



**Verified Carbon
Standard**

SOUBRÉ HYDROPOWER PROJECT



Document Prepared By: 4K Earth Science Private Limited

Project Title	Soubré Hydropower Project
Version	032
Report ID	2131: VCS

Report Title	Soubré Hydropower Project
Client	AERA Group
Pages	34
Date of Issue	<u>14/12/2021</u> ~~13/09/2021~~
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Summary:

4K Earth Science Private Limited (4KES) has been contracted by “AERA Group” to undertake verification and certification for the greenhouse gas (GHG) emission reductions reported from ‘Soubré Hydropower Project’ for the monitoring period 01/07/2020 to 30/06/2021 in the initial monitoring report version 1.0 date 23/06/2021.

Soubré Hydro Power Plant (hereafter referred to as “Soubré HPP”) is a greenfield project located about 5 km from Soubré village on the river Sassandra, San Pedro Province, Bas Sassandra region, Côte d’Ivoire. The geographical coordinates of the project extension limits are 5°48’33” W, 6°39’28” S (Northernmost point of the dam) and 5°46’56” W, 6°36’55” S (Easternmost point) which has been verified from the Location finder /08/.

The project activity is composed of a run-of-river hydropower plant with a capacity of 270 MW and a micro-hydro power plant of 5.35 MW generating capacity with a total estimated average gross electricity generation of 1,170 GWh per year, fed by a 17.3 km² reservoir. The plant is connected via three 225 kV transmission lines to the national grid: the transmission line Soubré-Buyo, Soubré-San Pedro and Soubré-Taabo. The technical specification of the turbines/alternators and the installed capacity of the project activity has been verified during the remote audit and also from the photos of the Turbines/alternators /09/.

The purpose of this project activity is to generate clean form of electricity and the net electricity generated from this project is supplied to the national grid via the transmission lines.

The project activity generated renewable electricity without any GHG emissions, which displaced part of the electricity otherwise supplied by grid connected fossil fuel fired power plants. Thus, GHG emission reductions can be achieved.

A risk based approach has been followed to perform the 2nd periodic verification of the project activity. In the course of the verification, 01 Corrective Action Request (CAR) and 01 Clarification (CL) were raised.

The management of the ‘CI-ENERGIES’ responsible for the preparation of the GHG emissions data and the reported GHG emissions reductions on the basis set out within the project final monitoring report Version 1.21.1 dated 14/12/2021~~26/08/2021~~. The calculation and determination of GHG emission reductions from the project is the responsibility of the management of the AERA Group. The development and maintenance of records and reporting procedures are in accordance with the Monitoring Report Version 1.21.1 dated 14/12/2021~~26/08/2021~~.

It is our responsibility to express an independent GHG verification opinion on the GHG emissions and on the calculation of GHG emission reductions from the project for the period 01/07/2020 to 30/06/2021 based on the reported emission reductions in the final monitoring report Version

~~1.21.1~~ dated ~~14/12/2021~~~~26/08/2021~~ for the same period.

Based on an understanding of the risks associated with reporting GHG emissions data and the controls in place to mitigate these, 4KES planned and performed our work to obtain the information and explanations that we considered necessary to provide sufficient evidence for us to give reasonable assurance that this reported amount of GHG emission reductions for the period is fairly stated.

4KES confirms the following;

Reporting period: 01-July-2020 to 30-June-2021

Year	Baseline emissions or removals (tCO ₂ e)	Project emissions or removals (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Net GHG emission reductions or removals (tCO ₂ e)
2020	441,742	-	-	441,742
2021	342,725	-	-	342,725
Total	784,467	-	-	784,467

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1 INTRODUCTION

1.1 Objective

4KES has been commissioned by 'AERA Group' to perform verification of its registered VCS project 'Soubré Hydropower Project', for the reported GHG emission reductions for the given monitoring period 01/07/2020 to 30/06/2021 (both dates included). The VCS projects must undergo an independent third-party verification and certification of emission reductions as the basis for issuance of Voluntary 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 project description (PD) 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 data is recorded and stored as per the monitoring methodology and approved monitoring plan.
- To confirm that the monitoring system is implemented and fully functional to generate Voluntary Emission Reductions (VERs/VCUs) without any double counting, and
- To establish that the data reported are accurate, complete, consistent, transparent and free of material error or omission by checking the monitoring records and the emissions reduction calculation.

1.2 Scope and Criteria

The scope of verification is to assess the claims and assumptions made in the VCS monitoring report (MR) against the VCS criteria, including but not limited to, VCS standard, applied methodology and other relevant rules and requirements established for VCS project activities.

The Verification is not meant to provide any consulting towards the project participants. However, stated requests for clarification and/or correction actions request may have provided inputs for improvement of the project design.

1.3 Level of Assurance

The verification team verified the complete monitoring data /09/, /10/, /13/, /15/, /16/, /20/ and /23/ for all the monitoring parameters of the monitoring plan against the Monitoring report /01/ and ER Calculation sheet /02/ and confirms that the reported emission reductions are free from any type of material errors. Remote audit was also conducted to verify the implementation and monitoring plan of the project activity. The implementation of the project activity (i.e. major equipment and the metering arrangement) was verified during the Microsoft Teams video conferencing and found in accordance with the monitoring report /01/ and registered VCS PD /05/. Verification team has also verified the technical details of the project equipments and metering arrangement during the remote audit and also with the supportive document /09/ and /14/ and found correct. Therefore, 4KES confirms that the verification is conducted with reasonable level of assurance.

1.4 Summary Description of the Project

Soubré Hydro Power Plant (hereafter referred to as “Soubré HPP”) is a greenfield project located about 5 km from Soubré village on the river Sassandra, San Pedro Province, Bas Sassandra region, Côte d’Ivoire. The geographical coordinates of the project extension limits are 5°48'33" W, 6°39'28" S (Northernmost point of the dam) and 5°46'56" W, 6°36'55" S (Easternmost point) which has been verified from the Location finder /08/.

The project activity is composed of a run-of-river hydropower plant with a capacity of 270 MW and a micro-hydro power plant of 5.35 MW generating capacity with a total estimated average gross electricity generation of 1,170 GWh per year, fed by a 17.3 km² reservoir. The plant is connected via three 225 kV transmission lines to the national grid: the transmission line Soubré-Buyo, Soubré-San Pedro and Soubré-Taabo. The technical specification of the turbines/alternators and the installed capacity of the project activity has been verified during the remote audit and also from the photos of the Turbines/alternators /09/.

The purpose of this project activity is to generate clean form of electricity and the net electricity generated from this project is supplied to the national grid via the transmission lines and PPA is signed between PP and the utility company /12/.

The project activity generated renewable electricity without any GHG emissions, which displaced part of the electricity otherwise supplied by grid connected fossil fuel fired power plants. Thus, GHG emission reductions can be achieved.

Soubré hydropower project had a planned execution time of 56 months and was completed ahead of schedule by Sinohydro International EPC contractor, in May 2017 as per following progressive commissioning by turbo-generator group:

- **G1:** 25 may 2017
- **G2:** 23 august 2017
- **G3:** 25 october 2017
- **G4 (mini-plant):** 8 november 2017

The commissioning date of each turbine has been verified during the remote audit and also from the supportive document /10/ and found consistent.

The project activity is operational since commissioning of first unit and during current monitoring period i.e. from 01/07/2020 to 30/06/2021, the project activity has supplied 12,98,363.6 MWh net electricity to the grid, there by resulted in emission reduction of 7,84,467 tCO₂e. The monitoring period subject to this monitoring report is inclusive of first and last day of period.

2 VERIFICATIONPROCESS

The registered VCS project is undergoing 2nd verification under VCS (1st Crediting period), the approach adopted to ensure the quality of emission reductions is described in the following sections.

2.1 Method and Criteria

4KES assessed and determined whether the proposed implementation and operation of the project activity, and the steps taken to report emission reductions comply with the criteria and relevant guidance provided by the VCS Board. The verification process consists of the following three phases;

- A desk review of the VCS PD and VCS MR
- follow up interviews with project stakeholders
- The resolution of outstanding issues and issuance of final report and opinion.

The prepared verification report and other supporting documents then undergo an internal quality control before being submitted to the VCS executive board for issuance of credits as per VCS standard version 4.

Duration of Verification:

Verification Contract	27/07/2021
Remote audit	24/08/2021
Findings raised	25/08/2021
Draft Verification Report	05/09/2021
Final Verification Report	~~13/09/2021~~ 14/12/2021

2.2 Document Review

The verification is performed primarily as a document review of the approved VCS PD and associated documents as stated in detail in appendix 1 of this document. The assessment is performed by a verification team using a protocol. The cross checks between information provided in the Monitoring report, VCS PD and information from sources other than those used, if available, the team's sectoral or local expertise and, if necessary, independent background investigations.

2.3 Interviews

Considering the current COVID19 situation, we don't expect the site visit to happen in near future. To meet the timeline as per the Verification contract, VVB could not conduct site visit for this project activity.

However, the verification team performed the Microsoft Teams remote interview with the PP representative, stakeholders and reviewed documents to achieve a reasonable level of assurance in the verification. This is in line with Section 4.1.2 of the VCS Standard, v4.0 /03/ which does not explicitly mandate site visits as part of the validation and verification process, only that VVBs must achieve a reasonable level of assurance on all validations and verifications. No sampling procedures were adopted in document verification and all the document were cross checked to ensure conservative estimation of emission reduction. Kindly find below names of the persons interviewed (Microsoft Teams remote interview).

Location	The project is located about 5 km from Soubré village on the river Sassandra, San Pedro Province, Bas Sassandra region, Côte d'Ivoire.	
Dates	24/08/2021	
Key points discussed	Name of person, interviewed	Designation, Organization
Project Implementation, Operational data, Calibration, Data collection, QA/QC, procedures,	Kouakou Martin Kouassi	Manager at Soubre hydro powerplant, CI-ENERGIES
	Koui Serges	Operation assistant at SODECI SA (Côte d'Ivoire water distribution company) - Local Stakeholder
	ABOUA Maxime Koffi	Chief Operating Officer at SODECI SA (Côte d'Ivoire water distribution company) - Local Stakeholder

Calculation of ERs, requirements VCS	Gaïa Ludington	Project Manager at Aera Group
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2.4 Site Inspections

Considering the current COVID19 situation, we don't expect the site visit to happen in near future. To meet the delivery deadline, VVB could not conduct site visit for this project activity.

However, the verification team performed the Microsoft Teams remote interview with the PP representative, stakeholders and reviewed documents to achieve a reasonable level of assurance in the verification. This is in line with Section 4.1.2 of the VCS Standard, v4.0 /03/ which does not explicitly mandate site visits as part of the validation and verification process, only that VVBs must achieve a reasonable level of assurance on all validations and verifications.

2.5 Resolution of Findings

The objective of this step is to identify, discuss and conclude on the issues related to the monitoring, implementation and operations of the registered project activity that could impair the capacity of the registered project activity to achieve emission reductions or influence the monitoring and reporting of emission reductions. This is done based on the desk review and Microsoft Teams remote interview. The verification team prepares and/or updates a verification protocol (internal document) that records the conformities and non-conformities, which may be of following types;

CAR (Corrective Action Request) is raised if one of the following occurs:

- Non-compliance with the monitoring plan, the methodology or the standardized baseline are found in monitoring and reporting and has not been sufficiently documented by the project participants, or if the evidence provided to prove conformity is insufficient;
- Modifications to the implementation, operation and monitoring of the registered project activity has not been sufficiently documented by the project participants;
- Mistakes have been made in applying assumptions, data or calculations of emission reductions that will impact the quantity of emission reductions;
- Issues identified in a FAR during validation to be verified during verification or previous verification(s) have not been resolved by the project participants.

Clarification request (CL) is raised if information is insufficient or not clear enough to determine whether the applicable CDM requirements have been met. All CARs and CLs raised by the 4KES during verification shall be resolved prior to submitting a request for issuance.

FAR (Forward Action Request) is raised during verification if the monitoring and reporting require attention and/or adjustment for the next verification period.

During the Verification process, total 01 CAR and 01 CL were raised and resolved satisfactorily. No FAR has been raised in the verification. The list of CAR/CL/FAR raised and the response provided, the mean of validation, reasons for their closure and references to correction in the relevant documents are provided in Appendix II of this report.

2.5.1 Forward Action Requests

No FAR raised during the verification.

2.6 Eligibility for Validation Activities

4KES conducted the verification activity; the validation was performed by the other VVB. 4KES has a valid UNFCCC accreditation in the sectoral scope from UNFCCC. The accreditation scope can be checked from the below link: <http://cdm.unfccc.int/DOE/list/DOE.html?entityCode=E-0069>

3 VALIDATION FINDINGS

3.1 Participation under Other GHG Programs

The project has been simultaneously registered as a CDM Project activity under the UNFCCC (Project 10326)¹; however it will either claim emission reduction under the VCS program or under the CDM, never both. For this monitoring period, PP is claiming only under VCS which is also verified from the declaration given by the PP /11/.

3.2 Methodology Deviations

The verification team confirms that the registered PD complies with the requirements in the applied monitoring methodology ACM0002- Version 16.0 /07/. Therefore, no methodology deviations are applied during the monitoring period. The verification team confirms that no deviations were observed during the current monitoring period.

¹ <https://cdm.unfccc.int/Projects/DB/RWTUV1476171677.04/view>

3.3 Project Description Deviations

The technical details of Turbines/alternators installed under the project activity is different than the registered VCS-PD /05/. Section 3.2.2 of the MR /1.2/ has been filled accordingly. Verification team has verified the capacity of the project activity from the name plate photo of the turbines/alternators /09/ and found consistent. The impact of the change in project capacity has been checked and verification team confirm that the deviation does not impact the applicability of the methodology nor the appropriateness of the baseline scenario. Since the change in the capacity is within 10%, which is already considered in the VCS-PD /05/ as part of the sensitivity analysis. Hence the deviation does not have any impact on the additionality of the project activity and project is still additional.

3.4 Grouped Project

The project is not a grouped project. Therefore, this section is not applicable.

4 VERIFICATION FINDINGS

4.1 Project Implementation Status

Soubre hydropower project had a planned execution time of 56 months and was completed ahead of schedule by Sinohydro International EPC contractor, in May 2017 as per following progressive commissioning by turbo-generator group:

- **G1:** 25 may 2017
- **G2:** 23 august 2017
- **G3:** 25 october 2017
- **G4 (mini-plant):** 8 november 2017

The commissioning date of each turbine has been verified during the remote audit and also from the supportive document /10/ and found consistent.

The key technical indicators of the power plant are shown below:

Specifications of the power plant:				
Turbines	Manufacturer	Type	Rated Power	Rated flow
3	Alstom	Francis HLF250-LJ	93.93 MW	238 m ³ /s
Generator	Manufacturer	Type	Rated Power	Rated speed
3	Alstom	SF90-56	90 MW / 105.88 MVA	107.14 r/min

Specifications of the micro-hydro power plant:				
Turbines	Manufacturer	Type	Rated Power	Rated flow
1	Alstom	Bulb GZ4B068-WP	5.51 MW	50 m ³ /s
Generator	Manufacturer	Type	Rated Power	Rated voltage
1	Alstom	SFWG5360-28	6.7 MVA	6.6 kV

The net electricity generated from this project is supplied to the national grid via the transmission line and PPA is signed between PP and the utility company /12/.

During the process of verification, 4KES confirmed the capacity, power generation, arrangement for evacuation of electricity generated, technical specifications, date of commissioning and necessary clearances for setting the project activity. List of documents reviewed during the course of verification is presented under Appendix I of this report.

The selected monitoring period i.e. 01/07/2020 to 30/06/2021 (both days included) is within the 1st crediting period i.e. 25/05/2017 to 24/05/2027 which is accepted to the verification team. As per the registered VCS-PD /05/, the expected start date of the project activity was 01/01/2017 however the commissioning of the first turbine occurred on 25/05/2017 /10/, hence the start date/crediting period start date has been revised to 25/05/2017 which is accepted to the verification team.

There was no major breakdown or shutdowns during the monitoring period which might affect the applicability of methodology or might cause material errors in emission reductions.

The capacity of the project is not consistent with the registered VCS-PD /05/, section 3.3 of this report has been filled accordingly. The impact of the same has been checked on the applicability of the methodology, additionality and the appropriateness of the baseline scenario. All required monitoring equipment's and procedures as mentioned in the registered VCS PD & monitoring report are available and implemented in an appropriate manner.

The organisational role and responsibility as mentioned in the registered VCS PD /05/ & monitoring report /01/ is followed onsite. All the emergency preparedness as mentioned in the registered VCS PD & monitoring report is followed onsite and no discrepancies were found regarding the same.

Project activity provide local jobs and directly contributing to the improvement of infrastructure in region. Section 1.11 of the Monitoring report has been checked and found OK. The project activity contributes positively to sustainable development.

Finding: No finding raised.

Opinion:

Assessment team concludes the following:

- a) There is no material discrepancies between project implementation and the project description provided in the registered PD /05/.
- b) The monitoring plan is implemented completely and monitoring system (i.e., process and schedule for obtaining, recording, compiling and analysing the monitored data and parameters) is appropriate.
- c) There is no material discrepancies between the actual monitoring system, and the monitoring plan set out in the project description and the applied methodology.
- d) The GHG emission reductions or removals generated by the project (for this monitoring period) have not included in an emissions trading program or any other mechanism that includes GHG allowance trading.
- e) For this monitoring period, the project has not received or sought any other form of environmental credit.

In view of the information's as verified above, the assessment team is able to conclude that the project has been implemented as described in the project description.

4.2 Safeguards

4.2.1 No Net Harm

The detailed environmental impact assessment was submitted to the Direction of Environment in February 2015 and approved by ANDE decree n°0078 of August 21st, 2015.

As of the latest update of the project's Environmental and Social Management Plan (PGES, September 2019), its overall progress has exceeded 60% completion with on the one hand, the protection of biodiversity is effective with the creation of the a dedicated area of more than 200ha and the preservation of fauna and flora species, and on the other hand, the implementation of the development plan for the fishing industry in Soubré with, in particular, the training of aspiring fishermen, the organisation of the sector in Soubré and the start of construction work on the infrastructure.

The Resettlement Action Plan (PAR) has achieved its objectives with the restoration of impacted people's livelihoods. The construction of the resettlement sites with all the amenities of the urban areas and population displacements ended in 2018. Purge compensations of customary rights and destruction of agricultural crops have been carried out for all areas impacted by the dam.

The project activity doesn't cause negative socioeconomic impacts. The project activity creates positive socioeconomic impacts by providing jobs to local people and improving the local infrastructure as confirmed from the remote interview, detailed EIA /21/ and ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN /22/.

4.2.2 Local Stakeholder Consultation

Stakeholder consultation happened in multiple phases. The process was validated during the registration of project activity in VCS. VCS validation report verified to confirm the same. The PP had invited identified stakeholders well in advance with details of venue and time of meeting.

PP has a mechanism for on-going communication with local stakeholders which has been discussed during the remote interview. During the monitoring period, there are no comments received.

4.3 AFOLU-Specific Safeguards

Not Applicable.

4.4 Accuracy of GHG Emission Reduction and Removal Calculations

The verification team was able to confirm that the monitoring plan contained in registered VCS-PD/05/ and MR/01/ is in accordance with the approved large scale methodology applied for the project activity i.e. “ACM0002 ver. 16 - Grid-connected electricity generation from renewable sources” /07/ and its applicable tools.

All parameters stated in the monitoring plan /05/ and the applied methodology /07/ have been fulfilled in the current monitoring period.

The GHG emission reductions were correctly calculated on the basis of the applied methodology ACM0002 Version 16.0 /07/, VCS-PD /05/ and the formulae given in the monitoring report /01/.

Parameters monitored:

Verification team confirms through remote audit verification and from the document review, the actual monitoring system complies with the monitoring plan mentioned in the registered validated VCS-PD /05/. According to the monitoring plan in the registered VCS-PD, there are 3 monitoring parameters required to be monitored.

1. $EG_{\text{facility},y}$ (Unit: MWh)

		VVB Assessment
Data / Parameter	$EG_{\text{facility},y}$	The monitoring parameter, Unit, and descriptions are as per the registered VCS-PD /05/.
Data unit	MWh/yr	

Description	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y	
Source of data	Electricity meter(s)	The monitoring parameter is measured by energy meters installed at power house and at the delivery point at 225kV substation. One meter per group has been installed in the power house as well as at the delivery substation, totalling 8 devices. The metering arrangement is verified during the remote audit and single line diagram /14/. The source of data is in accordance with the registered VCS-PD /05/.
Description of measurement methods and procedures to be applied	This parameter should be calculated as difference between (a) the quantity of electricity supplied by the project plant/unit to the grid, and (b) the quantity of electricity delivered to the project plant/unit from the grid. In case it is calculated then the following parameters shall be measured: (a) The quantity of electricity supplied by the project plant/unit to the grid; and (b) The quantity of electricity delivered to the project plant/unit from the grid Meters will be installed at the substation of the hydro power plant to measure directly and continuously the electricity supply to (and, if any, import from) the grid. The metering instruments will be calibrated annually in accordance with manufacturers specifications. Accuracy class of the meters is 0.2	The monitoring parameter is measured by energy meters installed at power house and at the delivery point at 225kV substation. One meter per group has been installed in the power house as well as at the delivery substation, totalling 8 devices. The meters are bi-directional. The metering arrangement is verified during the remote audit and single line diagram /14/. Monthly electricity export and import are measured at 225 kV substation by PP and CIE as confirmed during the remote audit. The electricity supplied to grid is calculated by subtracting Electricity export to grid and Electricity import from grid. The measurement method is in

		accordance with the registered VCS-PD /05/.
Frequency of monitoring/recording	Continuous measurement and at least monthly recording	The electricity export and import are continuously measured and monthly recorded in the form of the monthly reports /15/ as verified during the remote audit. The frequency of monitoring/recording is in accordance with the registered VCS-PD /05/.
Value monitored	12,98,363.6 MWh	Verification team has verified the reported electricity export/import data with the monthly electricity reports /15/ and found consistent.
Monitoring equipment	Electricity meter calibrated as per manufacturer's requirements.	Verification team has checked the meter details during the remote audit, from the photos /09/ and found consistent with the details mentioned in the monitoring report /1.2/. The energy meters are in accordance with the registered VCS-PD /05/. During the monitoring period, no replacement of meter was observed. Electricity export and import is measured at two levels i.e. energy meters installed at power house and energy meters installed at substation. Initial calibration (dated 20/12/2014) of the 4 energy meters installed at power house /13/ along with the latest calibration (dated

		18/02/2021) of all the 8 meter /23/ has been submitted. The monthly electricity export and import invoices are submitted to CIE (offtaker) and they have their own QA/QC procedure to check if the meters are working properly. However, PP has conservatively corrected the monthly electricity export and import for the whole monitoring period with respect to the accuracy class (0.2) which is conservative and accepted.
QA/QC procedures to be applied	Cross check measurement results with records for sold electricity	The electricity export and import has been cross checked from the monthly reconciliations for invoicing /16/ and found consistent.
Purpose of the data	Calculation of baseline emissions	The purpose of the monitoring parameter is to calculate the baseline emission which is in accordance with the registered VCS-PD /05/.
Calculation method	-	-
Comments	The information is provided monthly by CI-ENERGIES, and contradictorily reconciled with CIE off-taker at invoicing stage. The electricity generated and delivered by Soubré to the grid is monitored both at the hydropower plant departure and at the substation delivery points, through metering equipments with a respective accuracy of 0.2% all, and invoiced monthly to CIE based on the reconciled, signed joint readings of delivered net electricity (after transmission losses). While the departure meters calibration has been evidenced, the calibration evidence of the delivery meters is still awaited from	The justification has been checked and found correct which is already justified above. PP has conservatively corrected the monthly electricity export and import for the whole monitoring period with respect to the accuracy class (0.2) which is conservative and accepted.

	foreign provider and still delayed; therefore, corresponding measurements are conservatively considered as un-calibrated throughout the whole period and have been adjusted by deducting the accuracy range of meters:			
	Uncalibrated metered data (MWh)	Applicable accuracy deduction	Adjusted data for ER calculation (MWh)	
	EG _{facility,y} :	0.2%	EG _{facility,y} :	
	13,00,970.7		12,98,363.6	
	The meters have been verified by the central direction of energy transport and telecommunications sub-direction maintenance / control department of CIE on 18 February 2021.			

2. CAP_{PJ} (Unit: W)

		VVB Assessment
Data / Parameter	CAP _{PJ}	The monitoring parameter, Unit, and descriptions are as per the registered VCS-PD /05/.
Data unit	W	
Description	Installed capacity of the hydro power plant after the implementation of the project activity	
Source of data	Project site	The source of data is in accordance with the registered VCS-PD /05/.
Description of measurement methods and procedures to be applied	Determine the installed capacity based on manufacturer's specifications or commissioning data or recognized standards	The measurement method is in accordance with the registered VCS-PD /05/.
Frequency of monitoring/recording	Once at the beginning of each crediting period	The frequency of monitoring/recording is in accordance with the registered VCS-PD /05/.

Value monitored	275,354,000	Verification team has verified the capacity of the project activity from the Name plate photos of the turbines/alternators /09/ and found correct.
Monitoring equipment	-	Not Applicable
QA/QC procedures to be applied	-	Not Applicable
Purpose of the data	Calculation of project emissions	The purpose of the monitoring parameter is to calculate the project emission which is in accordance with the registered VCS-PD /05/.
Calculation method	-	-
Comments	This parameter is used to calculate the power density.	The purpose of the monitoring parameter is to calculate the power density (ultimately project emission) which is in accordance with the registered VCS-PD /05/.

3. A_{PJ} (Unit: m²)

		VVB Assessment
Data / Parameter	A _{PJ}	The monitoring parameter, Unit, and descriptions are as per the registered VCS-PD /05/.
Data unit	m ²	
Description	Area of the single or multiple reservoirs measured in the surface of the water, after the implementation of the project activity, when the reservoir is full	
Source of data	Project site	The source of data is in accordance with the registered VCS-PD /05/.
Description of measurement methods and procedures to be	Measured from topographical surveys, maps, satellite pictures, etc.	The measurement method is in accordance with the registered VCS-

applied		PD /05/.
Frequency of monitoring/recording	Once at the beginning of each crediting period	The frequency of monitoring/recording is in accordance with the registered VCS-PD /05/.
Value monitored	13,778,000	Loi HSV_Centrale Soubré_vF.pdf (abacus/framework in application for water level & superficy equivalence, at nominal height of CRN = 152,00 m), abacus was determined by SinoHydro (EPC Contractor) during the water filling of the dam, under the supervision of Tractebel engineering (Consulting Company). Verification team has verified the area of the reservoir /20/ and found correct.
Monitoring equipment	-	Not Applicable
QA/QC procedures to be applied	-	Not Applicable
Purpose of the data	Calculation of project emissions	The purpose of the monitoring parameter is to calculate the project emission which is in accordance with the registered VCS-PD /05/.
Calculation method	-	-
Comments	This parameter is used to calculate the power density.	The purpose of the monitoring parameter is to calculate the power density (ultimately project emission) which is in accordance with the registered VCS-PD /05/.

Finding: CAR-01 are raised and successfully closed.

Opinion: The verification team confirms;

- The monitoring plan has been implemented as per the registered PD /05/;
- The monitoring complies with the requirement of the applied methodology /07/;
- The information inflow (from data generation, aggregation, to recording, calculation and reporting) is included above under each parameters and confirms to the requirement of the PDD;

- The values included in the monitoring report and corresponding emission reduction sheets are verified and included under each monitoring parameter, wherever appropriate;
- The net generation for this monitoring period is higher than the ex-ante estimated. Verification team has checked the IRR sheet, the breaching point for the electricity generation for additionality is 34%. The increase in generation is lower than that, hence project is still additional. Further Hydro generation is unexpected i.e. based on the water availability and not in the control of PP.

Parameters not monitored/ex-ante:

4. $EF_{grid,CM,y}$ (tCO₂/MWh)

Combined margin CO₂ emission factor for grid connected power generation in year y

	Discussion and verification assessment
Purpose of data	Calculation of baseline emissions
Verified value	0.6042 tCO ₂ /MWh
Source of value	Registered VCS-PD /05/
Justification	It is fixed for the entire crediting period as per the registered VCS-PD /05/. The value of the Combined margin emission factor has been correctly taken as per the registered VCS-PD /05/ and Hence accepted by the verification team.

5. Cap_{BL} (W)

Installed capacity of the hydro power plant before the implementation of the project activity.

	Discussion and verification assessment
Purpose of data	Calculation of project emissions
Verified value	0
Source of value	Registered VCS-PD /05/
Justification	Project is a new hydro power plant which has been verified from various documents /10/, /12/, /19/, /21/, /22/. For new hydro power plants, this value is zero. The value has been correctly taken as per the registered VCS-PD /05/ and Hence accepted by the verification team.

6. A_{BL} (m²)

Area of the single or multiple reservoirs measured in the surface of the water, before the implementation of the project activity, when the reservoir is full (m²).

	Discussion and verification assessment
Purpose of data	Calculation of project emissions
Verified value	0
Source of value	Registered VCS-PD /05/
Justification	Project is a new hydro power plant which has been verified from various documents /10/, /12/, /19/, /21/, /22/. For new hydro power plants, this value is zero. The value has been correctly taken as per the registered VCS-PD /05/ and Hence accepted by the verification team.

Opinion:

In the opinion of assessment team, emission factor values that were applied in the calculations is consistent with registered PDD /05/ and correctly applied in MR /01/, emission reduction spread sheet /02/ and justified.

Assessment of Data and Calculation of GHG emission reductions:

According to the approved methodology ACM0002, Version 16.0, Emission Reductions are calculated as follows:

Baseline Emissions

The baseline emissions are calculated as follows:

$$BE_y = EG_{PJ,y} * EF_{grid,CM,y}$$

Where:

BE_y	=	Baseline emissions in year y(tCO ₂ /yr)
$EG_{PJ,y}$	=	Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the VCS project activity in year y(MWh/yr)
$EF_{grid,CM,y}$	=	Combined margin CO ₂ emission factor for grid connected power generation in year y(tCO ₂ /MWh)

The baseline emission calculation for the monitoring period is described in the table below:

Period		Net electricity $EG_{facility,y}$ (MWh)	Baseline Emission BE_y (tCO ₂ e) (Round down)
From	To		

01/07/2020	31/07/2020	90,356.6	54,593
01/08/2020	31/08/2020	91,216.9	55,113
01/09/2020	30/09/2020	1,12,494.5	67,969
01/10/2020	31/10/2020	1,24,165.9	75,021
01/11/2020	30/11/2020	1,43,875.3	86,929
01/12/2020	31/12/2020	1,69,012.4	1,02,117
Sub-total 2020		731,121.7	441,742
01/01/2021	31/01/2021	1,49,838.4	90,532
01/02/2021	28/02/2021	1,34,099.3	81,022
01/03/2021	31/03/2021	1,38,142.8	83,465
01/04/2021	30/04/2021	47,964.8	28,980
01/05/2021	31/05/2021	42,348.6	25,587
01/06/2021	30/06/2021	54,848.0	33,139
Sub-total 2021		567,241.9	342,725
TOTAL		1,298,363.6	784,467

The baseline emission (BE_y) for the monitoring period is:

$$BE_y = 784,467 \text{ tCO}_2$$

Project Emissions

According to the registered PDD /05/ and applied methodology ACM0002, Version 16.0 /07/, Project emissions shall be accounted by using the following equation:

$$PE_y = PE_{FF,y} + PE_{GP,y} + PE_{HP,y}$$

Where:

PE_y = Project emissions in year y ($\text{tCO}_2\text{e/yr}$)

$PE_{FF,y}$ = Project emissions from fossil fuel consumption in year y ($\text{tCO}_2\text{/yr}$)

$PE_{GP,y}$ = Project emission from the operation of geothermal power plants due to the release of non-condensable gases in year y ($\text{tCO}_2\text{/yr}$)

$PE_{HP,y}$ = Project emission from water reservoirs of hydro power plants in year y ($\text{tCO}_2\text{/yr}$)

Project emissions from fossil fuel consumption ($PE_{FF,y}$)

According to para 31 of ACM0002 “for all renewable energy power generation activities, emissions due to the use of fossil fuels for the backup generator can be neglected, hence $PE_{FF,y} = 0$.

Project emission from the operation of geothermal power plants due to the release of non-condensable gases ($PE_{GP,y}$)

Project is hydro power plant hence inapplicable and $PE_{GP,y} = 0$.

Emissions from water reservoirs of hydro power plants ($PE_{HP,y}$)

Since the calculated Power Density is 19.98 W/m², hence as per para 39 of the applied methodology (ACM0002 Version 16), $PE_{HP,y}$ is zero. Verification team has checked the power density calculation and found correct.

Leakage

According to ACM0002 version 16.0, no leakage emissions are considered.

Emission reductions

Reductions are calculated as follows:

$$ER_y = BE_y - PE_y$$

Where:

ER_y = Emission reductions in year y (t CO₂e/yr)

BE_y = Baseline emissions in year y (t CO₂e/yr)

PE_y = Project emissions in year y (t CO₂e/yr)

The results of the emission reduction are shown in the table below:

Year	Baseline emissions or removals (tCO ₂ e)	Project emissions or removals (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Net GHG emission reductions or removals (tCO ₂ e)
2020	441,742	-	-	441,742
2021	342,725			342,725
Total	784,467	-	-	784,467

In the registered VCS PD, annual emission reductions were estimated as 636,222 tCO₂e. However actual emission reductions corresponding to this monitoring period are 784,467 tCO₂e which is higher than the ex-ante estimated emission reduction. PP has demonstrated that the higher generation is due to higher availability which is found convincing as the hydro power generation is based on the water availability which is not under control of PP. Verification team has checked the impact of higher generation on the additionality of the project activity.

The project IRR reaches to 14.92% with the 23% increase in emission reduction which is still below the default RoE i.e. 16.65%. Hence project is still additional and hence accepted.

Opinion:

The verification team confirms that

- The complete data set for the identified and required parameters for the operational days in the current monitoring period was available;
- The reported data has been cross checked with available records, as indicated in the section 4.4 above under each monitored data, wherever appropriate;
- The baseline, project and leakage emissions have been determined in accordance with the requirement of the applied methodologies, as contained in the final monitoring report and corresponding emission reductions spreadsheet;
- The assumptions, emission factors and default values used are justified, as indicated in the section 4.4 above.

4.5 Quality of Evidence to Determine GHG Emission Reductions and Removals

Evidences (Documents/Microsoft Teams interviews) referred for verification of individual monitoring parameter and fixed parameters are defined under section 4.4. We further confirm that, sufficient evidence covering the entire monitoring period and at the required frequency were available. A list of referred documents for verification is also included in Appendix 1 of this report.

4.6 Non-Permanence Risk Analysis

Not applicable.

5 VERIFICATION CONCLUSION

4K Earth Science Pvt. Ltd (4KES), contracted by 'AERA Group', has performed the independent verification of the emission reductions for the VCS project activity (VCS ID - 1522) "Soubré hydropower project" in Côte d'Ivoire for the monitoring period 01-July-2020 to 30-June-2021 as reported in the Monitoring Report Version ~~1.24-1~~ dated ~~14/12/2021~~~~26/08/2021~~. CI-ENERGIES are responsible for the collection of data in accordance with the monitoring plan and the reporting of GHG emissions reductions from the project activity. It is our responsibility to express an independent verification statement on the reported GHG emission reductions from the project activity

4KES commenced the verification on the basis of the baseline and monitoring methodology ACM0002- Version 16.0, the monitoring plan contained in the registered VCS PD /05/, VCS guidelines version 4 and Monitoring Report (Version ~~1.21.1~~ dated ~~14/12/2021~~~~26/08/2021~~) as per the process described under Section 2 of this report.

4KES verification approach is based on the understanding of the risks associated with reporting of GHG emission data and the controls in place to mitigate these. 4KES planned and performed the verification by obtaining evidence and other information and explanations that 4KES considered necessary to give reasonable assurance that reported GHG emission reductions are fairly stated.

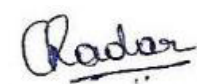
In our opinion the GHG emissions reductions reported for the project activity for the period 01-July-2020 to 30-June-2021 are fairly stated in the Monitoring Report Version ~~1.21.1~~ dated ~~14/12/2021~~~~26/08/2021~~. The GHG emission reductions were calculated correctly on the basis of the approved baseline and monitoring methodology ACM0002- Version 16.0 and the VCS standard.

Verification period: From 01-July-2020 to 30-June-2021

Verified GHG emission reductions and removals in the above verification period:

Year	Baseline emissions or removals (tCO ₂ e)	Project emissions or removals (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Net GHG emission reductions or removals (tCO ₂ e)
2020	441,742	-	-	441,742
2021	342,725			342,725
Total	784,467	-	-	784,467

Approved by



Chandrakala R.

Director

~~2021 September 2021~~

4K Earth Science Private Limited

Date: ~~13-14 December~~

Place: Bangalore, India

APPENDIX I: LIST OF DOCUMENTS

/1/	/1.1/ Monitoring Report, Version 1.0, dated 23/06/2021 (Initial Version) /1.2/ Monitoring Report, Version ~~1.24.1~~ , dated ~~14/12/2021~~ ~~26/08/2021~~ (Final Version)
/2/	/2.1/ Draft Emission Reduction calculation sheet (corresponding to initial Version of VCS MR) /2.2/ Final Emission Reduction calculation Sheet (corresponding to final Version of VCS MR)
/3/	VCS Standard Version v4.0 https://verra.org/project/vcs-program/rules-and-requirements/
/4/	VCS Program Guide, v4.0 https://verra.org/project/vcs-program/rules-and-requirements/
/5/	Registered VCS PD version 2.1 dated 13/10/2016
/6/	Web-Link for the Registered project activity for Validation Report and Grid Emission factor calculation https://registry.verra.org/app/projectDetail/VCS/1522
/7/	Approved monitoring methodology: ACM0002 ver. 16.0 - Grid-connected electricity generation from renewable sources
/8/	Websites referred: http://www.itouchmap.com/latlong.html (Latitude-Longitude location finder)
/9/	Photos of major equipment (turbine, alternator and meters) along with Video of project site
/10/	Date of operation of each project unit: Final Works Supervision Report (Technical report of the works) by Tractebel engineering (a consultant company providing technical services to the project proponent), Document number: SBR-TEF-RF-18-01-B, dated 17-05-2019
/11/	Declaration by PP for No double counting of Emission Reductions, Date: 17/09/2020
/12/	Power Purchase Agreement between PP and Utility company (COMPAGNIE IVOIRIENNE D'ÉLECTRICITÉ (CIE)) 26/07/2013
/13/	Calibration certificates of the 4 energy meters installed at power house dated 20/12/2014
/14/	Single line diagram of the project connection with grid and monitoring points
/15/	Supportive for Electricity export and import to grid: SBRE_Rapport_Exploitation (Monthly reports)
/16/	Monthly power metering reconciliations for invoicing
/17/	Company registration certificates

/18/	The 'Public Interest Decree' promulgated by the President of Cote d'Ivoire
/19/	The Right of use: legal title to the flooded land >> Arrete IntMinist_Bareme Indemnisation Cultures (which evidences the indemnisation of relocated lands' owners, while the Public Utility decree grants state ownership/requisition of the flooded land).
/20/	Supportive for the area of the reservoir: Loi HSV_Centrale Soubré_vF.pdf (abacus/framework in application for water level & superficy equivalence, at nominal height of CRN = 152,00 m), abacus was determined by SinoHydro (EPC Contractor) during the water filling of the dam, under the supervision of Tractebel engineering (Consulting Company).
/21/	The detailed environmental impact assessment was submitted to the Direction of Environment in February 2015 and approved by ANDE decree n°0078 of August 21st, 2015.
/22/	SOUBRE HYDROELECTRIC DEVELOPMENT ENVIRONMENTAL AND SOCIAL IMPACT STUDY, ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN, September 2019
/23/	Calibration certificates of all the 8 energy meters installed at power house and at substation dated 18/02/2021 by central direction of energy transport and telecommunications sub-direction maintenance / control department of CIE (Government authority)

APPENDIX II: VERIFICATION FINDINGS

Table 1. CL from this verification

CL ID	01	Section no.	1.4	Date: 25/08/2021
Description of CL				
Under section 1.1 of the Monitoring report, the sentence “Since its commissioning date on 25-May-2017 over its first monitoring period ending on 30-June-2020, and the second from 1 st July 2020 to 30 June 2021 its GHG emission reductions amount to 3,350,508 tCO _{2e} .” is not clear. Also the mentioned Emission Reduction value corresponding to the monitoring period is not consistent with the submitted ER sheet.				
Project participant response				Date: 26/08/2021
Indeed the sentence was very ambiguous. Now updated, and consistent with ER sheet				
Documentation provided by project participant				
Monitoring report version 1.1				
DOE assessment				Date: 05/09/2021
Correction has been done in the revised MR /1.2/ and found consistent with the ER sheet /2.2/. Hence this CL is closed.				

Table 2. CAR from this verification

CAR ID	01	Section no.	4.4	Date: 25/08/2021
Description of CAR				
Under section 4.3 of the MR, PP need to provide the Calibration details of the energy meters used for the measurement of electricity export and import covering the monitoring period.				
Project participant response				Date: 30/08/2021
Verification documents provided. The verification occurred on 18/02/2021 and was carried out by the “central direction of energy transport and telecommunications sub-direction maintenance / control department” of CIE.				
Documentation provided by project participant				
Monitoring report version 1.1 and verification documents				
DOE assessment				Date: 05/09/2021
Correction has been done in the revised MR /1.2/ and found OK. Verification team has verified the calibration certificates /13/, /23/ to confirm the same. PP has conservatively corrected the monthly electricity export and import for the whole monitoring period with respect to the accuracy class (0.2) which is conservative and accepted. Hence CAR is closed.				

Table 3. FAR from this verification

No FAR raised during this verification.

FAR ID	Xx	Section no.		Date: DD/MM/YYYY
Description of CAR				

NA	
Project participant response	Date: DD/MM/YYYY
Documentation provided by project participant	
DOE assessment	Date: DD/MM/YYYY

APPENDIX III: TEAM COMPETENCE

<i>Certificate of Competence</i>						
Name	☒ Mr. ☐ Ms.	Chetan Swaroop Sharma				
Qualification Procedure	Fulfil 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	13-06-2020					
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 distribution	2.1		Energy distribution		
	Energy demand	3.1		Energy demand		
	Waste handling and disposal	13.1		Solid waste and wastewater		
Authorized to work as Local Expert for:						
Country/Countries	India					
Compliance check by: Anand S. R.						

<i>Certificate of Competence</i>						
Name	☒ Mr. ☐ Ms.	Ma Paa Puratchikkanal				
Qualification Procedure	Fulfil 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	29-07-2019					
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		
	Agriculture		15.1	Agriculture		
Authorized to work as Local Expert for:						
Country/Countries	India					
Compliance check by: Anand S. R.						

APPENDIX IV: ABBREVIATIONS

CAR	Corrective Action Request
CDM	Clean Development Mechanism
CL	Clarification Request
EB	Executive Board
EIA	Environmental Impact Assessment
ER	Emission Reductions
FAR	Forward Action Request
GHG	Greenhouse Gases
IPCC	Intergovernmental Panel for Climate Change
JMR	Joint Meter Readings
MP	Monitoring Period
MR	Monitoring Report
MW	Mega Watt
MWh	Mega Watt hour
O&M	Operation & Maintenance
PD	Project Description
PP	Project proponent
PPA	Power Purchase Agreement
QA/QC	Quality Assurance/Quality Control
tCO ₂	Tonnes of Carbon Dioxide
UNFCCC	United Nations Framework Convention on Climate Change
VCS	Verified Carbon Standard
VCSA	Verified Carbon Standard Association
VCU	Verified Carbon Unit