Technical Expert for:			
Authorized Technical Area	**Sectoral Scope**	**TA Code**	**Technical Area within the scope**
	Energy industries (renewable - / non-renewable sources)	1.2	Renewables
	Energy demand	3.1	Energy demand

Authorized to work as Local Expert for:	
Country/Countries	India
Compliance check by: Anand S. R.	

Appendix 3. Documents reviewed or referenced

No.	Author	Title	References to the document	Provider
1	SEDS	Monitoring Report	Version 01, dated 22/05/2022	SEDS
	SEDS	Monitoring Report	Version 02, dated 24/08/2022	SEDS
	SEDS	Monitoring Report	Version 03, dated 10/07/2023	SEDS
2	SEDS	VER Calculation Sheet	Version 01	SEDS
	SEDS	VER Calculation Sheet	Version 02	SEDS
	SEDS	VER Calculation Sheet	Version 03	SEDS
3	SEDS	Registered PDD 2nd Crediting Period	Version 05 dated 22/01/2021.	SEDS
4	SEDS	GS4GG Transition Annex GS passport (2nd Crediting period)	- Version 09 dated 08/08/2018	Publically available
5	4KES	GS 5th Verification report	Version 2, dated 12/04/2021	Publically available
6	UNFCCC	AMS I.E- Switch from non-renewable biomass for thermal applications by the user	Version 07	Publically available
7	IPCC	1. 1996 IPCC Guidelines for National Greenhouse Gas Inventories: work book 2. 2006 IPCC Guidelines for National Greenhouse Gas Inventories: work book	Web Link	Publically available
8	UNFCCC	Kyoto Protocol (1997)	Web Link	Publically available
9	GS	Template: Gold standard for the global goals Monitoring report	Version 01.1	Publically available
10	UNFCCC	CDM project standard for project activities	Version 03	Publically available
11	UNFCCC	Standard: Sampling and surveys for CDM project activities and programme of activities	Version-09	Publically available
	UNFCCC	Guidelines for sampling and surveys for CDM project activities and programme of activities	Version 04	Publically available
12	UNFCCC	CDM validation and verification standard for project activities	Version 03	Publically available
13	UNFCCC	Glossary “CDM terms”	Version 10	Publically available
14	SEDS	Biogas basic record set: - Biogas application form - End user agreement for VER ownership - Completion Certificate - Online Monitoring Solution	-	SEDS
15	SEDS	Sample Survey Monitoring sheet for the year 2020 & 2021 SEDS Biogas CDM project for the rural poor - End User Survey-analysis	-	SEDS
16	SEDS	Kitchen Test monitoring sheets conducted in non-project households	-	SEDS
17	SEDS	Training Records - Training conducted foe end user - Training conducted for Mason - Training conducted for Staffs - Training conducted for Village level Volunteers	-	SEDS
18	SEDS	Records of non-working, repair details of biogas monitored by village monitors	-	SEDS
19	SEDS	List of biogas units that are not functional	-	SEDS
20	SEDS	Employment Records	-	SEDS

21	SEDS	Grievance Records	-	SEDS
22	SEDS	Sample Bank receipt of money deposits /Financial Records	-	SEDS

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

Table 1. CL from this Verification

~~**CL ID**~~		~~**Section no.**~~		~~**Date :**~~
~~**Description of CL**~~				
~~**Project participant response**~~				~~**Date :**~~
~~**Documentation provided by project participant**~~				
~~**VVB assessment**~~				~~**Date:**~~

Table 2. CAR from this verification

CAR ID	01	**Section no.**	E.6.2	**Date :** 23/06/2022
Description of CAR				
The percentage use values used to determine fuel wood consumption of each cooking item in "SEDS survey sheet - Fuelwood Use_2020-2021-analysis -Sheet 1" is differ from the values mentioned in the monitoring report and KT results conducted during last verification. Correction requested.				
Project participant response				**Date :** 22/08/2022
The excel sheet for ER calculations and the Monitoring Report is corrected with the values from the KT results conducted during the last verification, which is valid for the entire crediting period.				
Documentation provided by project participant				
Revised ER Calculations Sheet, Parallel use of Fuelwood use calculations sheet and Monitoring Report				
VVB assessment				**Date:** 10/09/2022
The percentage use values used to determine fuel wood consumption of each cooking item in "SEDS survey sheet- Fuelwood Use_2020-2021-analysis -Sheet 1 is revised and in line with values arrived in the KT conducted during last verification which is valid for the entire crediting period. Hence CAR 01 is closed.				

CAR ID	02	**Section no.**	E.6.2.1	**Date :** 23/06/2022
Description of CAR				
The sample size determination calculations for SDG parameters sheets and sample survey sheets/results obtained during the monitoring period to be submitted for further review.				
Project participant response				**Date :** 22/08/2022
The sample size calculations sheet is submitted for further review.				
Documentation provided by project participant				
Sample survey size calculations sheet				
VVB assessment				**Date:** 10/09/2022
The sample size determination calculations and survey results obtained during the monitoring period have been reviewed by the verification team. The sample size determined by the project participant is in line with the Guidelines for sampling and surveys for CDM project activities and programme of activities Annex 06, EB 67 and based on the verification team expertise the sample size considered for estimation of SDG parameters is found to be adequate and appropriate. Also, the results arrived in the sample survey were verified and inline with reported value in the monitoring report. Further verification team done the acceptance survey and found that sample survey results of the PP for all the sample HHs were in line with VVB's field survey results Hence, the PP's sample survey is found to be acceptable. Hence CAR 02 is closed.				

CAR ID	03	Section no.	E.6.2.1	Date : 23/06/2022
Description of CAR				
Reason for not conducting the sample survey on physical basis in the year of 2020 to be provided in section D.4 of Monitoring report. Correction requested.				
Project participant response				**Date :** 22/08/2022
The sample surveys were conducted through physical and telephonic survey, but predominantly telephonically. This is included in the monitoring report.				
Documentation provided by project participant				
Revised Monitoring Report				
VVB assessment				**Date:** 10/09/2022
The PP has conducted the monitoring surveys largely by telephonically and few physical surveys due to Covid-19 pandemic and travel restrictions exists in the country which is acceptable to the verification team and confirmed by interviewing the monitoring personnel of the project activity. The explanation has been provided in the revised monitoring report which is found to be correct. Hence CAR 03 is closed.				

CAR ID	04	Section no.	E.8.5	Date : 23/06/2022
Description of CAR				
The comparison of monitored parameter values obtained in this monitoring period with last monitoring period in section D.3 of the MR is not filled. Correction requested.				
Project participant response				**Date : :** 22/08/2022
The comparison of monitoring parameter value with the previous monitoring period is updated in section D.3. of the revised monitoring report				
Documentation provided by project participant				
Revised Monitoring Report				
VVB assessment				**Date:** 10/09/2022
The values of the previous monitoring period and current monitoring period is given in Section D.3 of the revised monitoring report and crosschecked with previous issued and current monitoring report and ER calculations sheets which are found to be correct and acceptable. Hence CAR 04 is closed.				

CAR ID	05	Section no.	E.8.5	Date : 23/06/2022
Description of CAR				
In SDG 17- Access to domestic or international carbon funding to implement clean technologies, the amount received and expenditures towards clean technologies is not given in the corresponding sections of MR also submit the proof for the same. Correction requested.				
Project participant response				**Date :** 22/08/2022
All the section of the monitoring report is updated to reflect on the carbon money received for the project activity.				
Documentation provided by project participant				
Revised Monitoring Report				
VVB assessment				**Date:** 10/09/2022
The forward funding of Rs.89.83 million received for implementation, repair and maintenance and monitoring of the project activity and related financial documents submitted by the PP is verified and found to correct. The information is given in the in the corresponding sections of the revised monitoring report. Hence CAR 05 is closed.				

CAR ID	06	Section no.	E.6.2	Date : 23/06/2022
Description of CAR				
As per the monitoring solution database, households stopped using biogas due to non interest of beneficiary and migration of beneficiary & Animals Sold, however these are fixed by the village volunteers in some cases. These issues are permanent in nature. PP has to clarify how all these issues are fixed during the monitoring period.				
Project participant response				**Date :** 22/08/2022
The initial reason for the stoppage of biogas use as provided by the end user is recorded in the monitoring solution. Migration is not always permanent. Some families migrate temporarily during summer to nearby towns for work and get back, in which case they use the biogas units. Families that sell their cattle due to non-availability of fodder during summer or when they require money, repurchase cattle, when they can use biogas units. Hence in some cases the issue is not permanent and is sorted out by the end users themselves. The non-usage is captured so that ERs are not estimated for the period and hence is a conservative approach.				
Documentation provided by project participant				
Revised monitoring report.				

VVB assessment	Date: 10/09/2022
The reason provided by the project participant is reasonable and acceptable to the verification team and same has been confirmed by interviewing village level volunteers and other monitoring personnel of the project activity also for non-usage period is not accounted in the emission reduction calculation which is a conservative approach followed by the PP is deemed appropriate and acceptable. Hence CAR 06 is closed.	

CAR ID	07	Section no.	E.8.5	Date : 23/06/2022
Description of CAR				
In section E.4 of the MR for SDG 5, how the baseline and project scenario values are arrived to be substantiated with documents/proofs. Clarification requested.				
Project participant response				**Date :** 22/08/2022
This is through sample surveys conducted. The data from sample survey sheets and their analysis in Microsoft Excel is provided. Scanned copies of sample survey sheets are also provided.				
Documentation provided by project participant				
Sample survey sheets and excel sheet of sample survey results with analysis				
VVB assessment				**Date:** 10/09/2022
The results arrived in the sample survey were verified and in line with reported value in the monitoring report. Further verification team done the acceptance survey and found that sample survey results of the PP for all the sample HHs were in line with VVB's field survey results Hence, the PP's sample survey is found to be acceptable. Hence CAR 07 is closed.				

Appendix 1. Table 3. FAR from this verification

FAR ID	01	Section no.	GS Transition	Date : 10/09/2022
Description of FAR				
Since the GS transition to GS4GG review report was not made available during the verification. The review comments, site information and any additional requirements by GS needs to be checked, evaluated and assessed. However, the PP is requested to add all the SDGs from previous version. This FAR 01 is raised to address any GS transition review comments.				
Project participant response				**Date :** DD/MM/YYYY
Documentation provided by project participant				
DOE assessment				**Date:** DD/MM/YYYY

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Document information

Version	*Date*	*Description*
04.0	6 April 2021	Revision to: Reflect the “Clarification: Regulatory requirements under temporary measures for post-2020 cases” (CDM-EB109-A01-CLAR).
03.0	31 May 2019	Revision to: • Ensure consistency with version 02.0 of the “CDM validation and verification standard for project activities” (CDM-EB93-A05-STAN); • Make structural and editorial improvements.
02.1	11 January 2018	Editorial revision to correct the numbering of appendices in the instructions.
02.0	31 October 2017	Revision to align with the requirements of the “CDM validation and verification standard for project activities” (version 01.0).
01.0	23 March 2015	Initial publication.

Decision Class: Regulatory
Document Type: Form
Business Function: Issuance
Keywords: project activities, verifying and certifying