



**Verified Carbon
Standard**

VERIFICATION REPORT FOR
“BUGOYE 13.0 MW RUN-OF-RIVER
HYDROPOWER PROJECT”



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Summary:

LGAI Technological Center, S.A. (hereafter referred to as Applus+ Certification) has been contracted by Aera Group to conduct the second verification of the project “Bugoye 13.0 MW Run-of-River Hydropower Project”, VCS ID 1199, against VCS Standard Version 4.0/16/.

The verification includes confirming the implementation of the monitoring plan of the registered VCS PD (Project ID 1199) and the application of the monitoring methodology as per AMS I.D., Version 15 “Grid connected renewable electricity generation”/9/.

Bugoye Hydro Limited (formerly Tronder Power Ltd) has implemented the Bugoye hydropower project, a run-of-river plant. The project is located at the foot of the Rwenzori Mountains in the Kasese District, Western Uganda. The project diverts water from the rivers Mubuku and Isya which runs via a five kilometer-long canal into a 950 meter-long penstock with a head of 160 meters. After passing through two turbines, the water is discharged to the Mubuku River. The project uses the remaining head between two existing hydropower plants; Mubuku 1, upstream of the project site, and Mubuku 3, downstream of the project site.

A risk based approach has been followed to perform this verification. In the course of verification, 10 Corrective Action request (CARs), 00 Forward Action Request (FAR) and 01 Clarification request (CLs) were raised and successfully closed.

The review of the project design documentation, monitoring report and additional documents related to baseline and monitoring methodology; the subsequent background investigation, telephonic interviews and stakeholders have provided Applus+ Certification with sufficient evidence to validate the fulfillment of the stated criteria.

Applus+ Certification confirms that the project is implemented in accordance with the registered VCS PD/01/. The monitoring system is in place and the emission reductions are calculated without material misstatements. Our opinion relates to the project’s GHG emissions and the resulting GHG emission reductions reported and related to the valid and registered project baseline and monitoring and its associated documents. Based on the information seen and evaluated we confirm that the emission reductions from the project activity “Bugoye 13.0 MW Run-of-River Hydropower Project” during the period 01/01/2013 - 06/10/2019 (including both days) amount to 281,345 tons of CO₂e.

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1. INTRODUCTION

1.1 Objective

Applus+ Certification has been contracted by Aera Group who is authorised by Bugoye Hydro Limited (formerly Tronder Power Ltd.)(project proponent), to undertake the verification of the renewable energy project titled “Bugoye 13.0 MW Run-of-River Hydropower Project”(VCS ID-1199) The verifiers have reviewed the GHG data collected to date for the monitoring period from 01/01/2013 - 06/10/2019(both days included) covered in this verification.The objective of this verification is a thorough and independent assessment of registered project activities against the applicable VERRA requirement by the VVB. The verification process shall determine whether the proposed project activity complies with the requirements of latest VCS guidelines, applicability conditions of the selected methodology, relevant host country regulations and guidance issued by the VERRA Board.

1.2 Scope and Criteria

The scope of the verification was the independent and objective review and ex-post determination of the monitored reductions in GHG emissions from “Bugoye 13.0 MW Run-of-River Hydropower Project” The verification of this project was based on the registered project description/01/ & monitoring report /04/ and supporting documents submitted by the project proponent to the verification team. The documents were reviewed against the following guidance and protocols:

VCS Standard: VCS standard Version 4.0, dated19/09/2019/16/

Approved baseline and monitoring methodology AMS I.D., Version 15, “Grid-connected electricity generation from renewable sources”/09/

Validated VCS PD, version 01 dated 06/03/2013/01/

VCS Program Guide, Version 4.0, dated 19/09/2019/17/

ISO 14064-3: Specification with guidance for the validation and verification of greenhouse gas assertions, 2006/18/

CDM VVS and PS for project activities version 02.0/19/

The verification is not meant to provide any consulting towards the client. However, stated request for clarifications and/or corrective actions may provide input for improvement of the project design.

1.3 Level of Assurance

The level of assurance of the verification report falls under reasonable assurance engagements as selected by the Client. The verification team verified the complete monitoring data for all the parameters of the monitoring plan and confirms that the reported emission reductions are free from any type of material errors.

1.4 Summary Description of the Project

Bugoye Hydro Limited (formerly Tronder Power Ltd) has implemented the Bugoye hydropower project, a run-of-river plant. The project is located at the foot of the Rwenzori Mountains in the Kasese District, Western Uganda. The project diverts water from the rivers Mubuku and Isya which runs via a five kilometer-long canal into a 950 meter-long penstock with a head of 160 meters. After passing through two turbines, the water is discharged to the Mubuku River. The project uses the remaining head between two existing hydropower plants; Mubuku 1, upstream of the project site, and Mubuku 3, downstream of the project site.

The hydro power plant is connected to the national grid, National Ugandan Electricity Grid, operated by Ugandan Electricity Transmission Company (UETCL) via a 6 km long transmission line routed to the Nkenda substation. The primary purpose of the project is to supply affordable renewable energy to the population of Uganda. The electricity sold to the grid is measured by a main meter and is verified by the purchaser, the Ugandan Electricity Transmission Company (UETCL); a check meter is also installed.

In the power house two horizontal axis turbines are installed, each with a capacity of 7.228 MW, giving a total capacity of 14.456 MW. The two 7.140 MW generators are horizontal axis, three-phase, synchronous salient-pole, with sleeve bearings and brushless excitation systems; hence possessing the generator capacity of 2 x 7.140 (14.28) MW. The generators have a power factor of 0.85, a frequency of 50 Hz and an output of 8.4 MVA. The power output for supply to the grid has to include losses in the generator ($n \sim 0.97$) and transformer ($n \sim 0.985$). The rated output to the grid for combined operation of the two turbines at discharge 10 m³/s, taking into account losses in the generator and transformer, is 13 MW. Electricity generation is 451,703 MWh for the monitoring period under consideration (01/01/2013 – 06/10/2019).

The project also includes installation of a small switch field at the power house. Two transformers amplify the production energy of 6.3 kV to a potential of 33 kV. The 33kV line is connected to the indoor switchgear in the existing spare 33kV panel at Nkenda Substation by an underground cable. The energy produced at the outlet of the switch field is sold to UETCL.

Below is a summary of key events related to the project activity and related infrastructure:

- January 2008 : Start of construction of the Bugoye 13.0 MW run-of-river Hydropower Plant
- 7 October 2009 : Commissioning of BHP
- 31 December 2012 : Cut-off of the previous CDM monitoring period

During this Monitoring Period (01-January-2013 to 06-October-2019), the net emission reductions achieved are 281,345 tCO₂e.

2. VERIFICATIONPROCESS

The registered VCS project is under going fourth verification under VCS, the approach adopted to ensure the quality of emission reductions is described in the following sections.

2.1 Method and Criteria

Verification was conducted using Applus+ Certification procedures in line with the requirements specified in the VCS standard Version 4.0/16/ Requirements, CDM M&P, the latest version of the CDM Validation and Verification Standard, and relevant decisions of the COP/MOP and the CDM EB and applying standard auditing techniques. The project activity does not falls under category “grouped projects”, hence any sampling methods not to be employed by the validation/verification body for the verification of GHG emission reductions or removals generated by the project.

It is to be 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

Telephonic interviews with project stakeholders

The resolution of outstanding issues and issuance of final report and opinion.

2.2 Document Review

The verification is performed primarily as a document review of the registered VCS PD/01/, previous validation and verification report and associated documents as stated in detail in appendix 1 of this document. The assessment is performed by a verification team referring the Applus+ Certification internal procedures in line with latest VCS requirements. 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

Due to the current situation with the global COVID-19 pandemic scenario and international travel to Uganda from India was not possible due to which on-site inspection has not been performed by the assessment team. However, the representatives of the PP and O&M contractors were interviewed telephonically on 05/02/2021 i.e. personnel responsible for monitoring of the project activity, data collection and management, and QA/QC procedure. The details of the people interviewed are mentioned in the table below:

S N	Name	Organization
01	Mr. Alexandre Dunod	AERA Group
02	Mr. Francis Ocamgiu Jawotho	Bugoye Hydro Limited (formerly Tronder Power Ltd.)
03	Mr. Kiggundu Fred Marc	Bugoye Hydro Limited (formerly Tronder Power Ltd.)
04	Mr. Sergio Gil	Bugoye Hydro Limited (formerly Tronder Power Ltd.)
05	Mrs. Faith Kamau	Bugoye Hydro Limited (formerly Tronder Power Ltd.)

The topics covered during interview ranges from general features and implementation of project to technical details of the project like calibration details, monitoring and measuring system and data collection, recording and archiving procedures. The assessment was drawn based on the feedback received during telephonic interview coupled with the documentation.

2.4 Site Inspections

As discussed in the above section, physical site inspection is not done for the current verification. However to achieve a reasonable level of assurance, the assessment team has followed the alternative means to substantiate the verification criteria as described in the below table:

Assessment Criteria	Means of verification/source documents	Assessment opinion
Description of project activity	i. Commissioning certificates /11/ ii. PPA signed /12/ iii. Latest VCS validation and verification report /2/. iv. Telephonic interview on 05/02/2021	The information's with reference to project capacity, technology, plant equipment and commissioning dates as provided in section 1.1 of MR are found consistent with the documents.

Assessment Criteria	Means of verification/source documents	Assessment opinion
Compliance of the project implementation with the registered project design document	i. Monthly generation and energy bill/08/ ii. Geographical co-ordinates (Location of plant) verified through Google Map iii. Latest VCS validation & verification report /2/. iv. PPA signed with UETCL /12/ v. Telephonic interview on 05/02/2021 vi. Photograph of the plant, energy meters installed at site and screen shots of online monitoring system /20/	Monthly generation and energy bill issued by UETCL indicate the following information: <ul style="list-style-type: none"> • Commissioning date • Serial number of energy meters • Capacity of project • Name of project participant Location of plant is verified through Google Map. Daily generation records are verified to check the operational status of project activity. Grid connectivity of the project is confirmed through the PPA. All the information's regarding the project implementation as discuss above are further verified through VCS verification report along with latest and found consistent.
Compliance of the registered monitoring plan with applied methodologies and standardized baselines	i. Monthly generation and energy bill/08/ ii. Geographical co-ordinates (Location of plant) verified through Google Map iii. Latest VCS validation and verification report /2/. iv. PPA signed with UETCL /12/ v. Telephonic interview on 05/02/2021 vi. Photograph of the plant, energy meters installed at site and screen shots of online monitoring system	The organizational structure, responsibilities and competencies of the personnel confirmed through telephonic interview. Frequency of monitoring of parameters listed under approved monitoring plan is verified through monthly generation/Energy bills. The methods used for measuring, recording, storing, aggregating, and reporting the data on monitored parameters are verified though PPA and interactions with site personnel. Procedure for data uncertainty, emergency

Assessment Criteria	Means of verification/source documents	Assessment opinion
	/20/	preparedness, roles and responsibility, operational and management structure are mentioned in the MR is confirmed through policy documents and found satisfactory.
Compliance with the calibration frequency requirements for measuring instruments	i. Calibration certificates of instruments/06/ ii. Monthly generation and energy bill/08/ iii. PPA signed with UETCL /12/	Calibration frequency and energy meter specifications (Sr.No, make accuracy class) is verified through calibration certificates. Responsibility of calibration and maintenance of energy meters is solely under control of UETCL; this is verified through the PPA.
Assessment of data and calculation of emission reductions or net removals	i. Monthly generation and energy bill/08/ ii. Energy bills raised by project developer to UETCL/07/ iii. Latest VCS validation and verification report /2/	Monthly values of monitoring parameters used in ER calculation are verified through monthly generation and cross verified with the energy bills. Methods, formulae and emission factor for calculating baseline emissions have been followed are in accordance with the applied methodology and as described in the approved VCS verification report.

It is noteworthy that no sampling plan for verification is applied as 100% data is verified for the current monitoring period. Most of the reference document referred by the assessment team (above table) are either issued /endorsed by grid authority (UETCL), an external government agency, hence is deemed authentic.

Furthermore, the project activity already verified under VCS previously and currently undergoing second verification, hence based on the information's available through approved documents (VCS verifications), it can be confirmed that project is implemented and being operated as described in the registered PD.

The assessment team has verified sufficient appropriate audit evidences, to reduce audit risk to an acceptably low level as requisite to achieve reasonable level of assurance for the current verification.

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 telephonic interview of site personnel. 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 Applus+ Certification 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 current verification, 10 Corrective Action request (CARs), 00 Forward Action Request (FAR) and 01 Clarification request (CLs) were raised and successfully closed.

All the findings that are raised and communicated to project participant during the verification are included under Appendix 4. The section also includes the response, if provided, by the project participants and an assessment by the verification team if it was closed out or otherwise.

2.5.1 Forward Action Requests

The project activity is undergoing fourth verification under VCS; there were no FARs raised during the validation or previous verification. Also during the current verification no FAR is raised.

2.6 Eligibility for Validation Activities

Not applicable, as Applus+ holds the accreditation to perform validation activities in this Sectoral Scope.

3. VALIDATION FINDINGS

Use this section to provide details of all validation activities that took place during the verification, such as gap validation, validation of methodology deviations and project description deviations, and the inclusion of new project activity instances into grouped projects.

3.1 Participation under Other GHG Programs

The project is registered under the Clean Development Mechanism (Project #3017) on 01-Jan-2011, although its GHG emission reduction will either be claimed under the VCS programme or the CDM programme, never both.

A declaration shall be submitted to VVB and confirming the same.

3.2 Methodology Deviations

There is no methodology deviation identified during the current monitoring period

3.3 Project Description Deviations

Calibration of the main and check meters was stated in the CDM-PDD as having to be undertaken annually. Since the project has been implemented it has become apparent that there is no relevant expertise in Uganda needed to undertake the calibration of the said meters. The meter manufacturers (CEWE instruments) have confirmed that the installed

meters, following initial test and calibration, do not require any further or regular calibration. For this reason, annual calibration, which is not considered to be required and which cannot be undertaken locally, has not been implemented. It should be mentioned that there has been a continuous check of the readings of the Main Meter vis-à-vis the Check Meter in order to ensure the accuracy of the Main Meter. The meter readings have been performed in the presence of the UETCL representatives (as purchaser of the generated electricity) and all of the invoices have been approved by UETCL and paid. PP has taken 0.2% error factor on conservative side for entire monitoring period based on latest calibration of main meter and check meter on 11th March 2021.

Furthermore, the VVB has verified that the overall responsibility for monitoring and reporting issues now relapses on Bugoye Hydro Limited (formerly Tronder power Limited) and Nicholas Tatrallyay, its Managing Director of the company. The PP has submitted “Certificate of Change of Name” dated 10/08/2015 issued by Registrar of Companies, the Republic of Uganda/22/. This was found to be correct and hence accepted.

3.4 Grouped Project

Not applicable. The project activity is not a grouped project

4. VERIFICATION FINDINGS

4.1 Project Implementation Status

Bugoye Hydro Limited (formerly Tronder Power Ltd) has implemented the Bugoye hydropower project, a run-of-river plant. The project is located at the foot of the Rwenzori Mountains in the Kasese District, Western Uganda. The project diverts water from the rivers Mubuku and Isya which runs via a five kilometer-long canal into a 950 meter-long penstock with a head of 160 meters. After passing through two turbines, the water is discharged to the Mubuku River. The project uses the remaining head between two existing hydropower plants; Mubuku 1, upstream of the project site, and Mubuku 3, downstream of the project site.

Before the implementation of the project and in its absence, the baseline situation was the continuation of the current situation i.e. electricity will continue to be generated by the existing generation mix operating in the grid. Implementation of the project consists of construction of the following main items:

- A main intake and sedimentation basin where water from the river Mubuku is diverted through a 1,0 km canal to the river Isya;
- A second intake and sedimentation basin at the river Isya, where tailrace water from the Mubuku 1 power station is added to the system;
- An open concrete headrace canal with total length of 4.0 km;
- A spillway of approximately 1 km, a forebay and 950 m penstock;
- Power house with two horizontal 7.228 MW Francis turbines and two 7.140 MW generators;
- Tailrace canal back to the Mubuku river;

- Switch station and a 33 kV transmission line of 6.5 km;
- An emergency diesel generator.

The project also includes installation of a small switch field at the power house. Two transformers amplify the production energy of 6.3 kV to a potential of 33 kV. The 33kV line is connected to the indoor switchgear in the existing spare 33kV panel at Nkenda Substation by an underground cable. The energy produced at the outlet of the switch field is sold to UETCL.

During maintenance periods, power is drawn from the grid. Normally however, it is possible to operate one turbine while the other is under maintenance, so there should be little need to import power from the grid. An 80 kVA emergency diesel generator is installed to cover non-operation of the turbines. This on-site diesel generator is only used in exceptional periods, for example when the grid is down and on-site loads cannot be self-supplied.

The key project data for the Bugoye Hydropower Project is given below:

• Catchment area	207 km ²
• Mean annual run-off	10.2 m ³ /s
• Intake pond storage	1000 m ³
• Canal length	4.0 km
• Penstock length	950 m
• Penstock diameter	1.8/2.0/2.2 m
• Rated head	160 m
• Turbine type	Francis
• Turbine capacity	2 x 7.228 (14.456) MW Mavel Francis Turbines
• Generator type	ELPROM ZEM Horizontal synchronous Generator
• Generator capacity	2 x 7.140 (14.28) MW
• Mean annual production	82,000 MWh
• Plant load factor	65.55%

Main production interruption occurred between February 14th 2017 and September 27th 2017 following penstock failure. The shutdown events did not result in any permanent changes in the project.

4.2 Safeguards

4.2.1 No Net Harm

An Environmental & Social Audit of the Operation activities for Bugoye Hydropower Project was conducted in compliance with the National Environment (Conduct and Certification of Environmental Practitioners) Regulations, 2003, National Environment (Audit) Regulations, 2006, other relevant laws and permits that have been issued for the operation of Bugoye Hydropower Project.

Overall performance by the Auditee in managing environmental issues relating to resource protection, user protection and environment conservation was satisfactory, with improvements needed in the following areas:

- Abstraction volume should be regulated to allow continued flow along the entire river channels especially at the intake along R. Mubuku.
- Mitigations to be put for such areas with high noise levels that include; administrative controls such as
 - Provision of adequate Personnel Protective Ear muffs,
 - Limiting the time that workers are exposed to noise through job rotation
 - Task modifications and increased noise hazard awareness be availed to workers who access noise polluted areas
 - Relocating the control room
 The Riverbank permit expired in March, 2020 and it's in renewal process.

4.2.2 Local Stakeholder Consultation

During the current monitoring period 8 comments received by the PP under grievance reporting mechanism and PP has resolved all 8 comments. This is verified by VVB through grievance register.

4.3 AFOLU-Specific Safeguards

This is a non-AFOLU project. For non-AFOLU projects, this section is not required.

4.4 Accuracy of GHG Emission Reduction and Removal Calculations

The project monitoring has been carried in accordance with the registered VCS PD/01/ and the monitoring report/04/. The monitoring plan laid in the registered PD/01/ is being followed at the site/20/. The assessment team has verified the information flow (from data generation, aggregation, to recording, calculation and reporting for these parameters including the values) in the MR/04/.

The emission reductions are purely based on the net electricity generated and exported from the machines. PP has provided all the sufficient data for current monitoring period. The values of the parameter EG_y used in deriving the GHG emission reduction could be very well correlated between the data sets and ER spreadsheet/05/ provided by PP. Net electricity supplied by the project activity to the grid (EG_y) by the project activity calculated as a difference of electricity exported to the grid, electricity imported from the grid obtained from monthly generation report/energy bill issued as per below equation:

$$\text{Net electricity} = \text{Export} - \text{Import}$$

The calculation is done by UETCL and the Project Developer has no control over the authority for the calculation. Based on the monthly generation report/energy bill, the project developer

shall raise the energy bill. Verification team has verified the monthly values of parameter (EG_y) as reported in the ER sheet with the source document and no discrepancy is observed, hence it can be confirmed that no manual transposition errors between data sets have been occurred. The verification of each monitoring parameter has been discussed later in section 4.5.

The calculation method and formulae used in calculating baseline emission is in compliance to the methodology used i.e. AMS I.D.Version 15 /09/.

As the Bugoye run-of-river hydropower project does not lead to any emissions due to the operation of geothermal power plants, or from of water reservoirs), project emissions, PE_y, should equal 0.

As noted in the registered PDD/01/, however, a diesel generator has been installed in the plant to provide emergency power in the event of any grid blackouts. The generator was expected to be operating for less than 100 hours a year. Based on a conservative assumption that the generator operates for 100 hrs/yr, it was calculated that the emissions from this source will amount to 19.37 tCO₂/yr, which accounts for less than 0.05% of baseline emissions.

Nevertheless, fuel consumption of the diesel generator was to be monitored, and if running hours, and therefore fuel consumption, were to increase to a level where emissions from this source will be equal to or exceed 1% of baseline emissions, the electricity generation metered will be adjusted by deducting the electricity generation from fossil fuels using the specific fuel consumption and the quantity of fossil fuel used, as prescribed in AMS I.D. v 15.

The estimation of emissions from the diesel generator presented in registered PDD is based on a conservative assumption that typical fuel consumption for the said diesel generator is 68.12 l/hr, or 18 USg/hr, as opposed to 18 l/hr, or 4.8 USg/hr, i.e. assumption is made that fuel consumption by diesel generator is over 3.5 times that proposed by manufacturer. Running hours for the diesel generator amounted to 675.5 hours during the totality of the monitoring period (i.e. 01/01/2013 to 06/10/2019). The estimate made in the registered PDD showed that if the generator ran for 100hrs/yr, total CO₂ emissions from diesel use would amount to 19.37 tCO₂. Based on the estimation of emissions from the diesel generator presented in registered PDD, emissions from the diesel generator would therefore amount to 130.8 tCO₂ (675.5/100 * 19.37). As a percentage of baseline emissions, 130.8 tCO₂ represents 0.05% of baseline emissions.

As stated in the registered PDD “if running hours, and therefore fuel consumption, will increase to a level where emissions from this source will be equal to or exceed 1% of baseline emissions, the electricity generation metered will be adjusted by deducting the electricity generation from fossil fuels using the specific fuel consumption and the quantity of fossil fuel used, as prescribed in AMS I.D. v 15.”. As emissions from this source have been shown not to equal or exceed 1% of baseline emissions, electricity generation metered is therefore not adjusted.

The below table summarizes calculations of the Project Emissions.

PROJECT EMISSION CALCULATIONS

According to the CDM-PDD:	<i>if the generator ran for 100 hrs/yr, total CO₂ emissions from diesel use would amount to 19.37 tCO₂</i>
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Running hours of the Generator during the entire Monitoring Period	675.5	Hours
Emissions from diesel use	130.8	tonneCO ₂
Percentage of Baseline Emissions	0.05%	<i>This value is far below 1% of the Baseline Emissions so could be set to zero</i>

4.5 Quality of Evidence to Determine GHG Emission Reductions and Removals

The below tables describe how the parameter, that is to be measured according to the monitoring plan, has been verified to confirm that the actual monitoring complies with the monitoring plan, monitoring data has been thoroughly assessed and that the calibration requirements are met.

Parameter	Net electricity supplied by the project activity to the grid in year y EG _y (MWh)	
Means of verification	Criteria/Requirements	Assessment/Observation
	Measuring /Reading /Recording frequency	The parameter is continuously monitored, hourly measured and monthly recorded.
	Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes. The reporting frequency is in line with the monitoring plan as outlined in the registered PD/01/ and monitoring methodology/09/.
	Monitoring equipment	Bidirectional electronic meters of accuracy class 0.2s are used.
	Is accuracy of the monitoring equipment as stated in the monitoring plan? If the monitoring plan does not specify the accuracy of the monitoring equipment, does the accuracy of the monitoring equipment comply with local/national standards, or as per the manufacturer's specification?	The accuracy of the monitoring equipment used to measure the values is 0.2s, which is as per the registered PD/01/ which is as per the norm defined in the PPA/12/.

	Is the accuracy valid for the entire measuring range or do different accuracy levels apply to different measuring ranges?	Yes. The accuracy of monitoring equipment is valid for the entire range.
	Calibration frequency /interval:	Calibration frequency of the meters is once in a year.
	Is the calibration interval in line with the monitoring plan and/or methodology? If the monitoring plan does not specify the frequency of calibration, is the selected frequency in accordance with the local/national standards, or as per the manufacturer's specifications?	Yes. The calibration frequency is in line with the monitoring plan as outlined in the registered PD/01/.
	Is the calibration of measuring equipment carried out by an accredited person or institution?	No calibration is not conducted by grid authority. PP has organized meter calibration from third party.
	Is(are) calibration(s) valid for the whole reporting period?	No, calibration was not valid for whole monitoring period. PP has taken 0.2% maximum error for delay period.
	How were the values in the monitoring report verified?	Monthly value of the parameters for entire monitoring period is reported in the monitoring report and ER calculation sheet. The monthly values were verified from the monthly generation report and found to be consistent. Value of this parameter for the current monitoring period was verified as 451,703 MWh
	If applicable, has the reported data been cross-checked with other available data?	The monthly reported values were further cross checked with the monthly energy bills raised by the PP /07/ to state utility and found to be consistent.

	Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	<p>Yes, the adequate QA/QC procedures were implemented by all the stakeholders, namely, the Grid Authority (UETCL), The data transfer process for the said parameter is as follows:</p> <p>The export reading has been crosschecked with the Energy bill raised by the developer to UETCL</p> <p>The import reading shall be crosschecked with the energy bill raised by UETCL to developer.</p>
	In case project participants have temporarily not monitored the parameter, has either i) a deviation been approved by the CDM EB or ii) has the parameter been estimated as stipulated by Appendix 1 to the CDM Project Standard?	No such issues.
Findings	CL #1 & CAR #3 were raised and resolved	
Conclusion	The parameter has been monitored appropriately, in accordance with the registered monitoring plan (as per measurement methods and procedures to be applied) and applied methodology. The monitoring results were recorded consistently as per the approved frequency in the monitoring plan.	

Parameter	Quantity of diesel fuel used by site diesel generator during year y $FC_{i,j,y}$ (tonne/year)	
Means of verification	Criteria/Requirements	Assessment/Observation
	Measuring /Reading /Recording frequency	The parameter is continuously monitored and recorded on monthly basis.
	Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes. The reporting frequency is in line with the monitoring plan as outlined in the registered PD/01/ and monitoring methodology/09/.

	Monitoring equipment	Counter on control panel monitoring continuously
	Is accuracy of the monitoring equipment as stated in the monitoring plan? If the monitoring plan does not specify the accuracy of the monitoring equipment, does the accuracy of the monitoring equipment comply with local/national standards, or as per the manufacturer's specification?	<p>The consistency of metered fuel consumption quantities will be cross-checked by an annual energy balance that is based on purchased quantities and stock changes.</p> <p>Verified against annual diesel fuel purchase invoices from the financial records.</p>
	Is the accuracy valid for the entire measuring range or do different accuracy levels apply to different measuring ranges?	NA
	Calibration frequency /interval:	NA
	Is the calibration interval in line with the monitoring plan and/or methodology? If the monitoring plan does not specify the frequency of calibration, is the selected frequency in accordance with the local/national standards, or as per the manufacturer's specifications?	NA
	Is the calibration of measuring equipment carried out by an accredited person or institution?	NA
	Is(are) calibration(s) valid for the whole reporting period?	NA
	How were the values in the monitoring report verified?	<p>Monthly value of the parameters for entire monitoring period is reported in the monitoring report and ER calculation sheet and found to be consistent.</p> <p>Value of this parameter for the current monitoring period was verified as 10.24 tonne.</p>

	If applicable, has the reported data been cross-checked with other available data?	NA
	Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	The consistency of metered fuel consumption quantities will be cross-checked by an annual energy balance that is based on purchased quantities and stock changes. Verified against annual diesel fuel purchase invoices from the financial records.
	In case project participants have temporarily not monitored the parameter, has either i) a deviation been approved by the CDM EB or ii) has the parameter been estimated as stipulated by Appendix 1 to the CDM Project Standard?	No such issues.
Findings	No finding raised	
Conclusion	The parameter has been monitored appropriately, in accordance with the registered monitoring plan (as per measurement methods and procedures to be applied) and applied methodology. The monitoring results were recorded consistently as per the approved frequency in the monitoring plan.	

Parameter	Weighted average net calorific value of diesel fuel in year y $NCV_{i,y}$ (GJ/tonne)	
Means of verification	Criteria/Requirements	Assessment/Observation
	Measuring /Reading /Recording frequency	NA
	Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	NA
	Monitoring equipment	NA

	Is accuracy of the monitoring equipment as stated in the monitoring plan? If the monitoring plan does not specify the accuracy of the monitoring equipment, does the accuracy of the monitoring equipment comply with local/national standards, or as per the manufacturer's specification?	NA
	Is the accuracy valid for the entire measuring range or do different accuracy levels apply to different measuring ranges?	NA
	Calibration frequency /interval:	NA
	Is the calibration interval in line with the monitoring plan and/or methodology? If the monitoring plan does not specify the frequency of calibration, is the selected frequency in accordance with the local/national standards, or as per the manufacturer's specifications?	NA
	Is the calibration of measuring equipment carried out by an accredited person or institution?	NA
	Is(are) calibration(s) valid for the whole reporting period?	NA
	How were the values in the monitoring report verified?	Measurement method not required as option d) above is chosen (IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in table 1.2 of Chapter1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories) Value applied 43.3 Tj/Gg.

	If applicable, has the reported data been cross-checked with other available data?	NA
	Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Any future revision of the IPCC Guidelines will be taken into account by PP.
	In case project participants have temporarily not monitored the parameter, has either i) a deviation been approved by the CDM EB or ii) has the parameter been estimated as stipulated by Appendix 1 to the CDM Project Standard?	No such issues.
Findings	No finding raised	
Conclusion	The parameter has been monitored appropriately, in accordance with the registered monitoring plan (as per measurement methods and procedures to be applied) and applied methodology. The monitoring results were recorded consistently as per the approved frequency in the monitoring plan.	

Parameter	Weighted average CO ₂ emission factor of diesel fuel in year y $EF_{CO_2,i,y}$ (tCO ₂ /GJ)	
Means of verification	Criteria/Requirements	Assessment/Observation
	Measuring /Reading /Recording frequency	NA
	Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	NA
	Monitoring equipment	NA

	Is accuracy of the monitoring equipment as stated in the monitoring plan? If the monitoring plan does not specify the accuracy of the monitoring equipment, does the accuracy of the monitoring equipment comply with local/national standards, or as per the manufacturer's specification?	NA
	Is the accuracy valid for the entire measuring range or do different accuracy levels apply to different measuring ranges?	NA
	Calibration frequency /interval:	NA
	Is the calibration interval in line with the monitoring plan and/or methodology? If the monitoring plan does not specify the frequency of calibration, is the selected frequency in accordance with the local/national standards, or as per the manufacturer's specifications?	NA
	Is the calibration of measuring equipment carried out by an accredited person or institution?	NA
	Is(are) calibration(s) valid for the whole reporting period?	NA
	How were the values in the monitoring report verified?	Measurement method not required as option d) above is chosen (IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in table 1.4 of Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories) Value applied 74.8 tCO ₂ /Gg.

	If applicable, has the reported data been cross-checked with other available data?	NA
	Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	Any future revision of the IPCC Guidelines will be taken into account by PP.
	In case project participants have temporarily not monitored the parameter, has either i) a deviation been approved by the CDM EB or ii) has the parameter been estimated as stipulated by Appendix 1 to the CDM Project Standard?	No such issues.
Findings	No finding raised	
Conclusion	The parameter has been monitored appropriately, in accordance with the registered monitoring plan (as per measurement methods and procedures to be applied) and applied methodology. The monitoring results were recorded consistently as per the approved frequency in the monitoring plan.	

Parameters fixed ex ante:

FC_{i,m,y} mass or volume unit: it is amount of fossil fuel type I consumed by power plant m in year y (for calculation of FE_{EL,m,y}), fixed for the entire crediting period and the value is considered as, that is consistent with the VCS PD/01/.

For operating margin:		
		FC _{i,m,y} , 1000 litres
2005	LGGO Aggreko 1	37,724
	Kiira Agrekko 2	-
2006	LGGO Aggreko 1	83,970
	Kiira Agrekko 2	13,203
2007	LGGO Aggreko 1	73,989
	Kiira Agrekko 2	70,445
For build margin:		
Power plants	Start of operation	FC _{i,m,y} , 1000 litres
Kakira Sugar Works (KSW)	2007	-

50*KIIRA Aggreko	2006	70,445	
20*LGGO Aggreko	2005	29,596	
Total		100,051	

EF_{CO₂,i,y}, tCO₂/TJ: it is CO₂ emission factor of fossil fuel type fixed for the entire crediting period and the value is considered as 72.6 tCO₂/TJ, that is consistent with the VCS PD/01/.

EG_{m,y}, EG_{k,y}, MWh: it is Net electricity generated and delivered to the grid by power plant/unit m or k, fixed for the entire crediting period and the value is considered as, that is consistent with the VCS PD/01/.

For operating margin:		
		Gen (EG _{m,y}), MWh
2005	LGGO Aggreko 1	140,911
	Kiira Aggreko 2	-
2006	LGGO Aggreko 1	319,320
	Kiira Aggreko 2	50,137
2007	LGGO Aggreko 1	272,995
	Kiira Aggreko 2	266,437
For build margin:		
Power plants	Start of operation	Gen (EG _{m,y}), MWh
Kakira Sugar Works (KSW)	2007	1,828
50*KIIRA Aggreko	2006	266,437
20*LGGO Aggreko	2005	109,198
Total		377,463

NCV_{i,y}; GJ/tonne: it is Weighted average net calorific value of diesel fuel fixed for entire crediting period and the value is considered as 41.4 TJ/Gg, , that is consistent with the VCS PD/01/.

EF_{CO₂}; tCO₂e/MWh: it is the CO₂ emission factor for the electricity grid fixed for the entire crediting period and the value is considered as 0.62286 tCO₂e/MWh, that is consistent with the VCS PD /01/.

During the verification assessment of the project activity, accuracy of all the metering have been checked and found appropriate. The installation and working conditions of the meters checked through latest photographs, calibration certificates and were found to be satisfactory. Details of meters are provided in below table:

Details	Calibration dates	Calibration due date	Delay
Main Meter Mt No: 1641802	10.07.2008	09.07.2009	Delay
	11.03.2021	10.03.2022	Delay
Check meter Mt. No: 1641801	10.07.2018	09.07.2009	Delay
	11.03.2021	10.03.2022	Delay

Meters used to measure the parameters are of accuracy class 0.2s, as verified through calibration certificates/06/ and the photographs indicating the accuracy, make etc. PP has taken 0.2% maximum permissible error for entire monitoring period for delay in calibration.

Monitoring Plan:

The monitoring consists of metering the electricity generated by the renewable technology in line with “I.D. Grid connected renewable electricity generation” and the “Tool to calculate the emission factor for an electricity system”.

The monitoring plan ensures that the true, maintainable and measurable GHGs of CDM project can be monitored, recorded and reported. This is the key procedure to determine the CERs. According to monitoring plan, monitoring system should be reliable, conservative and comprehensive; this system should have the function of data evaluation, measurement, and collection and monitoring.

CDM Manager

The overall responsibility for quality assurance of monitoring and reporting issues lies with BHL CDM Manager. If errors or omissions in the primary data required as part of the CDM monitoring are detected during final QA/QC by CDM Manager, he is responsible for initiating a dialogue with the CDM Director in Kampala to handle these issues, ensuring a conservative approach is selected and taking into account guidance in the relevant CDM methodology, the registered CDM-PDD and any other CDM EB guidance.

CDM Director

The CDM Director in Kampala is responsible for proper quality assurance of all primary data to be utilized for CDM monitoring purposes. Any issues identified regarding primary data used for CDM monitoring detected during initial quality assurance shall without delay be communicated to the CDM Coordinator on site until the issue is resolved.

On a periodical basis the CDM Director shall, subject to having undertaken proper quality control, submit an electronic copy of the consolidated CDM reporting template to the CDM Manager of BHL.

At the end of each monitoring period, the CDM Director is responsible for reviewing the final dataset to be used as basis for CDM calculations for the monitoring period in consideration. This includes undertaking any relevant consistency checks vis-à-vis operational values. Following finalization of the complete dataset as contained in the CDM Monitoring Model (in excel format), the relevant data for the monitoring period in consideration shall be extracted into a CDM verification reporting template. Calculations of CDM parameter values, Baseline Emissions, Project Emissions and Emission Reductions relevant for the monitoring period shall be

undertaken in line with CDM requirements and presented transparently in the CDM verification reporting template.

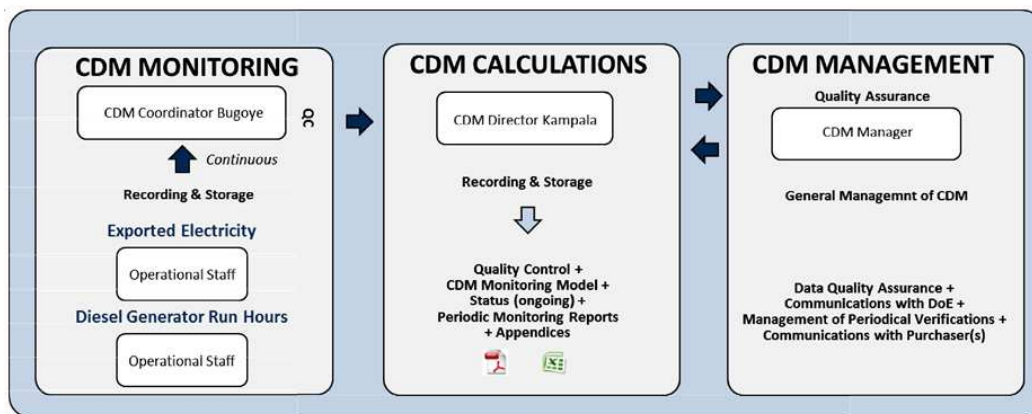
The CDM Director is responsible for organizing quarterly internal audits with a pre-notification of the CDM Coordinator. The internal audits include overall quality control of the Monitoring System and ensuring that all the internal specific CDM procedures are followed closely. On annual bases, the CDM Manager shall be involved in the internal audits as well.

CDM Coordinator

The CDM Coordinator on Bugoye is responsible for measurement and recording of all the primary data, including electricity exports to the grid, back-up diesel consumption, down-time events, and all of the supporting measurements and records.

Responsibility holders for the Monitoring Period under consideration in this report

Figure 2 summarizes, in a visual manner, the monitoring system and how the carbon responsibilities are distributed. Specific carbon procedures have been developed for all of the personnel involved in monitoring to describe the responsibilities and ensure the properness of implementation of the Monitoring Plan.



Meter

One main meter and one check meter system has been installed. The main and check meter, physically installed in the control room at the power house, measure the power flow at the 33 kV side of the transformer (i.e. the output of the transformer) that connects to the 33 kV line that evacuates the power to the main grid.

There is only one line and the meter will be a two-way hourly meter, so each meter reading will be a net reading of power exported/imported to the power station. The main meter and the check meter system installed, owned and maintained by TPL is designed such that the overall error of the installation, (including instrument transformers, wiring, and metering instruments) shall be no greater than 0.2% over the equivalent road range.

All instruments are of the flush mounting type and fitted with non reflecting glass according to the relevant international standards.

As the main meter, TPL has installed a Cewe Prometer R supplied by Cewe Instrument AB. The Cewe Prometer R is a Precision meter in class 0.2S. The serial number for the main meter is 1641802.

As the check main meter, TPL has installed a Cewe Prometer R supplied by Cewe Instrument AB. The Cewe Prometer R is a Precision meter in class 0.2S. The serial number for the main meter is 1641801.

Testing/calibration

- Calibration of the main and check meters was stated in the CDM-PDD as having to be undertaken annually. Since the project has been implemented it has become apparent that there is no relevant expertise in Uganda needed to undertake the calibration of the said meters. The meter manufacturers (CEWE instruments) have confirmed that the installed meters, following initial test and calibration, do not require any further or regular calibration. For this reason, annual calibration, which is not considered to be required and which cannot be undertaken locally, has not been implemented. Yet as a conservative follow-up initiative, meters have been verified on 11/03/2021 together with UETCL with successful results.

Recording

Main and Check meter is read at 12:00 on the 2nd day of each month. Representatives from UETCL and UMEME, together with a representative from Bugoye Hydro Limited (BHL) retrieve historical data for the previous month from each meter by using an optical eye connected to a laptop and the meter. The data is saved as an excel files. A copy of the data is copied on to a hard copy which is signed by the representatives from UETCL, TPL and UMEME.

Reporting

All readings are reported to UETCL and reading from main meter is used for preparing the invoice. All data required for verification and issuance will be kept for at least two years after the end of the crediting period or the last issuance of CERs of this project, whichever occurs later. The invoice documentation can be used to quality assure report.

Emergency

If the meter is found to be inaccurate for more than two-tenths of a percent ($\pm 0,2\%$) or otherwise function improperly, BHL and UETCL shall jointly prepare an estimate for correct reading.

Training

Before the project was put into operation, the staffs received a training program on operation and metering, both on generally on operation of hydro power plant and specifically on carbon.

- The overall responsibility for monitoring and reporting issues lies with Bugoye Hydro Limited Managing Director.

The assessment team has verified the monthly generation/energy bills issued by UETCL and confirmed that only the data recorded through main meters is used to calculate net electricity supplied to the grid and consequently for ER calculations. As verified through the calibration certificates, there is delay in calibration of main meters and check meter for period 09/07/2009 to 06/10/2019 identified during the current monitoring period, therefore on conservative side PP has applied maximum possible error 0.2% in energy import and export value.

In view of the above discussion the assessment team able to confirm that evidence used to determine the GHG reductions and removals are sufficient and appropriate with respect to quality and quantity.

GHG Calculations

The emission reduction as per the applied methodology equals the baseline emissions (project emissions and leakage emissions for such project activities is considered zero). The formula provided for the calculation of baseline emissions is:

$$BE_y = EG_{BL,y} * EF_{CO_2}$$

BE_y	Baseline emissions in year y (t CO ₂ /yr)
$EG_{BL,y}$	Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the project activity in year y (MWh/yr)
EF_{CO_2}	Combined margin CO ₂ emission factor for grid connected power generation in year y calculated using the latest version of the “Tool to calculate the emission factor for an electricity system” (t CO ₂ /MWh)

$EG_{BL,y}$ i.e. the quantity of net electricity generation supplied by the project plant to the grid, as monitored and displayed below on a yearly basis.

$EF_{CO_2} = 0.62286tCO_2/MWh$, as per registered VCS PD/01/

Year	$EG_{BL,y}$	EF_{CO_2}	BE_y
	MWh	tCO ₂ /MWh	t CO ₂
Year 2019 (until Oct 6 th)	44,401	0.62286	27,655
Year 2018	77,744	0.62286	48,423
Year 2017	32,105	0.62286	19,996
Year 2016	65,835	0.62286	41,006

Year 2015	77,038	0.62286	47,984
Year 2014	86,903	0.62286	54,128
Year 2013	67,677	0.62286	42,153
TOTAL	451,703		281,345

As the Bugoye run-of-river hydropower project does not lead to any emissions due to the operation of geothermal power plants, or from of water reservoirs), project emissions, PEy, should equal 0.

As all generating equipment installed for the project activity is new and not transferred from another activity, it is concluded that LEy = 0.

The verification team confirms that appropriate methods and formulae for calculating baseline emissions have been followed. The assumptions, emission factors and default values that were applied in the calculations are justified. The actual emission reduction achieved during the current monitoring period are 22.83% lower than the estimated amount of emission reductions at the time of validation, which is due to marginally lower CUF or lower generation as compared to the projected generation of the plant operation.

All the data were made available and have monitored as per required monitoring frequency. The means of verification for the values of parameters, used for baseline emission calculation, is described above.

4.6 Non-Permanence Risk Analysis

Not applicable for the project activity.

5. VERIFICATION CONCLUSION

LGAI Technological Center, S.A. (also referred to as Applus+ Certification), contracted by Aera Group (authorised from Bugoye Hydro Limited), has performed the independent verification of the emission reductions for the VCS project activity (VCS ID- 1199) “Bugoye 13.0 MW Run-of-River Hydropower Project” for the monitoring period 01/01/2013 - 06/10/2019 as reported in the Monitoring Report Version 1.3 dated 01/07/2021. AERA Group is 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

Applus+ Certification commenced the verification on the basis of the baseline and monitoring methodology AMS I.D. Version 15, the monitoring plan contained in the registered VCSPD Version 1, dated 06/03/2013 and VCS guidelines version 4.0, Monitoring Report Version 1.3 dated 01/07/2021 as per the process described under Section 2 of this report.

Applus+ Certification 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. Applus+ Certification planned and performed the verification by obtaining evidence and other information and explanations that Applus+ Certification 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 01/01/2013 - 06/10/2019 are fairly stated in the Monitoring Report Version 1.3 dated 01/07/2021. The GHG emission reductions were calculated correctly on the basis of the approved baseline and monitoring methodology AMS I.D. Version 15, and the VCS standard.

Verification period: From 01/01/2013 - 06/10/2019 (including both days)

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 emission reductions or removals (tCO ₂ e)	GHG
Year 2013	42,153	-	-	42,153	
Year 2014	54,128	-	-	54,128	
Year 2015	47,984	-	-	47,984	
Year 2016	41,006	-	-	41,006	
Year 2017	19,996	-	-	19,996	
Year 2018	48,423	-	-	48,423	
2019 (until Oct 6th)	27,655	-	-	27,655	
Total	281,345	-	-	281,345	

APPENDIX 1: DOCUMENT REFERENCES

S.No	Title of Document	Version	Date
1.	Registered VCS PD	1	06/03/2013
2.	VCS verification report issued by SGS for monitoring period 07/10/2009 to 31/12/2010	3	28/03/2013
3.	VCS Monitoring Report	01	19/11/2020
4.	VCS Monitoring Report (Final)	1.3	01/07/2021
5.	ER spread sheet (corresponding to the final monitoring report)	1.2	17/03/2021
6	Certificates of Calibration for all the meters belongs to project activity	-	10/07/2008 & 11/03/2021
7.	Energy bill issued by PP to UETCL	for the period 01/01/2013 to 06/10/2019	-
8.	Monthly generation report for the current verification period.	for the period 01/01/2013 to 06/10/2019	-
9.	“Grid connected renewable electricity generation”, AMS I.D.,	Version 15	-
10.	Email evidence dated 21/05/2012 received from the OEM confirming that the frequency of calibration for the energy meters (Main and Check) will be six years.		21/05/2012
11.	Certificate of Commissioning issued by UETCL to PP vide ref no: UETCL/MCS/IPP-11	-	02/02/2011
12.	Power Purchase Agreement signed between Tronder Power Ltd and Uganda Electricity Transmission Company Limited	-	28/02/2008
13.	VCS webpage for the project, VCS ID 1199; https://registry.verra.org/app/projectDetail/VCS/1199	-	Last accessed on 23/03/2021
14.	Letter of declaration dated from PP regarding not having created or sought any other form of environmental credit for the same period	-	Dated 11/02/2021
15.	Approvals and Clearances for project activity	-	-
16.	VCS Standard	Version 4.0	19/09/2019
17.	VCS Program Guide	Version 4.0	19/09/2019
18.	ISO 14064-3: Specification with guidance for the validation and verification of greenhouse gas assertions, 2006		
19.	CDM VVS and PS for project activities	Version 2.0	29/11/2018
20.	Photograph of the plant, energy meters installed at site and screen shots of online monitoring system		
21	2006 IPCC Guidelines for National Greenhouse Gas Inventories. Weblink: http://www.ipccnggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_		

S.No	Title of Document	Version	Date
	1_Ch1_Introduction.pdf		
22.	“Certificate of Change of Name” dated 10/08/2015 issued by Registrar of Companies, the Republic of Uganda. Tronderpower Limited to new name “Bugoye Hydro Limited”	N/A	N/A
23	VCS Monitoring Report (Final)	1.2	17/03/2021

APPENDIX 2: COMPETENCY STATEMENT

According to the sectoral scope / technical area and experience in the sectoral or national business environment, Applus+ Certification has composed a project assessment team in accordance with the appointment rules in the internal Quality Management System of Applus+ Certification.

The composition of audit team shall be approved by the Applus+ Certification ensuring that the required skills are covered by the team.

The four qualification levels for team members that are assigned by formal appointment rules are as presented below:

- Lead Auditor (LA).
- Auditor (A) / Auditor in Training (AiT).
- Technical Expert (TE).
- Technical Reviewer (TR).

The sectoral scope / technical area knowledge linked to the applied methodology/ies shall be covered by the assessment team.

Name	Qualification	Coverage of scope	Coverage of technical Area	Financial aspect	Host country Experience	Attendance to the Assessment (remote)
Vivek Kumar Ahirwar	Lead Auditor (LA)	Yes (1)	Yes (1.2)	N/A	Yes	Yes
Vivek Kumar Ahirwar	Technical Expert (TE)	Yes (1)	Yes (1.2)	N/A	Yes	Yes
Simon Shen	Technical Reviewer (TR)	Yes (1)	Yes (1.2)	N/A	N/A	N/A

The curricula vitae of the DOE's team members are provided below:

Vivek Kumar Ahirwar is a BEE-Certified Energy Auditor by Govt of India with over eight years of relevant experience in energy efficiency, energy audit, thermal and electrical energy generation technology from renewable source and energy conservation in energy intensive industries, designated consumers and commercial buildings, implementation of energy conservation building codes, research, process and green building projects. He is a certified lead auditor for ISO 14001 EMS and 14064. He has experience under various categories of projects stating from renewable to waste to supercritical projects and WCD. He has successfully audited more than 100 GHG (CDM/VCS/GS) projects in different states across the India. He has done Mater in Technology (Energy Management) from a premier institute, School of Energy & Environmental Studies, DAVV, Indore (M.P.), India and Bachelor of Engineering (Mechanical Engineering) from Govt. Engineering college, Rewa, RGPV, India.

Simon Shen (master degree in thermal energy engineering, bachelor degree in environmental engineering) is a lead auditor appointed by Applus+ certification for the GHG project assessment. He is based in Shanghai. He has several years of work experience in environmental protection field. Before he joined Applus+ certification, he had been worked for TÜV SÜD as a GHG validator/verifier and ISO 9001/14001 lead auditor for 3.5years.

APPENDIX 3: ABBREVIATIONS

Abbreviations	Full texts
ABT	Availability Based Tariff
BEF	Baseline Emission Factor
BM	Build Margin
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CL	Clarification Request
CMS	Central Monitoring System
CMP	Conference of Parties Serving as Meeting of Parties
CO2	Carbon dioxide
EB	Executive Board
UETCL	Uganda Electricity Transmission Company Limited
FAR	Forward Action Request
GHG	Green House Gas
IPCC	Intergovernmental Panel on Climate Change
ISO	International Standards Organization
kW	Kilowatt
kWh	Kilowatt hour
MR	Monitoring Report
MW	Megawatt
MWh	Megawatt-hour
O&M	Operation and Maintenance
PD	Project Description
PP	Project Proponent
PPA	Power Purchase Agreement
QA/QC	Quality Assurance and Quality Control
TOD	Time of the Day
UNFCCC	United Nations Framework Convention on Climate Change
VCS	Voluntary Carbon Standard
VCSA	Voluntary Carbon Standard Association
VCS PD	VCS Project Description
VCUs	Voluntary Carbon Units

APPENDIX 4: FINDINGS OVERVIEW

Table 1: Remaining FAR from validation and/or previous verification

FAR ID	NA	Section no.	NA	Date :DD/MM/YYYY
Description of FAR				
No FAR from validation or verification				
Project participant response				Date :DD/MM/YYYY
NA				
Documentation provided by project participant				
NA				
DOE assessment				Date: DD/MM/YYYY
NA				

Table 1. CL from this verification

CL ID	01	Section no.	MR and ER sheet	Date:13/12/2020
Description of CL				
<p>Please submit the following documents:</p> <ol style="list-style-type: none"> 1. Records of sold electricity to UETCL for period Jan 2013 to 6th Oct 2019 2. Quantity of diesel consumption at site in between Jan 2013 to 6th Oct 2019 3. Calibration details of main meter and check meter 4. Copy of grievance register for stakeholder comment as required in section 2.2 5. Training records 6. The project has not been applied under any other GHG programs, the PP need to submit declaration confirming the same. 7. The Project has no intend to generate any other form of GHG-related environmental credit for GHG emission reductions or removals claimed under the VCS Program, the PP need to submit a declaration confirming the same. 8. PP is requested to provide commissioning certificate of plant which clarifies project start date is 7th Oct 2009. 				
Project participant response				Date: 7/01/2021

<ol style="list-style-type: none"> 1. Invoices provided 2. See Run hours meters readings & PE (tCO₂) conversion = 0,05% of BE < 1% 3. See §2.3.2 'Project Description Deviations' already approved during previous VCS verification: <i>Since the project has been implemented it has become apparent that there is no relevant expertise in Uganda needed to undertake the calibration of the said meters. The meter manufacturers (CEWE instruments) have confirmed that the installed meters, following initial test and calibration, do not require any further or regular calibration. For this reason, annual calibration, which is not considered to be required and which cannot be undertaken locally, has not been implemented. It should be mentioned that there has been a continuous check of the readings of the Main Meter vis-à-vis the Check Meter in order to ensure the accuracy of the Main Meter. The meter readings have been performed in the presence of the UETCL representatives (as purchaser of the generated electricity) and all of the invoices have been approved by UETCL and paid.</i> 4. BUGOYE HYDRO LIMITED PUBLIC COMPLAINTS LOG&December 9th 2019 E&S consultations minutes 5. Training records provided (Annex 3_Training Registers) 6. – 7. declaration provided 	
8. COD letter provided	
Documentation provided by project participant	
<ol style="list-style-type: none"> 1. "Invoices and signed metering" folder 2. 'Raw Power and Engine generator Run hours' folder 3. "2013-2019 EMERGENCY DIESEL GENERATOR" xls 4. BUGOYE HYDRO LIMITED PUBLIC COMPLAINTS LOG&December 9th 2019 E&S consultations minutes 5. Annex 3_Training Registers 6. – 7. declaration 8. COD letter provided 	
DOE assessment	Date: 21/01/2021
<ul style="list-style-type: none"> - Assessment team confirm that PP has submitted invoices for period of jan 2013 to 6th Oct 2019. Hence accepted. Closed - Assessment team confirm that PP has submitted Emergency Diesel Generator run hour meter reading for the period Jan 2013 and 6th Oct 2019. Hence accepted. Closed - Assessment team accepted PP response and also confirm the same from last verification report and CEWE meter manufacturer declaration. Hence accepted. Closed - Assessment team confirm that PP has submitted public complaint log and consultation minutes. Hence accepted. Closed - Assessment team confirm that PP has submitted training register copy. Hence accepted. Closed - PP is requested to submit declaration on company letter head with signature of authorised signatory. Therefore this response not accepted. Open - Assessment team confirm that PP has submitted COD letter. Hence accepted. Closed 	
Project participant response	Date: 11/02/2021
Bugoye Written Declaration submitted	
Documentation provided by project participant	
210211_Bugoye Written Declaration VCS	
DOE assessment	Date: 23/03/2021

Assessment team confirm that PP has submitted declaration on company letter head with signature of authorised signatory. Therefore this response is accepted. **Closed**

Table 2. CAR from this verification

CAR ID	01	Section no.	Front page, 1.1& 1.8	Date: 13/12/2020
Description of CAR				
Please correct the following inconsistency with respect to as per the guidelines mentioned in VCS Monitoring Report Template version-4.0:				
<ol style="list-style-type: none"> MR page 01&5;Font used is “Arial” or “Helvetica” instead of “Franklin Gothic Book”, which is not Consistent with MR template requirement. Also same places, Font Size used are 10 instead of “9.5”. Please correct. PP is requested to correct electricity generation value for monitoring period under section 1.1. PP is requested to include complete monitoring period under section 1.1. 				
Project participant response				Date: 7/01/2021
<ol style="list-style-type: none"> MR fonts have been harmonized electricity generation value has been corrected MR monitoring period completed 				
Documentation provided by project participant				
Revised MR				
DOE assessment				Date: 21/01/2021
Assessment team also confirm that PP has corrected this CAR in revised MR. Closed				

CAR ID	02	Section no.	2.1 & 2.2	Date: 13/12/2020
Description of CAR				
<ol style="list-style-type: none"> As per VCS template requirement PP should clarify why no net harm is not applicable. As per VCS template required PP should provide details how PP accounts stakeholders comments during current monitoring period. 				
Project participant response				Date: 12/01/2021
No net harm and stakeholders comments sections completed				
Documentation provided by project participant				
Revised MR				
DOE assessment				Date: 21/01/2021
Assessment team confirm that PP has corrected no net harm and stakeholders comments during the monitoring period. Hence accepted. Closed				

CAR ID	03	Section no.	4.1 & 4.2	Date: 13/12/2020
Description of CAR				
<ol style="list-style-type: none"> PP is requested to add all parameter fixed at the time of validation. These parameters included in section B.6.2 of registered CDM PDD. PP is requested to include all monitoring parameters included in registered PDD. PP is also requested to adopt VCS template version 4 table for data and Parameters monitored EG_{BLY} parameter included by PP is not inline with registered PDD, PP is requested to correct it. 				
Project participant response				Date: 12/01/2021
All missing parameters have been added, revised and consistency-checked from registered PD.				
Documentation provided by project participant				
Revised MR				
DOE assessment				Date: 21/01/2021
- Assessment team confirm that PP has corrected all missing parameters and included all parameters inline with registered PDD. PP is requested to correct the font size and font style as per template requirement.				

Project participant response	Date: 02/03/2021
Font size and style have been harmonized to Franklin Gothic 9.5	
Documentation provided by project participant	
Revised MR	
DOE assessment	Date: 23/03/2021
Assessment team confirm that now font size and style is inline and harmonized. Hence accepted Closed	

CAR ID	04	Section no.	4.3	Date :13/12/2020
Description of CAR				
PP is requested to include monitoring plan inline with registered PDD.				
Project participant response				Date : 12/01/2021
Monitoring plan included as per registered PD				
Documentation provided by project participant				
Revised MR				
DOE assessment				Date: 21/01/2021
Assessment team confirm that PP has included monitoring plan in revised monitoring report inline with registered PDD. Closed				

CAR ID	05	Section no.	5.1	Date :13/12/2020
Description of CAR				
PP is requested to include rounddown values of baseline emissions in section 5.1. PP is requested to specify the specific dates of monitoring period start date.				
Project participant response				Date : 12/01/2021
Rounddown values applied to section 5.1 Specific dates of monitoring period added				
Documentation provided by project participant				
Revised VER sheet and MR				
DOE assessment				Date: 21/01/2021
Assessment team confirm that PP has included rounddown value of baseline emissions in section 5.1 and also corrected monitoring period start date in revised MR. Hence accepted. Closed				

CAR ID	06	Section no.	5.2	Date :13/12/2020
Description of CAR				
PP is requested to include complete description of project emission mentioned in registered PDD and prove how during the current monitoring period project emission is zero.				
Project participant response				Date : 12/01/2021
Project emission section described in full as per registered PDD				
Documentation provided by project participant				
Revised PD and VER sheet tab 'project emissions'				
DOE assessment				Date: 21/01/2021
Assessment team confirm that PP has included complete description how project emission considered as zero in current monitoring period. Hence accepted. Closed				

CAR ID	07	Section no.	5.4	Date :13/12/2020
Description of CAR				
<ol style="list-style-type: none"> 1. PP is requested to correct values of baseline emissions included in section 5.4 it's not inline with ER sheet. 2. PP is requested to specify period of monitoring period start and end date under section 5.4. 				
Project participant response				Date : 12/01/2021

1. PD revised with correct ER values in section 5.4
2. Monitoring period start and end dates specified
Documentation provided by project participant
Revised PD
DOE assessment Date: 21/01/2021
Assessment team confirm that PP has corrected value of baseline emission in section 5.4. Hence accepted. Assessment team confirm that PP specified monitoring period start date but monitoring period end date not specified correctly. Closed

CAR ID	08	Section no.	5.4	Date :13/12/2020
Description of CAR				
PP is requested to provide comparison of ERs in between actual ER achieved and ex-ante estimated values.				
Project participant response				Date : 12/01/2021
The monitoring period total Emission Reductions of 281,908 tCO ₂ are lower than ex-ante ERs estimate of 51 074 tCO ₂ /y $*(6+9/12+6/365) = 345,589$ tCO ₂ , because the ex-ante estimate was based on a power generation of 82,000 MWh per year when actual performances were found lower due to hydrological conditions.				
Documentation provided by project participant				
Revised VER sheet and MR				
DOE assessment				Date: 21/01/2021
Assessment team confirm that PP has included comparison of ERs in between actual ER achieved and ex-ante estimated value. Hence accepted. Closed				

CAR ID	09	Section no.	Appendix 1	Date :13/12/2020
Description of CAR				
PP is requested to indicate meter calibration details of applicable meters for current monitoring period.				
Project participant response				Date : 12/01/2021
There are no previous or later calibration certificate except that provided in 2012 and it was noted that there was no need to continuously calibrate the meters since there two check meters until the discrepancy between them is substantially big. This is a historical matter/conversation between Tronder Energy and UETCL.				
Documentation provided by project participant				
See MR deviation section 2.3.2				
DOE assessment				Date: 21/01/2021
Assessment team accepted PP response and verified from previous verification report and meter manufacturer declaration.				
Please provide meter manufacturer's declaration confirming that there is no need to continuously calibration requirement for meter.				
Project participant response				Date : 27/02/2021
Meters' verification conducted on March 11 th 2021 together with UETCL with successful results				
Documentation provided by project participant				
Bugoye hydro CEWE Energy Meter accuracy calibration Report March 2021				
DOE assessment				Date: 23/03/2021
Assessment team confirm that PP has conducted main meter and check meter calibration on 11 th March 2021 with UETCL. Hence accepted. Closed				

CAR ID	10	Section no.	ER sheet	Date :13/12/2020
Description of CAR				
<ol style="list-style-type: none"> 1. PP is requested to include version number and date of ER sheet preparation. 2. PP is requested to clarify why baseline emission values are different in Row 17 and Row 22 to Row 29. PP is requested to correct baseline value consistent in ER sheet and adopt rounddown value. 3. PP is also requested to include Diesel consumption details and operating hours of DG set in ER sheet as required by monitoring plan. 				
Project participant response				Date :12/01/2021
<ol style="list-style-type: none"> 1. Included Version 1.1 Date 12/01/2021 2. ER sheet rows corrected 3. Diesel generator details included in Project emissions tab 				
Documentation provided by project participant				
Revised VER sheet				
DOE assessment				Date: 21/01/2021
<ul style="list-style-type: none"> - Assessment team confirm that PP has included version number and date of ER sheet. Hence accepted - Assessment team confirm that PP has corrected baseline value consistent in ER sheet. Hence accepted - Assessment team confirm that PP has included Diesel consumption details and operating hour details of DG set in ER sheet. Hence accepted. <p>Closed</p>				

Table 4. FAR from this verification

FAR ID	N/A	Section No.	N/A	Date:N/A
Description of FAR				
N/A				
Project participant response				Date:N/A
N/A				
Documentation provided by project participant				
N/A				
DOE assessment				Date:N/A
N/A				