Verification and certification report form for GS project activities

(Version 04.0)

BASIC INFORMATION	
Title and GS4GG reference number of the project activity	Namene Solar Light Company: Solar Lighting Project Zambia 1 GS reference no.: GS 7002
Scale of the project activity	☐ Large-scale ☒ Small-scale
Version number of the verification and certification report	1.2
Completion date of the verification and certification report	26/12/2023
Monitoring period number and duration of this monitoring period	3rd monitoring period. Duration: 01/08/2022 to 31/05/2023 (including both days)
Version number of the monitoring report to which this report applies	1.3 of 12/12/2023
Crediting period of the project activity corresponding to this monitoring period	15/09/2020 to 14/09/2025
Project participants	Namene Solar Lights Ltd.
Host Party	Zambia
Applied methodologies and standardized baselines	AMS-III A.R. - Substituting fossil fuel-based lighting with LED/CFL lighting systems, version 6.0
Mandatory sectoral scopes	Sectoral Scope 1 : Energy Industries (renewable/ non-renewable sources)
Conditional sectoral scopes, if applicable	N/A
Estimated amount of GHG emission reductions or GHG removals for this monitoring duration in the registered PDD	49,948 tCO_2e
Certified amount of GHG emission reductions or GHG removals for this monitoring period	27,319 tCO_2e
Name and GS4GG reference number of the VVB	Carbon Check (India) Private Limited
Name, position and signature of the approver of the verification and certification report	Priya Suman Priya Suman, Compliance Officer

SECTION A. Executive summary

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Carbon Check (India) Private Ltd. (VVB) has performed the third periodic verification of the GS project "Namene Solar Light Company: Solar Lighting Project Zambia 1" (GS project id: GS 7002) for the period 01/08/2022 to31/05/2023 (inclusive of both the dates). The project activity involves deployment of pico-solar lights (the SM100), that comply with the Lighting Global Pico PV Quality Standards, to households across 4 Provinces in Zambia to eradicate the use of high cost, dangerous and GHG emitting kerosene lamps and paraffin candles. The project involves deployment of 442,991 pico-solar lights across 4 provinces in Zambia, which is commissioned from 15/09/2020 onwards.

Verification methodology and process

The Verification team confirms the contractual relationship signed on the 21/06/2023 between the Carbon Check (India) Private Ltd. (hereafter the "VVB") and the project participant – Namene Solar Lights Ltd. The team assigned to the verification meets the Carbon Check (India) Private Ltd.'s internal procedures including the UNFCCC requirements for the team composition and competence. VVB has conducted a thorough contract review as per UNFCCC and Carbon Check's procedures and requirements.

The verification has been performed as per the requirements described in the Gold Standard for the Global Goals Principles & Requirements (version 1.2) /**5**/; and constitutes the review and completion of the following steps:

- Review of the registered PDD (version 1.4; Dated: 12/05/2020) /09**/**, including the monitoring plan and the corresponding validation report, the Sustainability Matrix and monitoring data;
- Desk review of the MR /01-d/, emission reduction spreadsheet /02-c/
- Review of the applied monitoring methodology "AMS-III A.R. - Substituting fossil fuel-based lighting with LED/CFL lighting systems", version 6.0 /B05/;
- Review of any CMP and EB decisions, clarifications and guidance and the Gold Standard Secretariat;
- Remote assessment (05/09/2023, 08/09/2023 & 11/09/2023) /12/
- Resolution of CARs and CLs raised during verification.
- Issuance of Verification Report

In Carbon Check's opinion, the project activity was correctly implemented according to selected monitoring methodology monitoring plan and the registered PDD /**09**/. The monitoring data allowed for the verification of the amount of achieved GHG emission reductions. Through document review and remote assessment, the verification team confirms that the project has resulted in the 27,319 tCO_2e emission reductions during this third monitoring period. The GHG emission reductions and non-GHG parameters were correctly calculated/monitored based on the approved monitoring methodology "AMS-III A.R. - Substituting fossil fuel-based lighting with LED/CFL lighting systems", version 6.0/B05/ and the monitoring plan contained in the registered PDD (version 1.4; Dated: 12/05/2020) /**09/**.

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	Remote inspection	Interviews	Verification findings
1.	Team Leader/ Technical Expert	IR	Raychoudhury	Rishi K.	CCIPL	X	X	X	X

2.	Trainee Assessor	IR	Raj	Piyush	CCIPL	X	X	X	X
3.	Local Expert	ER	Litebele	Samuel	CCIPL	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	IR	C.	Indumathi	CCIPL
2.	Approver	IR	Suman	Priya	CCIPL

SECTION C. Application of materiality

The threshold of materiality was evaluated based on "Guideline: Application of materiality in verifications" (version 02.0) /**B10**/. It was concluded that the materiality threshold applicable to the project activity based on actual emission reductions achieved is 5% of 27,319 tCO_2e which is equal to 1,366 tCO_2e because the project activity is registered as small scale and as per para 13(a) 5% materiality would be applicable to the project activity.

In planning the verification, verification team took cognizance of para. 11 and para. 12 of the "Guideline: Application ofmateriality in verifications" (version 02.0) /**B10**/ and a materiality threshold of 1,366 tCO_2e is determined for the current verification of the project activity.

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.	Human Error: Recording and reporting of the information in the ER spreadsheet.	Medium	All the ER spreadsheet data of the pico-solar lights including sales database, determination of parameters for operation percentage including data calculation. This includes all the parameters to be monitored ex-post as per the PDD	The risk were mitigated by reviewing the training records of the personnel involved in the data capture and calculations. The monitoring responsibilities will be reviewed. Also, the ER data/calculations will be cross-checked to insure error-free data.
2.	Information System: Use of spreadsheets without adequate controls related to data changes/updates, version tracking, traceability, security	Medium	The data is recorded in spreadsheets based on the raw data collected during the field visits. Access to the spreadsheets for calculation of ERs, monitoring and sales database and baseline project & baseline, and other test records.	The identified risk were mitigated by reviewing the management of access to the records. It will be confirmed through interviews whether the raw data is collected by the field personnel and then transmitted and stored electronically to the PP's office. The data quality control to be checked.
3.	Sample	Medium	The sample size is not suitable, or the surveyed lights are not random (If applicable)	Cross-checked the procedure to identify the sample size against the sampling guideline and standard and confirm the sample size is calculated correctly.

C.2. Consideration of materiality in conducting the verification

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In line with the Guidelines for Application of materiality /B10/ in verification, a reasonable level of assurance is defined for the verification of the project and complete verification of all the monitoring records was done by the verification team and compared with the values indicated in the emission reduction spreadsheet.

Inconsistencies were identified and subsequently findings were raised in the form of Clarification Request (CL) and Corrective Action Request (CAR). These findings are detailed in Appendix 4 and successfully closed. Therefore, related identified mistakes as listed in findings in Appendix 4 to this report have been determined to be immaterial. And thus, it is confirmed that there are no material errors, omissions or misstatements and a reasonable level of assurance is established.

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 /01-d/, emission reduction worksheet /02-c/ and supporting documentation. This process included review of data and information presented to verify their completeness and review of the monitoring plan and monitoring methodology. Documents reviewed or referenced during the verification are listed in Appendix 3 below.

D.2. On-site inspection

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

The last visit is done in August 2022 for 2nd verification. Therefore, on-site visit is not done for the verification of the project activity as per the para. 3.1.2 of the “Site Visit and Remote Audit Requirements and Procedures v2.0”.

The verification team has carried out off-site interviews in order to assess the information mentioned in MR /01-d/ is consistent with the registered PDD /09/. During the desk review, the relevant updated information in consistent with the registered PDD /09/ and corresponding validation report were checked. Previous periodic monitoring report and verification reports, telephonic interview and video call with project representatives were carried out. Details obtained are cross checked with publicly available documents to cross check consistency of information.

The verification report, previous verification reports were checked, comparing the relevant evidence and interview with the PD representative and operation staff through video call, Carbon Check has confirmed that the project is consistent with the registered PDD.

VVB has also carried out the risk assessment in accordance with the Annex 1 of the Site Visit and Remote Audit Requirements and Procedures, version 2.0 /B02/:

S. No.	Risk Identified	Justification
For all certification stages:		
1.	Risk of non-conformity with core GS4GG principles including but not limited to safeguarding principles, stakeholder inclusivity, SDG Impacts.	Not applicable
2.	Risk of non-conformity with potential reversal of GHG benefits and other SDG Impacts.	Not applicable
3.	Risk of non-conformity with key methodological requirements (applicability conditions, project boundary, identification of baseline scenario, algorithms and/or formulae used to determine emission reductions, monitoring methodology).	Not applicable
4.	Risk of any negative feedback/observations received from GS stakeholders, e.g., TAC, end-users, NGO supporters etc, not being addressed sufficiently by the project.	Not applicable
5.	Risk of key stakeholders and/or end users of project technology not willing/able to be interviewed through telephone/videocalls.	Not applicable
For Verifications		

6.	Any outstanding FAR(s)/pending issue(s) since the previous physical site visit.	FAR 01 was raised during previous verification. However, CME has provided appropriate evidence /06/ during current verification which VVB found appropriate and accordingly FAR 01 is closed. Hence, no risk is anticipated.
7.	Any design change(s)/temporary deviation(s) since the previous physical site visit.	There are no design changes temporary deviation(s) since the previous physical site visit. Thus, no risk is anticipated.
8.	Any gaps in monitoring data, if any, that cannot be justified as per applicable requirements.	There are no gaps in monitoring data that are identified during the verification. Thus, no risk is anticipated.

D.3. Interviews

No.	Interviewee			Date	Subject	Team member
	Last name	First name	Affiliation			
1.	Juyal	Anurag	Namene Solar Lights Ltd.	05/09/2023, 08/09/2023 & 11/09/2023	PDD development, GS requirements, Emission reduction calculations, methodology applicability.	Rishi K Raychoudhury Piyush Raj Samuel Litebele
2.	Mukambata	Mushabati	Namene Solar Lights Ltd.	05/09/2023, 08/09/2023 & 11/09/2023	Project Design, ownership details, carbon credit sharing arrangements, monitoring and reporting arrangements, QA/QC procedures, baseline assessment, project technology	
3.	Muyenga	Bright	Namene Solar Lights Ltd.	05/09/2023, 08/09/2023 & 11/09/2023		
4.		Danny	Namene Solar Lights Ltd.	05/09/2023, 08/09/2023 & 11/09/2023		
5.	Muleya	Adrian	Namene Solar Lights Ltd.	05/09/2023, 08/09/2023 & 11/09/2023		
6.	Nengela	Kangowa	End User (Light No. - 190911303872)	08/09/2023	Commissioning details, Agreement with project developers, Functioning of solar lights, sustainability issues, baseline fuel. Post project benefits, Impact on health and livelihood.	
7.	Wakumebo	Josephine	End User (Light No. - 191021303419)	08/09/2023		
8.	Maimbolwa	Namonda	End User (Light No. - 190907300517)	08/09/2023		
9.	Sishwashwa	Namukolo	End User (Light No. - 190943020924)	08/09/2023		
10.	Mukelabai	Namakau	End User (Light No. - 210509304137)	08/09/2023		
11.	Chabelwa	Maina	End User (Light No. - 210727302241)	08/09/2023		
12.	Nzila	Mercy	End User (Light No. - 220402300583)	08/09/2023		

13.	Folosi	Sangster	End User (Light No. - 19090830 1379)	08/09/2023		
14.	Palale	Nickson	End User (Light No. - 19091430 0308)	08/09/2023		
15.	Mukosiku	Namasiku	End User (Light No. - 19090730 0925)	08/09/2023		
16.	Munsanje	Bridget	End User (Light No. - 19090930 1603)	08/09/2023		
17.	Simachuulu	Princess	End User (Light No. - 21050530 4723)	11/09/2023	Commissioning details, Agreement with project developers, Functioning of solar lights, sustainability issues, baseline fuel. Post project benefits, Impact on health and livelihood.	
18.	Siankalanga	Estery	End User (Light No. - 21050630 2112)	11/09/2023		
19.	Simaanzu	Daffly	End User (Light No. - 21050930 1678)	11/09/2023		
20.	Muzyamba	Hilary	End User (Light No. - 21110930 3952)	11/09/2023		
21.	Siamazyambo	Iness	End User (Light No. - 21050730 2758)	11/09/2023		
22.	Sianakacha	Danny	End User (Light No. - 21050730 2738)	11/09/2023		
23.	Siamubayi	Tizzen	End User (Light No. - 21050730 2139)	11/09/2023		
24.	Muleya	Alpha	End User (Light No. - 21073030 3364)	11/09/2023		

25.	Kaandila	Eucaria	End User (Light No. - 220327304951)	11/09/2023		
26.	Munamushiba	Betty	End User (Light No. - 220406301486)	11/09/2023		
27.	Mugwagwa	Listone	End User (Light No. - 220327305020)	11/09/2023		

D.4. Sampling approach

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PD's sampling approach:

PD has done simple random sampling plan using 90/10 as confidence / precision for annual monitoring on 1st batch which is as per requirement of methodology /B05/ as 1st batch pico-solar lights completed 3 years of operation. The sample size for each parameter is determined following guidelines for Sampling and Surveys for CDM Project activities and Programme of Activities Ver. 4.0 (EB86, Annex 4) /**10/**.

The monitoring parameters monitored through the sampling plan are:

1) Percentage of operating unit (Pico-solar lights) under the project activity

CCIPL's verification sampling approach:

As per §25 of the Standard: Sampling and surveys for CDM project activities and programmes of activities (version 09.0) /B08/, the verification team has to verify whether the project participant have implemented the sampling and surveys according to the sampling plan in the registered monitoring plan. The verification includes determining:

(a) Whether the required confidence/precision has been met;
(b) Whether the selected sample was representative of the population.

In line with §26 of the Sampling Standard (version 09.0) /B08/, the verification team has applied an acceptance sampling approach to the sample surveyed by the PD for remote surveys as part of verification. The verification team has chosen acceptance sampling for monitoring parameters in accordance with §28 of the sampling standard (version 09.0) /B08/.

The following table illustrates the agenda covered during the acceptance sampling by the VVB in accordance with Table 1, § 37 of "Standard: Sampling and surveys for CDM project activities and programmes of activities (version 09.0) /B08/;

Parameter	How the PD conducted sampling surveys	How the VVB could obtain records for verification	Criteria for deciding what ultimately constitutes a discrepancy

Percentage of operating unit (Pico-solar lights) under the project activity	Sampling based survey (questionnaire survey/interviews)	Cross-check of a sample of PD's samples (Questionnaire, operation surveys/interviews) including but not limited to following: • Consistency between the information as contained in Survey sheet and revealed from on-site inspection interviews • Baseline scenario • Enquire/observe whether pico-solar lights are operational?	VVB results, accounting for duly justified differences.

CCIPL has considered para 39 (a) of "Standard for Sampling and surveys for CDM project activities and programmes of activities, Version 09.0" for determining the sampling size to be visited by VVB /**B08**/. In case of the current verification, the estimated emission reduction is 49,948 tCO_2e per year, the verification team determined the sample size for acceptance sampling by evaluating the following,

1. Using its own professional judgment and guidance in the Standard 'Sampling and surveys for CDM project activities and programme of activities' version 09.0 /B08/:

2. Considering Acceptable Quality Level (AQL): 1% Unacceptable Quality Level (UQL): 15% and

3. Producer risk of 10% and consumer risk of 15%

A sample size of 11 (each for 1st Batch and 2nd-4th Batch) is obtained as per Table 2 in the referred Standard /**B08**/. Acceptance number (c) thus determined for the sample size as 0.

VVB chooses 22 (11 each for 1st and 2nd - 4th batch) samples to verify the project activity. The verification team selected random samples from PD's sample list. The operational status of project systems was checked during the remote audit for the identified samples. The Solar LED Lights details (unique serial number, date of commissioning, technology, name of user and address were also checked and found to be consistent with that reported in the installation database. Some inconsistency was observed for some samples out of the 22 samples with respect to the observations interviews & document review that reported in the survey report. This assessment of the selected samples was done to ascertain the implementation status of the project activity with respect to the operational of solar LED lights, serial number, location etc.

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	-	CAR 01	-
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	CL 01	CAR 02	-
Compliance with the calibration frequency requirements for measuring instruments	-	-	-
Assessment of data and calculation of emission reductions or net removals	CL 02 CL 03	CAR 03	-
Assessment of reported sustainable development co-benefits	-	-	-
Global stakeholder consultation	-	-	-

Others (please specify) Previous Verification FAR	-	-	FAR 01
Total	03	03	01

SECTION E. Verification findings

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

Means of verification	Desk Review & Interview
Findings	CAR 01 was raised and closed satisfactorily. Kindly refer appendix 4 for more details.
Conclusion	VVB confirms that the monitoring report version 1.3 of 12/12/2023 /01-d/ and later versions are prepared using GS monitoring report template version 1.1 of 14/10/2020 which is the latest available template and completed with relevant information as per the template requirement.

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

Means of verification	Desk Review and Interview
Findings	FAR 01 was raised and closed satisfactorily. Kindly refer appendix 4 for more details.
Conclusion	During previous verification VVB had raised one FAR regarding collecting and recycling/safely disposing of spent batteries. During the current verification, PD has submitted waste management policy /06/, waste management procedure /06/ and record of E-waste disposal (dated 18/07/2022 & 08/06/2023) which PD does once a year /06/. VVB found the evidence appropriate and correct and confirmed the same with the relevant stakeholders during remote audit.

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

Means of verification	Desk Review and Interview
Findings	No findings raised.
Conclusion	VVB has reviewed the registered PD /09/ and MR /01/ and found that the implementation and operation is in line with the registered PD. This was also verified from remote audit and third-party survey report /**05**/. The audit team confirm the project implementation and operation complies with the project design document /**09**/. The solar LED (SM100) are distributed and commissioned by Namene Solar Lights Ltd. End users transfer the ownership of carbon credit via end user agreement /07/ as validated and verified during previous verification /08/. Namene Solar Lights Ltd. is owning for sale of carbon credit generated /07/ from the project activity. The operational and management structured is verified from document review and virtual interview. The project considers 442,991 pico-solar LED lights (258,380 household) which distributed in between 19/11/2019 – 31/05/2023 in four provinces of Zambia in four batches.

Batch	Number of Lights
1st (19/11/2019 – 18/11/2020)	8753
2nd (19/11/2020 – 18/11/2021)	45,394
3rd (19/11/2021 – 18/11/2022)	293,194
4th (19/11/2022 – 31/05/2023)	95,650
Total number of lights	**442,991**

At each project location (end user point) the solar LED (SM100) replaces emitted GHG emission and black carbon from burning fossil fuel based (paraffin candles and kerosene lamps) sources of lighting from rural households. The operational status of all 442,991 pico-solar lights are assessed during the monitoring period as per monitoring survey report and remote audit in some sample pico-solar lights /**12/**.

	VVB has considered 22 pico-solar lights (11 each for 1st and 2nd -4th batch) as explained in section D.4 above to ascertain accuracy of information. VVB confirms the project pico-solar lights are operational in all samples for 2nd - 4th batch and 55% for 1st batch samples verified during remote audit, each pico-solar light has unique identification number which has been provided in the end user agreement and are correct as per project database. The unique identification is also marked at each pico-solar light physically. Along with the serial number, the pico-solar lights (SM100) technology, end username, address, commissioning date etc. had also been noted which were found to be consistent during remote audit. It is noted that no changes have been observed or identified which may impact the additionality, no addition of component nor extension of technology, no addition nor removal of project sites, no change of values of the actual operational parameter relevant to determination of emission reductions which are within the control of the CME; no change has been observed or identified that may impact the scale of the project activity or applicability of baseline and monitoring methodology AMS-III AE version 6.0 /B05/. The operational status of all project pico-solar lights, impact on identified SDGs from 01/08/2022 to 31/05/2023 has been taken into consideration. CME has kept grievance book /13/ in each school participating in the deployment of pico-solar lights /03/ during the crediting period with the Headmaster/Headmistress (or nominated person) in order that families can record any grievances related to the Project. CME keep review the grievance book on a quarterly basis or more frequently based on field sales cycles by the Local Distribution Partner. If an urgent grievance is recorded, the Headmaster/Headmistress will be instructed to contact a representative of the Local distribution Partner by email, text or phone call. VVB found that CME has appropriate mechanism of grievance redressal which is also confirmed during remote audit /12/ and no grievance was raised by household during this monitoring period. It is VVB's opinion that the project implementation and operation comply with the registered project design document/09/.

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]

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Not Applicable

E.4.2. Corrections

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Not Applicable

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

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Not Applicable

E.4.4. Inclusion of a monitoring plan

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Not Applicable

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

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Not Applicable

E.4.6. Changes to the project design

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Not Applicable

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

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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	Desk Review and Interviews
Findings	No findings raised.
Conclusion	During this monitoring period, the validated and registered monitoring plan /09/ was found to be in accordance with the applied methodology /B05/. All monitoring parameters, monitoring procedures follow the methodology requirements and registered monitoring plan.

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

E.6.1. Data and parameters fixed ex ante.

Means of verification	Desk Review and Interviews
Findings	No finding raised.
Conclusion	Verification team confirms that the Data and parameters fixed ex ante are in compliance with the registered PDD /09/ and the monitoring plan. Please refer Appendix 5 for detailed analysis of the ex-ante parameters. The verification took cognizance of para. 17.2 of GS4GG VVS, version 1.0 /B01-b/.

E.6.2. Data and parameters monitored

Means of verification	Desk Review and Interviews
Findings	CL 01 & CAR 02 were raised and closed satisfactorily. Kindly refer appendix 4 for more details.
Conclusion	The Verification team confirms that the Data and parameters monitored are in compliance with the registered PDD /09/ and the monitoring plan. A complete assessment of each of the monitored parameters has been provided in Appendix 6 of the verification report. The verification took cognizance of para. 17.2 of GS4GG VVS, version 1.0 /B01-b/.

E.6.3. Implementation of sampling plan

Means of verification	Desk Review and Interviews
Findings	No findings raised..
Conclusion	According to the standard for sampling and survey and related guidelines /B07/ the sampling plan was determined at the time of project registration and applied during the monitoring. - Sampling method: Simple random sampling method is adopted as the target population are of homogeneous. The sample size is determined by the requirement to achieve 90/10 in line with the methodology for annual survey. Sampling approaches may follow the Guideline “Sampling and

	surveys for CDM project activities and programme of activities" for calculation of sample size. - Data to be collected: Number of project devices of type i and operating in year y. - Implementation plan: Annual. Actual implementation of sampling plan during the monitoring plan: - Sampling method: The sample size included all households and was randomly sampled from a list of all the project pico-solar lights in the project. The target population is the 442,991 lights covering all four provinces of Zambia states. The sampling frame is homogenous within itself, with respect to service level, established ex-ante baseline and user characteristics. Depending on the number of pico-solar distributed in each province, PD has first determined target sample number from total target of 68 pico-solar lights as below: In actual the survey took 85 samples. The total sample size has been derived using equation para 12 of appendix 1, EB 86 Annex 4, Guidelines for Sampling and Surveys for CDM Project activites and Programme of Activities Ver. 4.0. /B07/. The expected parameter values (mean, standard deviation and proportion) have been taken as per para 12 of appendix 1, EB 86 Annex 4 /10/. From total pico-solar lights from 1st batch, PD has randomly selected the pico-solar lights for survey. Data collected: Questionnaire survey form used by third party surveyor /**12/** and a detailed survey report has been provided /**12**/. Since the relative margin of error obtained is less than 10% for the monitored parameter, relative precision of the data is statistically acceptable and deemed representative of the population. Survey result shows 100% operational status of all sampled pico-solar for 2nd-4th Batch as per methodology /B05/ and 4% for 1st batch based on monitoring survey /05/ and hence desired confidence precision has been achieved. Carbon Check confirms that the sampling size and the sample size for VVB's acceptance sampling based on above is 11. Verification team in order to get the required number of samples, applied over sampling and has chosen 22 samples (11 each for 1st and 2nd - 4th batch) and the method of off-site (remote) assessment was in line with the requirements of the sampling standard /**B07**/ along with Site visit and remote audit requirements & procedures v2.0 /B02/.

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

Means of verification	Desk Review and Interviews
Findings	No finding raised.
Conclusion	There is no monitoring equipment involved in monitoring of the required parameters. Hence, no calibration requirement applicable for the project activity.

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	Desk Review and Interviews
Findings	CL 02 & CAR 03 were raised and closed satisfactorily. Kindly refer appendix 4 for further details.
Conclusion	Baseline emissions are calculated per equation (3): $BEy = DV \times GFy \times DBy$ Equation (3) Where: BEy = Baseline emissions per project lamp in year y (t CO_2e) GFy = Grid Factor in year y, DBy = Dynamic Baseline Factor (change in baseline fuel, fuel use rate, and/or utilization during crediting period) in year y.

This methodology provides for a default annual baseline emissions factor for the project lamps. The following assumptions are made about the equivalent baseline lighting system:

$DV = FUR \times O \times U \times EF \div 1000 \times LF \times n \times NTG$ Equation (2)

Where:

DV = Lamp Emission Factor (default is 0.092 t CO2e per project lamp)

FUR = Fuel use rate (0.03 liters/hour)

O = Utilization rate (3.5 hours/day)

U = Annual utilization (365 days/year)

EF = Fuel emissions factor (2.4 $kgCO_2$/liter)

LF = Leakage factor (1.0)

n = Number of fuel-based lamps replaced per project lamp (1.0)

NTG = Net-to-gross adjustment factor (1.0)

Parameter	Registered PDD Value
DV	0.092tCO_2
FUR	0.03 litres/hour
O	3.5 hours/day
U	365 days/year
EF	2.4$kgCO_2$/litre
n	1
NTG	1
GFy	1.0
DBy	1.0

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

Means of verification	Desk Review and Interviews
Findings	CL 03 is raised and closed satisfactorily. Kindly refer appendix 4 for further details.
Conclusion	Project emissions are already discussed in above section E.8.1. VVB confirms that project emissions have been appropriately calculated and are consistent with remote assessment /12/, the applied methodology/B05/ and registered PDD **/09/.**

E.8.3. Calculation of leakage GHG emissions

Means of verification	Desk Review and Interviews
Findings	No finding raised.
Conclusion	The Net to Gross Leakage Adjustment Factor has not been included in the emission reduction calculations applying adjustment factor 1.0 as per paragraph 26 of the applied methodology as there is no leakage attribute to the project activity. VVB confirms that there is no leakage emissions required to accounted in the estimation of emission reduction during remote audit /12/ which is mentioned in the applied methodology.

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

Means of verification	Desk Review and Interviews
Findings	No finding raised.
Conclusion	The emission reductions in this monitoring period are: $ER_y = BE_y - PE_y - LE_y$ Where, ER_y is the total emission reductions of the project activity during the year y intCO_2e; BE_y is the baseline emissions for the project activity during the year y in tCO_2e; PE_y is the emissions for the project activity during the year y in tCO_2e;

	LE_y is the leakage emissions for the project activity during the year y in tCO_2e. As explained in section E.8.1 above, the resulted Baseline emissions (BE_y) for the monitoring period is 27,319 tCO2. Similarly, as explained in section E.8.2 and section E.8.3 project emission is zero for the monitoing period and leakage emisisons are accounted considering an adjustment factor 1.0 (multiplying with BE_y). Therefore, resulted emission reduction for the monitoring period is 27,319 tCO_2e (roundown value). The data presented in the monitoring report /**01-d**/ and emission reduction worksheet /02-c/ were assessed by reviewing in detail project documentation, collection of monitored data, observation of established monitoring and reporting practices and assessment of the reliability of monitoring equipment. Sufficient evidences were presented and verified by VVB for the reported emission reductions as listed above.

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

Means of verification	Desk Review and Interviews
Findings	No finding raised.
Conclusion	The emission reductions from the project for the monitoring period as reported in the monitoring report revision 01.3 of 12/12/2023 /**01-d**/ is equivalent to 27,319 tCO_2e as against estimated 49,948 tCO2e. The emission reduction calculations provided in the spreadsheet /**02-c**/ have been verified to be correct and in line with the registered PDD /**09/.**

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

Means of verification	Desk Review and Interviews
Findings	No finding raised.
Conclusion	The emission reduction achieved during the monitoring period compared to estimated value is 45% less which is due to less operational rate of Solar LED during the monitoring period by some users. The emission reduction calculations provided in the spreadsheet /**03**/ have been verified to be correct and in line with the registered PDD /**02/.**

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

Means of verification	Desk Review and Interviews
Findings	No finding raised.
Conclusion	

GHG emission reductions or net GHG removals by sinks reported up to 31 December 2012	GHG emission reductions or net GHG removals by sinks reported from 1 January 2013 onwards
NA	27, 319 tCO_2e
Year-wise breakup of emission reductions:	
Year	Emission Reductions (tCO_2e)
01/08/2022 to 31/12/2022	12,241
01/01/2023 to 31/05/2023	15,078

The emission reduction calculations provided in the spreadsheet /**02-c**/ have been verified to be correct and in line with the registered PDD /**09**/, also the values are consistently reported in the MR for this monitoring period.

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

Means of verification	Desk Review and Interviews
Findings	No Findings raised

Conclusion

The verification team verified that whether the Sustainable development co-benefits are reported in MR v01.3 /01-d/ . Further, it is also confirmed that Project Developer has monitored the sustainable development co-benefits.

SDG	SDG Impact	Baseline estimate	Project estimate	Net Benefit	VVB Assessment
13	GHG emission reductions (tCO_2e)	27,319	0	27,319	VVB has reviewed the ER sheet /02/ monitoring survey /05/, database /03/ and SDG contribution calculation /13/. The same has been verified during remote audit /12/ and found the value is appropriate.
7	Population accessing clean lights	0	1,291,900	1,291,900	VVB has reviewed the ER sheet /02/ monitoring survey /05/, database /03/ and SDG contribution calculation /13/. The same has been verified during remote audit /12/ and found the value is appropriate.
1	Savings in lighting expenditure ($USD)	4,202,997	982,786	3,220,211	VVB has reviewed the ER sheet /02/ monitoring survey /05/, database /03/ and SDG contribution calculation /13/. The same has been verified during remote audit /12/ and found the value is appropriate.

Kindly refer appendix 7 for further details.

E.10. Global stakeholder consultation

Means of verification	Not Applicable
Findings	Not Applicable.
Conclusion	Not Applicable.

SECTION F. Internal quality control

>>

The final verification report passed a technical review before being submitted to the client for forward submission to GS. A technical reviewer qualified in accordance with VVB's qualification scheme for CDM validation and verification performed the technical review.

SECTION G. Verification opinion

>>

Carbon Check (India) Private Ltd. (CCIPL) has performed the 3rd periodic verification of the GS Project Activity "Namene Solar Light Company: Solar Lighting Project Zambia 1" in India having GS reference number GS 7002.

The verification team assigned by the VVB concludes that the project activity as described in the registered PDD (version 1.4; dated 12/05/2020) /**09**/ and the monitoring report (version 01.3 dated 12/12/2023) /01-d/,

meets all relevant GS4GG requirements for project activity. The verification has been conducted in-line with the GS4GG VVS version 1.0 /**B01-b**/

Verification methodology and process:

The verification team confirms the contractual relationship /10/ signed on 21/06/2023 between the VVB, Carbon Check (India) Private Ltd. and Project Participants (Namene Solar Lights Ltd.). The team assigned to the verification meets the VVB's internal procedures including the UNFCCC requirements for the team composition and competence. The verification team has conducted thorough review as per GS4GG, UNFCCC and VVB's procedures and requirements.

The verification has been performed as per the requirements described in the GS4GG requirements /**B01**/ and constitutes the review and completion of the following steps:

- Reviewing the registered PDD (version 1.4; dated 12/05/2020) /**09**/;
- Receipt of the MR (version 01.3 dated 12/12/2023) /**1-c**/;
- Desk review of the MR /0**1-d**/ and other relevant documents;
- Review of the applied monitoring methodology (AMS-III A.R, version 6.0) /**B05**/;
- Review of any CMP and EB decisions, clarifications and guidance;
- Remote assessment (05/09/2023, 08/09/2023 and 11/09/2023) /12/;
- Resolution of CARs and CLs raised during verification;
- Issuance of Verification Report

The project activity was correctly implemented according to the selected monitoring methodology and registered PDD /**09**/. Through document review and remote assessment, the verification team confirms that the project activity has resulted in 27,319 tCO_2e emission reductions during this third monitoring period.

The break-up of emission reduction up to 01/08/2022 and 31/05/2023 onwards as verified during the course of verification are as below:

Vintage	Emission reductions (tCO_2e)
01/08/2022 to 31/12/2022	12,241
01/01/2023 to 31/05/2023	15,078

VVB therefore pleased to issue a positive verification opinion expressed in the attached Certification statement.

SECTION H. Certification statement

>>

It is VVB's opinion that the GHG emission reductions stated in the monitoring report, version 01.3 dated 12/12/2023 for project activity, "Namene Solar Light Company: Solar Lighting Project Zambia 1" for period 01/08/2022 to 31/05/2023 (Inclusive of both the dates) are fairly stated. The GHG emission reductions were calculated correctly based on the approved monitoring methodology, AMS-III A.R, version 6.0. Hence, VVB able to certify that the emission reductions from the project during the monitoring period 01/08/2022 to 31/05/2023 (Inclusive of both the dates) amount to 27,319 tCO_2e.

Appendix 1. Abbreviations

Abbreviations	Full texts
CDM	Clean Development Mechanism
CEE	Central Environmental Authority
CAR	Corrective Action Request
CCIPL	Carbon Check (India) Private Ltd.
CL	Clarification Request
CO_2	Carbon Dioxide
CO_2e	Carbon Dioxide Equivalent
DR	Desk Review
EB	CDM Executive Board
EF	Emission Factor
EI	External individual
ER	Emission Reduction
FA	Final Approval
FAR	Forward Action Request
FVR	Final validation Report
FSR	Feasibility Study Report
GHG	Greenhouse gas(es)
GSF	Gold standard Foundation
GS4GG	Gold standard for Global Goals
IPCC	Intergovernmental Panel on Climate Change
IR	Internal resource
MH	Maharashtra
MW	Mega Watt
MWh	Mega Watt hours
PDD	Project Design Document
PP	Project Participant
OSV	On Site Visit
QC/QA	Quality control /Quality assurance
SS	Sectoral Scope
TA	Technical Area
TR	Technical Review
UNFCCC	United Nations Framework Convention on Climate Change
VER	Verified Emission Reduction
VVB	Validation and Verification Body
VVS	Validation and Verification Standard

Appendix 2. Competence of team members and technical reviewers

Carbon CHECK

Carbon Check (India) Private Limited

Certificate of Competency

Mr. Rishi K Raychoudhury

has been qualified as per CCIPL's internal qualification procedures in accordance with the requirements of CDM AS (V7.0), ISO/IEC14065:2020, ISO/IEC 17029:2019 and other applicable GHG programs:

for the following functions and requirements:

☒ Validator	☒ Verifier	☒ Team Leader	☒ Technical Expert
☐ Technical Reviewer	☐ Health Expert	☐ Gender Expert	☐ Plastic Waste Expert
☐ CCB Expert	☐ Legal Expert	☒ Financial Expert	☐ Environmental, Health and Safety financial matters
☒ SDG+	☒ Social no-harm(S+)	☒ Environment no-harm(E+)	
☒ Local Expert for India			

in the following Technical Areas:

☐ TA 1.1	☒ TA 1.2	☐ TA 2.1	☒ TA 3.1	☐ TA 4.1
☐ TA 4. n	☐ TA 5.1	☐ TA 5.2	☐ TA 7.1	☐ TA 8.1
☐ TA 9.1	☐ TA 9.2	☐ TA 10.1	☐ TA 13.1	☐ TA 13.2
☐ TA 14.1	☐ TA 15.1	☐ TA 16.1		

Issue Date
5th December 2023

Expiry Date
31st December 2024

Priya Suman

Ms. Priya Suman
Compliance Officer

Sanjay Agarwalla

Mr. Sanjay Kumar Agarwalla
Technical Director

Revision History of the document:

Revision date	Summary of changes
2022	Initial Adoption
Jan 2023	Annual revision
Dec 2023	Change in the template due to revision in TA and function

CCIPL_FM 7.9 Certificate of Competency_V4.0_112023

[1] Please refer to previous version of FM 7.9 for the revision history

Carbon CHECK

Carbon Check (India) Private Limited

Certificate of Competency

Samuel Litebele

has been qualified as per CCIPL's internal qualification procedures in accordance with the requirements of CDM AS (V7.0), ISO/IEC14065:2020, ISO/IEC 17029:2019 and other applicable GHG programs:

for the following functions and requirements:

☐ Validator	☐ Verifier	☐ Team Leader	☐ Technical Expert
☐ Technical Reviewer	☐ Health Expert	☐ Gender Expert	☐ Plastic Waste Expert
☐ SDG+	☐ Social no-harm(S+)	☐ Environment no-harm(E+)	☐ CCB Expert
☐ Financial Expert	☒ Local Expert for Zambia		

in the following Technical Areas:

☐ TA 1.1	☐ TA 1.2	☐ TA 2.1	☐ TA 3.1	☐ TA 4.1
☐ TA 4. n	☐ TA 5.1	☐ TA 5.2	☐ TA 7.1	☐ TA 8.1
☐ TA 9.1	☐ TA 9.2	☐ TA 10.1	☐ TA 13.1	☐ TA 13.2
☐ TA 14.1	☐ TA 15.1			

Issue Date
03rd May 2023

Expiry Date
02nd May 2024

Mr. Vikash Kumar Singh
Compliance Officer

Mr. Amit Anand
CEO

CCIPL_FM 7.9 Certificate of Competency_V2.1_012023

Carbon Check (India) Private Limited

Certificate of Competency

Ms. Indumathi C

has been qualified as per CCIPL's internal qualification procedures in accordance with the requirements of CDM AS (V7.0), ISO/IEC14065:2020, ISO/IEC 17029:2019 and other applicable GHG programs:

for the following functions and requirements:

☒ Validator	☒ Verifier	☒ Team Leader	☒ Technical Expert
☐ Technical Reviewer	☐ Health Expert	☐ Gender Expert	☐ Plastic Waste Expert
☐ CCB Expert	☐ Legal Expert	☐ Financial Expert	☐ Environmental, Health and Safety financial matters
☐ SDG+	☐ Social no-harm(S+)	☐ Environment no-harm(E+)	
☒ Local Expert for India			

in the following Technical Areas:

☐ TA 1.1	☒ TA 1.2	☐ TA 2.1	☒ TA 3.1	☐ TA 4.1
☐ TA 4. n	☐ TA 5.1	☐ TA 5.2	☐ TA 7.1	☐ TA 8.1
☐ TA 9.1	☐ TA 9.2	☐ TA 10.1	☒ TA 13.1	☐ TA 13.2
☐ TA 14.1	☐ TA 15.1	☐ TA 16.1		

Issue Date

5th December 2023

Expiry Date

31st December 2024

Mr. Sanjay Kumar Agarwalla
Technical Director

Revision History of the document:

Revision date	Summary of changes
2022[1]	Annual revision
Jan 2023	Annual revision
Dec 2023	Change in the template due to revision in TA and function

CCIPL_FM 7.9 Certificate of Competency_V4.0_112023

[1] Please refer to previous version of FM 7.9 for the revision history

Appendix 3. Documents reviewed or referenced.

No.	Author	Title	References to the document	Provider
01	Namene Solar Lights Ltd.	a) Initial Monitoring report for the project activity. b) Revised Monitoring report for the project activity. c) Revised Monitoring report for the project activity. d) Final Monitoring report for the project activity.	Version 01, dated-11/07/2023. version 01.1, dated-23/09/2023. version 01.2, dated-08/11/2023 version 01.3, dated-12/12/2023	PD
02	Namene Solar Lights Ltd.	a) Initial ER calculation spreadsheet for the project activity. b) Revised ER calculation spreadsheet for the project activity c) Final ER calculation spreadsheet for the project activity.	Version 01, dated-11/07/2023. version 01.1, dated-23/09/2023. version 01.2, dated-08/11/2023.	PD
03	Namene Solar Lights Ltd.	Solar Lights Database/Evidence for Unique Identification	--	PD
04	Namene Solar Lights Ltd.	Technical Specification		PD
05	Namene Solar Lights Ltd.	Monitoring Survey Records		PD
06	Namene Solar Lights Ltd.	Waste Management	2022 & 2023	PD
07	Namene Solar Lights Ltd.	Proof of Carbon credit waiver		PD
08	Namene Solar Lights Ltd.	Previous MP Verification Report	Version 1.0, dated 14/12/2022	PD
09	Namene Solar Lights Ltd.	Registered PDD	Version 1.4, dated 12/05/2020	PD
10	Namene Solar Lights Ltd.	Contract (CCIPL & PD)	21/06/2023	CCIPL
11	VersSol	Product Certificate (Third Party)	2021	
12	CCIPL	Remote Audit Records	05/09/2023, 08/09/2023 & 11/09/2023	CCIPL
13	Namene Solar Lights Ltd.	SDG Contribution		PD

Background Documents

No.	Author	Title	References to the document	Provider
/B01/	GS4GG	a) GS4GG "Principles & Requirements", version 1.2 b) GS4GG "Validation and Verification standard", version 1.0	www.goldstandard.org	Publicly Available
/B02/	GS4GG	Gold Standard - Site visit and remote audit requirements & procedures v2.0	www.goldstandard.org	Publicly Available
/B03/	GS4GG	GS Monitoring Template v1.1	www.goldstandard.org	Publicly Available
/B04/	GS4GG	GS Community Activity Requirements v1.2	www.goldstandard.org	Publicly Available
/B05/	UNFCCC	AMS-III AR: Substituting fossil fuel-based lighting with LED/CFL lighting systems (version 6.0)	http://cdm.unfccc.int/	Publicly Available
/B06/	Web sites	Websites: http://cdm.unfccc.int/ http://www.ipcc-nggip.iges.or.jp/ http://www.pciaonline.org/testing http://circodu.org.ug/		Publicly Available
/B07/	UNFCCC	Guidelines: Sampling and surveys for CDM project activities and programmes of activities (version 04.0)	http://cdm.unfccc.int/	Publicly Available
/B08/	UNFCCC	Standard: Standard for sampling and surveys for CDM project activities and Programme of Activities (version 09.0)	http://cdm.unfccc.int/	Publicly Available
/B09/	GS4GG	Renewable Energy Activity Requirements. V1.4	www.goldstandard.org	Publicly Available
/B10/	UNFCCC	Guideline: Application of materiality in verifications, Version 02.0	http://cdm.unfccc.int/	Publicly Available

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

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

FAR ID	01	**Section no.**	E.2	**Date:** 13/09/2023
Description of FAR				
The process for collecting and recycling/safely disposing of spent batteries shall be further developed. This shall be evaluated at the time of the next verification.				
Project participant response				**Date:** 23/09/2023
The PD has developed an E-waste Management Policy which provides guidance for re-use and recycling of electronic equipment. The objective of the policy is to (a) To minimize e-waste generation (b) To mobilize and sensitise stakeholders (our clients) on the proper management and handling of e-waste on a sustainable basis (c) To develop beneficial environmentally friendly sound e-waste recycling. Along with the policy, Waste Management procedure was also developed which provides detailed guidelines on E-waste management. The evidence of disposing of spent batteries through an e-waste company is also submitted.				
Documentation provided by project participant				
E-Waste Management Policy-Version 1.0.-05.05.21 Waste Management Procedure.V1.0-13.05.21 *AK_Record of E-waste Disposal-GS7002_NZL_08.06.2023*				
VVB assessment				**Date:** 13/10/2023
PD has submitted e-waste management policy, waste management procedure along with E-waste disposal record for disposing damaged Solar LED lights. Hence, FAR is closed.				

Table 2. CL from this verification

CL ID	01	**Section no.**	E.6.2	**Date:** 13/09/2023
Description of CL				
1) *During Remote Audit it is observed to VVB that for the 1st batch sample, 6 out of 11 Solar LED lights serial no. is not matching with database and end users mentioned that it is replaced earlier. However, the same lights have been considered for calculation of ER. Moreover, for the LED light with serial no. 191021304240 the end user interviewed "Kangowa Nengela" is the actual beneficiary but in database some different name is mentioned. PD is requested to clarify what QA/QC measures have been put in to avert this situation.* ***2)*** *In section E.1 of the MR under SDG 13 calculation, PD has used 100% OF for the Solar LED lights of 1st batch for 112 days for the year 2022. However, during remote audit it is observed that 45% of Solar LED lights in 1st batch were not operational. PD is requested to clarify how the consideration of 100% OF for year 2022 still hold good for calculation of ER.* ***3)*** *It is observed to VVB during remote audit that the contact no. mentioned in database doesn't belong to actual beneficiary. PD is requested to clarify necessary measures taken to rectify the same.* ***4)*** *PD has used, average number of project lights distributed per household as 1.51 to calculate the the population accessing clean and affordable solar lights, which is 1,466,195. However, during remote audit it is found that average number of project lights distributed per household is 1.95. PD is requested to clarify this deviation in terms of the impact of SDG 7.* ***5)*** *PD is requested to provide the SOP and records of disposing damaged Solar LED lights for the current MP.*				
Project participant response				**Date:** 23/09/2023
(1) The PD would like to clarify that the 1st batch constitutes lights sold between 19/11/2019 and 18/11/2020 as stated in the MR. These lights were sold and replaced a few years back when the PDs ICT tools were not very well developed and the information with respect to replacement of lights was recorded via paper forms. And some of the replaced lights serial numbers may have failed to get updated in the PDs database.				

However, 6 out of 11 users claiming to be using lights albeit a different serial number, still translates to more than 50% OF but the PD is only claiming 4% OF for the 1st batch as a conservative measure which subsumes the data inconsistency issue for the 1st batch and hence it can be considered that the PD is not claiming ERs for the usage of these lights even though they are included in the ER database.

Regarding the beneficiary details for light serial number 191021304240, a revised database is submitted to the VVB with the corrected details.

Regarding the QA/QC measures, the PD's ICT tools are now very well developed and now our agents register information with respect to replaced lights via ICT tools and the database gets automatically updated now without requirement of any human intervention.

(2) The PD would like to inform that even though the 1st batch constituted of lights sold between 19/11/2019 and 18/11/2020, except 4 lights, the latest date of sale of lights in the 1st batch was 10/12/2019 and accordingly PD has claimed 100% ERs for the 2019 batch max till 10/12/2022 and not till the end of 2022. Post this date, the PD has claimed an OF of only 4% for the 1st batch even for the remaining days of 2022 till the end of the MP. This approach is in line with the methodology which allows us to claim an OF of 100% till 3 years of operation of the light. The PD would also like to state that the audit has been conducted almost 10 months after the date at which we ceased claiming an 100% OF.

As a conservative measure, PD is not claiming ERs for the 4 lights sold in 2020 and included in the 1st batch.

(3) The PD would like to clarify that in Zambia it's a common practice to switch mobile numbers with other users since the users prefer to get a new number instead of recharging the old number and hence in some cases it may be possible that the phone numbers in the database gets switched with a non-beneficiary. But this issue is already rectified by the fact that the PD not only records the phone numbers of the beneficiaries but also their address and GPS co-ordinates as well which translates to a complete user traceability.

(4) The value of 1.51 is an average value calculated based on the number of clients and the number of lights (please see cell C16 in the tab SDG 7 in the ER sheet). This approach is in line with the approach opted for in the registered PDD.

(5) Its already submitted as part of the response to FAR 1.

Documentation provided by project participant

Revised ER sheet version 1.1

VVB assessment	**Date:** 13/10/2023

1) *PD has not shared the updated database. Also, it is observed that in revised ER sheet PD still uses the old Solar LED lights instead of replaced for the 1st batch. PD is requested to provide updated database along with revised ER sheet. Hence, CL is open.*

2) *PD has claimed 100% OF for 1st 112 days of the MP for the 1st batch of Solar LED light, as per para. 36 of the applicable methodology, thus justification provided by PD is acceptable to VVB. Hence, CL is closed.*

3) *PP is requested to maintain the database with updated phone no. and share the Solar LED light database which have geocoordinates of each Beneficiary. Hence CL is open.*

4) *In registered PDD, the ex-ante value is 2 and for the previous monitoring period the value is 1.91. Thus, the value obtained during remote audit is 1.95 is conservative in nature, PD is requested to revise the contribution of project activity for SDG 7. Hence, CL is open.*

5) *PD has provided the SOP and records for disposing damaged Solar LED lights for the current MP. Hence, CL is closed.*

Project participant response	**Date:** 16/11/2023

(1) The updated database is now revised along with the ER sheet. Please see sample screenshot below.

6723	6718	Muchimba	Sibeso	03/12/19		191021303747	-15.8627	23.802	31/05/23	304	153
6724	6719	Silimwe	Kaiko	03/12/19	977990982	191021301893	-15.8627	23.802	31/05/23	304	153
6725	6720	Maliwa	Mwangala	03/12/19	976945725	191021303843	-15.8627	23.802	31/05/23	304	153
6726	6721	n/a	Nawa	03/12/19		191021302798	-15.8627	23.802	31/05/23	304	153
6727	6722	n/a	Muliokela	03/12/19		191021302557	-15.8627	23.802	31/05/23	304	153
6728	6723	Nivia	Yamboto	03/12/19		191021304019	-15.8627	23.802	31/05/23	304	153
6729	6724	n/a	Kabukabu	03/12/19		191021301561	-15.8627	23.802	31/05/23	304	153
6730	6725	Chilindi	Ngombe	03/12/19		191021302127	-15.8627	23.802	31/05/23	304	153
6731	6726	Kangowa	Nengela	03/12/19		191021304240	-15.8627	23.802	31/05/23	304	153
6732	6727	n/a	Christine	03/12/19		191021302802	-15.8627	23.802	31/05/23	304	153
6733	6728	n/a	Mubita	03/12/19	953681615	191021302796	-15.8627	23.802	31/05/23	304	153
6734	6729	Masusu	Kachana	03/12/19		191021303043	-15.8627	23.802	31/05/23	304	153
6735	6730	Nanchimwa	Mukelebai	03/12/19		191021301682	-15.8627	23.802	31/05/23	304	153
6736	6731	Muleya	Julia	03/12/19		191021303857	-15.8627	23.802	31/05/23	304	153
6737	6732	Nzyoolole	Yuyi	03/12/19		191021301874	-15.8627	23.802	31/05/23	304	153
6738	6733	Susumani	Namasiku	03/12/19		191021303858	-15.8627	23.802	31/05/23	304	153

(3) The phone numbers are updated in the database. The geocoordinates of each beneficiary is also added. Please see sample screenshot.

Number	Owner First Name	Owner Last name	Dist Date	Owner Mobile	Serial Number	Latitude	Longitude	End of MP 3
1			20/11/19		191021300512	-15.3866	29.165	31/05/2
2	n/a	Siyamana	20/11/19	978819863	191021300510	-15.3866	29.165	31/05/2
3	Natasha	Mutinta	21/11/19	97685103	191021300344	-15.3866	29.165	31/05/2
4	n/a	Njobvu	21/11/19		191021300351	-15.3866	29.165	31/05/2
5	n/a	Muswala	21/11/19	976801408	191021300792	-15.3866	29.165	31/05/2
6	n/a	Agness	21/11/19	975272074	191021300227	-15.3866	29.165	31/05/2
7	Katongo	Nkata	22/11/19	978228207	191021300817	-15.3866	29.165	31/05/2
8	Enyias	Mudenda	21/11/19	974454392	191021300195	-15.3866	29.165	31/05/2
9	n/a	Muchimwa	21/11/19	978547302	191021300229	-15.3866	29.165	31/05/2
10	Liteta	Namukoko	21/11/19	979813138	191021300239	-15.3866	29.165	31/05/2
11	Mercy	Antonio	21/11/19	971127204	190910301682	-15.3866	29.165	31/05/2

(4) The value of 1.51 is a calculated value based on actual number of beneficiaries and actual number of lights sold so the value used is correct.

Documentation provided by project participant	
Updated database and ER sheet.	
VVB assessment	**Date:** 22/11/2023
1) PD has made the necessary changes in the database and ER sheet. Hence, CL point is closed. *3) PD has provided the updated database with contact no. and geo-coordinates of beneficiary. Hence, CL point is closed.* *4) PD has mentioned the actual value for "average number of project lights distributed per household" based on number of beneficiaries and no. of lights sold. Hence, CL point is closed.* *The response provided by PD for above raised points are appropriate and acceptable to VVB. Hence, CL is closed.*	

CL ID	02	**Section no.**	E.8.1	**Date:** 13/09/2023
Description of CL				
It is observed to VVB during remote audit that the geocoordinates of End users' home is not included in database. PD is requested to clarify what necessary measures are taken to prevent double counting. PD is also requested to submit signed agreement with end user regarding ownership of the VERs.				
Project participant response				**Date:** 23/09/2023
The PD would like to clarify that geocoordinates of End users' home is recorded for all users and the evidence for the same is also provided to the VVB. This information is not included in the database only to reduce the file size.				
Documentation provided by project participant				
Evidence of recording user GPS User carbon waiver signed				

VVB assessment	Date: 13/10/2023
PD has submitted evidence of procedure they adopt to collect geocoordinates and user carbon waiver, however PD is requested to submit database of solar LED lights with geocoordinates and also signed carbon waiver document for all beneficiaries. Hence, CL is open.	
Project participant response	**Date:** 16/11/2023
Updated database is submitted to the VVB which includes geocoordinates for all users. Sample carbon waiver forms are also submitted.	
Documentation provided by project participant	
Sample screenshot for carbon rights waiver. Updated database with geocoordinates added.	
VVB assessment	**Date:** 22/11/2023
PD has submitted updated database with geocoordinates and sample of carbon rights waiver form (screenshot of ICT tool). Hence, CL is closed.	

CL ID	03	Section no.	E.8.2	Date: 13/09/2023
Description of CL				
In section E.2 of the MR under SDG 13, PD has mentioned there is project emission but as per applicable methodology there is no project emission for this project activity. PD is requested to clarify the same.				
Project participant response				**Date:** 23/09/2023
It was a typographical error which has been corrected now.				
Documentation provided by project participant				
Revised MR version 1.1				
VVB assessment				**Date:** 13/10/2023
PD has rectified the section E.2 of the MR under SDG 13 and made the MR consistent as per applicable methodology. Hence, CL is closed.				

Table 3. CAR from this verification

CAR ID	01	Section no.	E.1	Date: 13/09/2023
Description of CAR				
In section E.4 of the MR, PD has not followed the standard notation of units as per para. 16 of MR Template guide. PD is requested to rectify the same.				
Project participant response				**Date:** 23/09/2023
The standard notation is now used as per as per para. 16 of MR Template guide.				
Documentation provided by project participant				
Revised MR version 1.1				
VVB assessment				**Date:** 13/10/2023
PD has rectified and use standard notation of units in section E.4 of the MR. However, PD is requested to rectify the same throughout the MR. (i.e., table 1, section B.1, section D.2, SDG 1 of section E.1, section E.2 etc.) Hence, CAR is open.				
Project participant response				**Date:** DD/MM/YYYY
The standard notations are now rectified throughout the MR.				
Documentation provided by project participant				
VVB assessment				**Date:** 22/11/2023
PD has made the necessary changes in the revised MR. Hence, CAR is closed.				

CAR ID	02	Section no.	E.6.2	Date: 13/09/2023
Description of CAR				
It is observed that the section D.3 of MR is inconsistent in describing the consideration of no. of days of operation percentage of solar LED lights "OF" of 1st batch in line with section E.1 of the MR. PD is requested to maintain the consistency in the sections.				
Project participant response				**Date:** 23/09/2023
The information is now consistently provided in section D.3 and E.1.				
Documentation provided by project participant				
Revised MR version 1.1				
VVB assessment				**Date:** 13/10/2023

PD has made the necessary changes in the section D.3 of the MR and included the bifurcation of operational percentage of solar LED lights of 1st Batch, according to years of operation as per applicable methodology and monitoring survey. Hence, CAR is closed.

CAR ID	03	**Section no.**	E.8.1	**Date:** 13/09/2023
Description of CAR				
In section E.1 of the MR under SDG 13, the emission factor of lamp i.e., DV is mentioned 0.0092 tCO_2e which seems to be inconsistent as per the applicable methodology. PD is requested to rectify the same.				
Project participant response				**Date:** 23/09/2023
The EF is now consistently mentioned as 0.092 tCO_2e in the entire MR.				
Documentation provided by project participant				
Revised MR version 1.1				
VVBCPA assessment				**Date:** 13/10/2023
PD has rectified the value of DV and made the MR consistent as per applicable methodology. Hence, CAR is closed.				

Table 4. FAR from this verification

No FAR raised in this verification.

Appendix 5: Data and parameters fixed ex ante

SDG 13: Climate Change

Parameter	GF_y (Grid Factor in year y)
Data unit:	Fraction
Default values used:	1.0
Purpose of data	Baseline emissions calculation per project lamp per year (tonnes CO_2e).
Source and Verification of the source	The value of this parameter is fixed ex-ante /B04/.

Parameter	DB_y (Dynamic Baseline Factor, change in baseline fuel, fuel use rate, and/or utilization during crediting period in year y)
Data unit:	Fraction
Default values used:	1.0
Purpose of data	Baseline emissions calculation
Source and Verification of the source	The value of this parameter is fixed ex-ante /B04/.

Parameter	DV (Lamp Emission factor)
Data unit:	Tonnes CO2e per year per project lamp.
Default values used:	0.092
Purpose of data	Baseline emissions calculation
Source and Verification of the source	The value of this parameter is fixed ex-ante /B04/.

SDG-1: Poverty alleviation:

Parameter	$Ex_{b,k}$ (Expenditure on kerosene during baseline monitoring period)
Data unit:	Kwacha
Default values used:	263.66
Purpose of data	Calculation of baseline scenario for SDG 1. Supports calculation of financial savings per solar light (SM100) due to avoided purchases of kerosene.
Source and Verification of the source	The value of this parameter is fixed ex-ante /B04/.

Parameter	$Ex_{b,c}$ (Expenditure on paraffin candles during baseline monitoring period)
Data unit:	Kwacha
Default values used:	451.27
Purpose of data	Calculation of baseline scenario for SDG 1. Supports calculation of financial savings per solar light (SM100) due to avoided purchases of paraffin candles.
Source and Verification of the source	The value of this parameter is fixed ex-ante /B04/.

Parameter	T_b (Baseline monitoring period)
Data unit:	Days
Default values used:	38
Purpose of data	Calculation of baseline scenario for SDG 1. Supports calculation of financial savings per solar light (SM100) due to avoided purchases of kerosene and paraffin candles
Source and Verification of the source	The value of this parameter is fixed ex-ante /B04/.

Parameter	$Ex_{p,k}$ (Expenditure on kerosene during project scenario monitoring period)
Data unit:	Kwacha
Default values used:	104.29
Purpose of data	Calculation of project scenario for SDG 1. Supports calculation of financial savings per solar light (SM100) due to avoided purchases of kerosene.
Source and Verification of the source	The value of this parameter is fixed ex-ante /B04/.

Parameter	$Ex_{p,c}$ (Expenditure on paraffin candles during project scenario monitoring period)
Data unit:	Kwacha
Default values used:	170.84
Purpose of data	Calculation of project scenario for SDG 1. Supports calculation of financial savings per solar light (SM100) due to avoided purchases of paraffin candles.
Source and Verification of the source	The value of this parameter is fixed ex-ante /B04/.

Parameter	T_b (Project scenario monitoring period)
Data unit:	Days
Default values used:	42
Purpose of data	Calculation of project scenario for SDG 1. Supports calculation of financial savings per solar light (SM100) due to avoided purchases of kerosene and paraffin candles
Source and Verification of the source	The value of this parameter is fixed ex-ante /B04/.

Appendix 6. Data and parameters monitored

Monitoring Parameter Requirement	Assessment/ Observation by the VVB
Data / Parameter: (as in monitoring plan of PDD):	OF_y
Measuring frequency/Time Interval:	Annual
Reporting frequency:	Annual
Reported value:	4% - 1st year batch 100% - 2nd – 4th year batch
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes
Details of monitoring equipment:	Value obtained from monitoring survey records
Is accuracy of the monitoring equipment as stated in the CPA-DD? If the CPA-DD does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring practise?	NA
Calibration frequency /interval: Is it monitoring methodology /CDM EB guidance / local or national standards / manufacturers specification	NA
Is the calibration interval in line with the monitoring plan of the PDD? If the PDD does not specify the frequency of calibration, does the selected frequency represent good monitoring practise?	NA. QA/QC procedures stated in MR comply with PDD.
Company performing the calibration(internal or external calibration):	NA
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	NA
Is (are) calibration(s) valid for the whole reporting period?	NA
If applicable, has the reported data been cross-checked with other available data?	Yes, the reported data in MR has been compared with monitoring survey records and the ER sheet /2/.
How were the values in the monitoring report verified?	NA
Does the data management (from data generation to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Yes, the data management ensures correct transfer of data and reporting of emission reductions and all necessary QA/QC processes are in place.
In case only partial data are available because activity levels or non-activity parameters have not been monitored in accordance with the registered monitoring plan, has the most conservative assumption theoretically possible been applied or has a request for deviation been approved?	NA

Monitoring Parameter Requirement	Assessment/ Observation by the VVB
Data / Parameter: (as in monitoring plan of PDD):	**N** (Total number of project solar lights distributed during the crediting period)
Measuring frequency/Time Interval:	Annually
Reporting frequency:	Annually
Reported value:	<table><tr><th>Year</th><th>Amount</th></tr><tr><td>1st (19/11/2019-18/11/2020)</td><td>8,753</td></tr></table>

	2nd (19/11/2020 – 18/11/2021): 45,394 3rd (19/11/2021 – 18/11/2022): 29,3194 4th (19/11/2022 till 31/05/2023)[2]: 95,650 Total: 442,991
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes
Details of monitoring equipment:	Value obtained from monitoring survey records
Is accuracy of the monitoring equipment as stated in the PDD? If the PDD does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring practise?	NA
Calibration frequency /interval: Is it monitoring methodology /CDM EB guidance / local or national standards / manufacturers specification	NA
Is the calibration interval in line with the monitoring plan of the PDD? If the PDD does not specify the frequency of calibration, does the selected frequency represent good monitoring practise?	NA. QA/QC procedures stated in MR comply with PDD.
Company performing the calibration (internal or external calibration):	NA
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	NA
Is (are) calibration(s) valid for the whole reporting period?	NA
If applicable, has the reported data been cross-checked with other available data?	Yes, the reported data in MR has been compared with monitoring survey records and the ER sheet /2/.
How were the values in the monitoring report verified?	NA
Does the data management (from data generation to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Yes, the data management ensures correct transfer of data and reporting of emission reductions and all necessary QA/QC processes are in place.
In case only partial data are available because activity levels or non-activity parameters have not been monitored in accordance with the registered monitoring plan, has the most conservative assumption theoretically possible been applied or has a request for deviation been approved?	NA

Monitoring Parameter Requirement	Assessment/ Observation by the VVB
Data / Parameter: (as in monitoring plan of PDD):	Average inhabitants per household in Zambia
Measuring frequency/Time Interval:	Annually
Reporting frequency:	Annually

[2] End of the current MP or 3rd MP

Reported value:	5.0
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes
Details of monitoring equipment:	Value obtained from publicly available reports and recent statistics.
Is accuracy of the monitoring equipment as stated in the PDD? If the PDD does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring practise?	NA
Calibration frequency /interval: Is it monitoring methodology /CDM EB guidance / local or national standards / manufacturers specification	NA
Is the calibration interval in line with the monitoring plan of the PDD? If the PDD does not specify the frequency of calibration, does the selected frequency represent good monitoring practise?	NA. QA/QC procedures stated in MR comply with PDD.
Company performing the calibration(internal or external calibration):	NA
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	NA
Is (are) calibration(s) valid for the whole reporting period?	NA
If applicable, has the reported data been cross-checked with other available data?	Yes, the reported data in MR has been compared with monitoring survey records and the ER sheet /2/.
How were the values in the monitoring report verified?	NA
Does the data management (from data generation to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Yes, the data management ensures correct transfer of data and reporting of emission reductions and all necessary QA/QC processes are in place.
In case only partial data are available because activity levels or non-activity parameters have not been monitored in accordance with the registered monitoring plan, has the most conservative assumption theoretically possible been applied or has a request for deviation been approved?	NA

Monitoring Parameter Requirement	Assessment/ Observation by the VVB
Data / Parameter: (as in monitoring plan of PDD):	Hazardous and non-hazardous waste (n_{rd})
Measuring frequency/Time Interval:	Annually
Reporting frequency:	Annually
Reported value:	406
Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes
Details of monitoring equipment:	Value obtained from monitoring survey records
Is accuracy of the monitoring equipment as stated in the PDD? If the PDD does not specify the accuracy of the monitoring equipment, does the monitoring equipment represent good monitoring practise?	NA
Calibration frequency /interval:	NA

Is it monitoring methodology /CDM EB guidance / local or national standards / manufacturers specification	
Is the calibration interval in line with the monitoring plan of the PDD? If the PDD does not specify the frequency of calibration, does the selected frequency represent good monitoring practise?	NA. QA/QC procedures stated in MR comply with PDD.
Company performing the calibration(internal or external calibration):	NA
Did calibration confirm proper functioning of monitoring equipment? (Yes / No):	NA
Is (are) calibration(s) valid for the whole reporting period?	NA
If applicable, has the reported data been cross-checked with other available data?	Yes, the reported data in MR has been compared with monitoring survey records and the ER sheet /2/.
How were the values in the monitoring report verified?	NA
Does the data management (from data generation to emission reduction calculation) ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Yes, the data management ensures correct transfer of data and reporting of emission reductions and all necessary QA/QC processes are in place.
In case only partial data are available because activity levels or non-activity parameters have not been monitored in accordance with the registered monitoring plan, has the most conservative assumption theoretically possible been applied or has a request for deviation been approved?	NA

Appendix 7: Sustainable Development Contributions Achieved

Sustainable Development Goals Targeted	SDG Impact	Ex-ante estimated	Amount Achieved	Units/ Products	VVB Assessment
13 Climate Action (mandatory)	GHG emission reductions	49,948	27,319	tCO_2e	VVB has reviewed the ER sheet /02/ monitoring survey /05/, database /03/ and SDG contribution calculation /13/. The same has been verified during remote audit /12/ and found the value is appropriate.
7 Affordable and clean energy	Population accessing clean lights	1,411,892	1,291,900	No. of People	VVB has reviewed the ER sheet /02/ monitoring survey /05/, database /03/ and SDG contribution calculation /13/. The same has been verified during remote audit /12/ and found the value is appropriate.
1 No Poverty.	Savings in lighting expenditure	7,809,924	3,220,211	$USD	VVB has reviewed the ER sheet /02/ monitoring survey /05/, database /03/ and SDG contribution calculation /13/. The same has been verified during remote audit /12/ and found the value is appropriate.