



ALKUMRU HYDROELECTRIC POWER PLANT



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Summary:

4K Earth Science Private Limited (4KES) has been contracted by, “Ekobil Environmental Services and Consultancy Ltd.¹” to undertake verification and certification for the greenhouse gas (GHG) emission reductions reported from ‘Alkumru Hydroelectric Power Plant’ for the monitoring period 01/12/2013 to 30/09/2020 in the initial monitoring report version 1 date 02/07/2020.

The Alkumru Hydroelectric Power Plant (Alkumru HPP from this point onward) is constructed at the Eastern Anatolia Geographical district of Turkey over the Botan River that is one of the major tributaries of the Tigris. The total project capacity is 275.520 MWe. Although the preliminary acceptance for the first three units came earlier the acceptance for the fourth unit came on 17/01/2014 and the project is fully installed from then on. During this monitoring period (December 1, 2013 to September 30, 2020, both days inclusive), the Alkumru HPP produced a total amount of 2,854,350 CO₂e tonnes of emission reductions. The monitoring period subject to this monitoring report is inclusive of first and last day of period.

A risk-based approach has been followed to perform the 2nd periodic verification of the project activity. In the course of the verification, 04 Corrective Action Requests (CARs) and 02 Clarification (CL) were raised.

The management of the ‘Limak Hidroelektrik Santral Yatırımları Anonim Şirketi’ 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 1.01 dated 20/10/2020. The calculation and determination of GHG emission reductions from the project is the responsibility of the management of the Ekobil Environmental Services and Consulting Ltd. The development and maintenance of records and reporting procedures are in accordance with the Monitoring Report Version 1.01 dated 20/10/2020.

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 01/12/2013 to 30/09/2020 based on the reported emission reductions in the final monitoring report Version 1.01 dated 20/10/2020 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

¹ It is Ekobil Environmental Services and Consultancy Ltd. that contracted 4KES authorised by the project owner. Ekobil is responsible for writing the Monitoring report and the contracting of the VVB.

stated.

4KES confirms the following;

Reporting period: 01/12/2013 to 30/09/2020

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)
2013	16,970	0	0	16,970
2014	273,633	0	0	273,633
2015	391,738	0	0	391,738
2016	503,458	0	0	503,458
2017	388,799	0	0	388,799
2018	353,982	0	0	353,982
2019	548,571	0	0	548,571
2020	377,199	0	0	377,199
Total	2,854,350	0	0	2,854,350

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1 INTRODUCTION

1.1 Objective

4KES has been commissioned by 'Ekobil Environmental Services and Consultancy Ltd.' to perform verification of its registered VCS project 'Alkumru Hydroelectric Power Plant' VCS 1464, for the reported GHG emission reductions for the given monitoring period 01/12/2013 to 30/09/2020 (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 for all the parameters of the monitoring plan and confirms that the reported emission reductions are free from any type of material errors. Therefore, 4KES confirms that the verification is conducted with reasonable level of assurance.

1.4 Summary Description of the Project

The Alkumru Hydroelectric Power Plant (Alkumru HPP from this point onward) is constructed at the Eastern Anatolia Geographical district of Turkey over the Botan River that is one of the major tributaries of the Tigris. All the 4 units have been commissioned as verified from commissioning certificates /06/. The last unit (4th unit) was commissioning on 17/01/2014, a date which is within this monitoring period i.e. 01/12/2013 to 30/09/2020. The total capacity of project capacity is 275.520 MWe as verified from the remote audit, technical specifications /09/, photos /10/, commissioning certificates /06/ and approval by the Ministry of Environment and Urban Planning /13/. The preliminary acceptance of the Dam and the HEPP for the fourth unit came on 17/01/2014 and the project is fully installed from then.

The chosen monitoring period i.e. 01/12/2013 to 30/09/2020 is within the crediting period i.e. 10/03/2011 to 09/03/2021 which is accepted to the verification team.

The Project Activity is located on the Botan River in the Eastern Anatolia region of Turkey, within the Siirt city borders. It is located between the elevations of 647 m and 541.80 between 42°05'04'' – 42°05'54'' east latitudes and 37°57'0'' – 37°57'46'' North latitudes.

The Following gives the coordinates of the Alkumru HPP Dam location and Power house location.

Coordinates of the Weir and Power house:

	Latitude	Longitude
Dam	37°57'36.94"N	42° 5'34.94"E
Powerhouse	37°57'25.24"N	42° 5'30.08"E

Verification team has verified the latitude and longitude through internet <https://www.latlong.net/> and found consistent.

During the current monitoring period which started from 01/12/2013 to 30/09/2020 (inclusive of both i.e. first and last day), the project activity has supplied 52,87,307.89 MWh of electricity to the grid, thereby resulted in an emission reduction of 28,54,350.00 tCO_{2e}.

2 VERIFICATION PROCESS

The registered VCS project is undergoing second 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 validation/verification process consist 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 Verra Secretariat for issuance of credits as per VCS standard version 4.

Duration of Verification:

Verification Contract	23/06/2020
Remote audit	29/07/2020
Findings raised	01/09/2020
Draft Verification Report	20/10/2020
Final Verification Report	22/10/2020

2.2 Document Review

The verification is performed primarily as a document review of the approved VCS PD, previous MR and Verification report 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

Due nationwide lockdown due to COVID-19 spread, Verification team could not conduct the site visit. Since the date of closure of lockdown is uncertain due to the increase spread of COVID-19 and hence VVB did not conduct site visit for this project activity. However, the verification team performed the Zoom remote interview with the PP and site person 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 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 (Zoom remote interview).

Location	The Project Activity is located on the Botan River in the Eastern Anatolia region of Turkey, within the Siirt city borders.	
Dates	29/07/2020	
Key points discussed	Name of person, interviewed	Designation, Organization
Implementation, Monitoring, Operational data, Calibration, Data collection, QA/QC procedures, Calculation of ERs, VCS requirements	Dr. G.Asli Sezer Özçelik	Consultant, Ekobil Environmental Services and Consulting Ltd.
	Mr. Fatih Baydar	Assistant Manager, Budget and Pricing, Limak Hidroelektrik Santral Yatırımları Anonim Şirketi
	Mr. Muhammed Ferit Şahin	Energy Systems Engineer, Limak Hidroelektrik Santral Yatırımları Anonim Şirketi

2.4 Site Inspections

As mentioned above, due nationwide lockdown due to COVID-19 spread, Verification team could not conduct the site visit. Since the date of closure of lockdown is uncertain due to the increase spread of COVID-19 and hence VVB did not conduct site visit for this project activity. However, the verification team performed the Zoom remote interview with PP and site person 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 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 Zoom 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 04 CAR and 02 CL were raised and resolved satisfactorily. No FAR has been raised in the verification. The list of CARs/CLs/FARs 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

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 in VCS only, verification team confirms that it has checked that there is no double counting associated with project activity being participation of other GHG programs.

3.2 Methodology Deviations

The verification team confirms that the registered PD complies with the requirements in the applied monitoring methodology ACM 0002 version 13.0.0. Therefore, no methodology deviations are applied during the monitoring period. The verification team confirms that no deviations were observed during the current monitoring period.

3.3 Project Description Deviations

As was mentioned in the first Monitoring report, the measurement point and measurement descriptions of the internal consumption data (EGPP-self consumption, y) that is used to calculate net electricity generation is deviated from the monitoring plan envisaged and presented in the validated Project Description. Details of this deviation and how the internal consumption is accounted for is explained in section 4.2 of the monitoring report at the related parameter (EGPP-self consumption, y).

No further deviations from the previous monitoring period.

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

The Alkumru Hydroelectric Power Plant (Alkumru HPP from this point onward) is constructed at the Eastern Anatolia Geographical district of Turkey over the Botan River that is one of the major tributaries of the Tigris. All the 4 units have been commissioned as verified from commissioning certificates /06/. The last unit (4th unit) was commissioning on 17/01/2014 which is in between of this monitoring period i.e. 01/12/2013 to 30/09/2020. The total capacity of project capacity is 275.520 MWe as verified from the remote audit, technical specifications /09/, photos /10/, commissioning certificates /06/ and approval by the Ministry of Environment and Urban Planning /13/. The preliminary acceptance of the Dam and the HEPP for the fourth unit came on 17/01/2014 and the project is fully installed from then.

The technical details of the turbine and generator were confirmed from the technical specifications /09/ and during Zoom remote interview.

During the process of validation, 4KES confirmed the capacity, unique identification of the project activity, estimated power generation, arrangement for evacuation of electricity generated, technical specifications, date of commissioning, arrangements for Operation & Maintenance (O&M) 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.

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.

There was no change of the meters during this monitoring period as verified during the remote audit and the discussion with PP. The assessment team confirmed that there is no proposed or actual change to the project design during this monitoring period. The project design as mentioned in the registered VCS PD & monitoring report submitted is implemented and thus the same is acceptable to the assessment team. 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 & monitoring report is followed onsite. All the monitoring equipment was calibrated as per the specified interval in the registered VCS PD & monitoring report. All the emergency preparedness as mentioned in the registered VCS PD & monitoring report is followed onsite and no discrepancies were found regarding the same.

The assessment team found that the project is in line with the registered VCS PD, monitoring report.

Opinion:

Assessment team concludes the following:

- a) There is no material discrepancies between project implementation and the project description provided in the registered PD/04/.
- 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 have not included in an emissions trading program or any other mechanism that includes GHG allowance trading.
- e) The project has not received or sought any other form of environmental credit, or has become eligible to do so since validation or previous verification.
- f) The project is registered under VCS only.

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

Since the project activity has a capacity higher than 50 MW, it has undergone a full Environmental Impact Assessment Process. During this process a third party Environmental Consultancy, studies the project design and studies the potential environmental impacts of the project, based on the format (parameters) provided by a committee convened under the secretariat of the Ministry of Environment and Urban Planning (was Ministry of Environment and Forestry at the time of preparation of the projects EIA report). The EIA report that also involves a stakeholder consultation process, and that studies the impacts of the project is presented to the same committee and the project is evaluated. If the committee is satisfied that all the precautions are taken and the project is complying with the environmental rules and regulations, the project is then granted an Environmental Impact affirmative certification. The certification provided to the project be found as at the annex of the registered PD of the Project Activity.

Hence verification team confirms that there are no any significant impacts due to implementation of project activity on air, water, Solid Waste, Waste Oils Hazardous Waste, Noise and Flora and Fauna as also described under section 2.1 of the monitoring report.

4.2.2 Local Stakeholder Consultation

For the project activity a local stake holders consultation meeting was held in Aydınlar town of Siirt Province, on October 25th, 2007, at 11:00 am, in the Public Educational Center Meeting Hall of Aydınlar Town, Siirt and the process was validated during the registration of project activity in VCS. VCS validation report verified to confirm the same. The meeting was announced at the bulletin boards of the governor house, municipality and at the village boards of Taşlı Village (via its muhtar Osman Çarp), Meydanderesi village (via its muhtar Ali Nur) Kılbasan Village (via its muhtar İzzettin Aygün), and Taşbalta Village (via Yılmaz Alanç). On the day of the meeting, Limak Hidroelektrik Santral Yatırımları A.Ş. has sent mini- busses to the villages and helped the stakeholders reach to the meeting hall.

The PP had invited identified stakeholders well in advance with details of venue and time of meeting.

4.3 AFOLU-Specific Safeguards

Not Applicable.

4.4 Accuracy of GHG Emission Reduction and Removal Calculations

The GHG emission reductions were calculated correctly on the basis of the approved baseline and monitoring methodology ACM 0002 (version 13.0.0), the formulae given in the monitoring report version and also based on the validation opinion stated in the VCS validation report /05/.

Parameter monitored:

4.4.1 EGPP-self consumption, y (MWh)

Quantity of electricity imported by the power plant from the Grid for self consumption, in year y

	Discussion and verification assessment				
Purpose of data	Data to be used to calculate net electricity supplied to the grid.				
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	The import electricity for self-consumption was measured by energy meters. The details of the energy meters used for self-consumption is mentioned under section 4.3 and Appendix 2 of the monitoring report /01/. The accuracy class of the energy meters is 0.2. The details of the energy meters used for this monitoring period is given below.				
	Purpose	Internal consumption recording meter brand	Internal consumption recording meter serial	Calibration Date	Used for the period

			number		
	Internal Consumption via Construction Camp Site Main	Actaris SL7000	53077842	Not available.	Only used for December 2013
	Internal Consumption via Construction Camp Site Back Up	Actaris SL7000	53077843	Not available.	Only used for December 2013
	Internal Consumption via Unit 1	Elster 1500	401585	29-01-2010	Entire monitoring period
	Internal Consumption via Unit 3	Elster 1500	401584	29-01-2010	Entire monitoring period
	Internal Consumption via Unit 4	Elster 1500	401587	29-01-2010	Starting Jan 2014
	Verification team has checked the meter details during the remote interview and photos /10/ and found OK. The meter need to be calibrated every 10 years as per the government regulation /17/. The calibration was not covering the monitoring period hence correction has been applied conservatively and the self-consumption has been increased by multiplying with a factor of 1.02 (for Dec 2013, Jan 2014, Jan-Sep 2020) which is conservative and hence accepted to the verification team.				
Measuring/Reading / Recording frequency	For all the meters involved, measurement is made continuous and recording is made monthly as verified from the monthly electricity data /16/ and remote zoom meeting.				
Data collection (from data	The self-consumption is measured every month using energy meters.				

generation, aggregation, to recording, calculation and reporting)	Entity responsible: Limak Hidroelektrik Santral Yatırımları Anonim Şirketi and TEIAS
Verified value	4,784.00 MWh. The data has been verified from the TEIAS and EPIAS web portals which are government portals /16/ and hence accepted to the verification team. The data is available online which can be verified.
Cross checks	NA
QA/QC procedures applied	During the monitoring period, no replacement of meter was observed. The energy meters are calibrated as per the government regulation which has been confirmed during the remote audit and the calibration records /15/.

4.4.2 EGPP-gross, y (MWh)

Quantity of electricity produced by the power plant, in y

	Discussion and verification assessment									
Purpose of data	Data to be used to calculate net electricity supplied to the grid.									
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	The primary source of data is the Main TEIAS meters located at the Alkumru HPP Powerhouse. The data read through these meters are recorded at the monthly reading protocols. There are four main meters, each record the generation of electricity from each line that transmit the electricity generated by each unit of generators, and there are four back-up meters, for each one of these main meters. The details of the energy meters is mentioned under section 4.3 and Appendix 2 of the monitoring report /01/. The accuracy class of the energy meters is 0.2. The details of the energy meters used for this monitoring period is given below. <table><tr><td>Purpose</td><td>Internal consumption recording meter brand</td><td>Internal consumption recording meter serial number</td><td>Calibration Date</td><td>Used for the period</td></tr></table>					Purpose	Internal consumption recording meter brand	Internal consumption recording meter serial number	Calibration Date	Used for the period
Purpose	Internal consumption recording meter brand	Internal consumption recording meter serial number	Calibration Date	Used for the period						

	Two Way electricity Measurement via Unit 1 Main	Elster 1500	00419607	20-07-2010	Entire monitoring period
	Two Way electricity Measurement via Unit 1 Backup	Elster 1500	00419608	20-07-2010	Entire monitoring period
	Two Way electricity Measurement via Unit 2 Main	Elster 1500	00419609	20-07-2010	Entire monitoring period
	Two Way electricity Measurement via Unit 2 Back up	Elster 1500	00419610	20-07-2010	Entire monitoring period
	Two Way electricity Measurement via Unit 3 Main	Elster 1500	00419611	20-07-2010	Entire monitoring period
	Two Way electricity Measurement via Unit 3 Back up	Elster 1500	00419612	20-07-2010	Entire monitoring period
	Two Way electricity Measurement via Unit 4 Main	Elster 1500	00480673	04/04/2013	Starting Jan 2014
	Two Way electricity	Elster 1500	00480672	04/04/2013	Starting Jan 2014

	Measurement via Unit 4 Back up				
	Verification team has checked the meter details during the remote interview and photos /10/ and found OK. The meter need to be calibrated every 10 years as per the government regulation /17/. The calibration was not covering the monitoring period, hence correction has been applied conservatively and electricity generation has been multiplying with a factor of 0.98 (for Dec 2013, Jan 2014, Jan-Sep 2020) which is conservative and hence accepted to the verification team.				
Measuring/Reading/ Recording frequency	For all the meters involved, measurement is made continuous and recording is made monthly as verified from the monthly electricity data /16/ and remote zoom meeting. All the meters belong to grid operator TEIAS.				
Data collection (from data generation, aggregation, to recording, calculation and reporting)	The generation is measured every month using energy meters. Entity responsible: Limak Hidroelektrik Santral Yatırımları Anonim Şirketi and TEIAS				
Verified value	5,292,091.89 MWh. The data has been verified from the TEIAS and EPIAS web portals which are government portals /16/ and hence accepted to the verification team. The data is available online which can be verified.				
Cross checks	NA				
QA/QC procedures applied	During the monitoring period, no replacement of meter was observed. The energy meters are calibrated as per the government regulation which has been confirmed during the remote audit and the calibration records /15/.				

4.4.3 CapPJ (W)

Installed capacity of the hydropower plant after the implementation of the Project Activity.

	Discussion and verification assessment
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Purpose of data	To calculate power density
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Not Applicable
Measuring/Reading/Recording frequency	Once for each monitoring period
Data collection (from data generation, aggregation, to recording, calculation and reporting)	Observed via the SCADA system of the Project Activity or name plate of each generator unit
Verified value	275,520,000 W. The data has been verified from the name plate capacity during the remote audit and also from the photos /10/.
Cross checks	NA
QA/QC procedures applied	NA

4.4.4 APJ (m2)

Area of the reservoir measured in the surface of the water, after the implementation of the Project Activity, when the reservoir is full.

	Discussion and verification assessment
Purpose of data	Power density calculation
Monitoring equipment (type, accuracy class, serial number, calibration frequency, date of last calibration, validity)	Not applicable

Measuring/Reading/Recording frequency	Indirectly measured based on depth readings from the SCADA system. Verification team has checked the calculation and found OK. This verified from the daily reports /18/ having water level, graph /18/ and from the scada screen during remote audit.
Data collection (from data generation, aggregation, to recording, calculation and reporting)	The reservoir area corresponding to maximum operational level has been determined as a certain value according to the topographical maps And a correlation graphic that exhibits the relationship between the water depth, reservoir area and the volume of the reservoir is plotted against a graphic. Presented in Annex 1.
Verified value	11,530,000 m2. The data is found correct.
Cross checks	NA
QA/QC procedures applied	NA

Finding: CL-01 and CAR-04 have been raised and successfully closed. Refer Appendix II for more details.

Opinion: The verification team confirms;

- The monitoring plan has been implemented as per the registered PD;
- The monitoring complies with the requirement of the applied methodologies;
- 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;

Parameters not monitored/ex-ante:

4.4.5 FCI,y (Volume Unit (cubic meter))

Amount of fuel consumed by relevant power plants in Turkey in years, 2008, 2009, 2010.

	Discussion and verification assessment
Purpose of data	Data used for the calculation of EF _{grid,OM,Simple,y}
Verified value	Please see Annex 2-Table-1 in the validated PDD
Source of value	Validated ex-ante. Official publications at the Turkish Electricity Transmission Company

	(TEİAŞ) Web Site (http://www.teias.gov.tr/TürkiyeElektrikIstatistikleri/istatistik2010/front%20page%202010-çiçek%20kitap/yakıt46-49/47.xls) ²
Justification	Values are checked from registered PD and VCS validation report

4.4.6 NCV_{i,y} (GJ/Mass or Volume Unit)

Net Calorific Values for fossil fuel type i in year, for the years 2008, 2009 and 2010

	Discussion and verification assessment
Purpose of data	Data used for the calculation of EF _{grid,OM,Simple,y}
Verified value	Please see Annex-2-Table 5 in the validated PDD.
Source of value	Validated ex-ante. Regional or national average default values that are reliable and documented in national energy statistics of the Turkish Electricity Transmission Company Web Site (http://www.teias.gov.tr/istatistik2010/front%20page%202010-çiçek%20kitap/yakıt46-49/49.xls http://www.teias.gov.tr/istatistik2010/front%20page%202010-çiçek%20kitap/yakıt46-49/47.xls)
Justification	Values are checked from registered VCS PD and validation report

4.4.7 EFCO_{2,i,y} (tCO₂/GJ)

Amount of fuel consumed by relevant power plants in Turkey in years, 2008, 2009, 2010.

	Discussion and verification assessment
Purpose of data	Data used both for the calculation of EF _{grid,OM,Simple,y} and EF _{EL,m,y}
Verified value	Please see Annex 2-Table-2 in the validated PDD.
Source of value	Validated ex-ante. IPCC default values at the lower limit of the uncertainty at a 95% confidence interval as provided in table 1.4 of Chapter1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories,

² If the provided link does not work please try the following link and look for the title and number of the excel sheet referred in the reference. "<http://www.teias.gov.tr/TürkiyeElektrikIstatistikleri/istatistik2010/Istatistik%202010.htm>"

	(http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf).
Justification	Values are checked from registered VCS PD and validation report

4.4.8 EGy (MWh)

Net electricity generated in the project electricity system in other words, net electricity generated and delivered to the grid by all power sources serving the system, not including low-cost / must-run power plants / units, in year

	Discussion and verification assessment
Purpose of data	Data used both for the calculation of EFgrid,OM,Simple,y
Verified value	Please see Annex 2-Table 3 and Table 4, in the validated PDD.
Source of value	Validated ex-ante. Turkish Electricity Transmission Company Web Site http://www.teias.gov.tr/istatistik2010/front%20page%202010-çiçek%20kitap/uretim%20tuketim(22-45)/40(06-10).xls www.teias.gov.tr/istatistik2009/30(84-09).xls ^{5,3}
Justification	Values are checked from registered VCS PD and validation report

4.4.9 EGm,y (MWh)

Net electricity generated and delivered to the grid by power unit m in year y

	Discussion and verification assessment
Purpose of data	Data used for the calculation of EFgrid,BM,y
Verified value	Please see Annex 2-Table 8a and Table 8b, in the validated PDD.
Source of value	Validated ex-ante. Turkish Electricity Transmission Company Web Site (www.teias.gov.tr). Data is extracted from the relevant annexes of the capacity projection reports for the years 2009 ⁴ and 2010 ⁵ , and the projects that are listed in Gold Standard Registry, VCS project Database, and Blue Registry (VER+ Standard) are deducted.

³ If the provided link does not work please try the following link and look for the title and number of the excel sheet referred in the reference. "<http://www.teias.gov.tr/TürkiyeElektrikIstatistikleri/istatistik2010/İstatistik%202010.htm>"

⁴ <http://www.teias.gov.tr/projeksiyon/KAPASITE%20PROJEKSİYONU%202010.pdf>

⁵ <http://www.teias.gov.tr/projeksiyon/KAPASITEPROJEKSİYONU2011.pdf>

Justification	Values are checked from registered VCS PD and validation report
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4.4.10 $\eta_{m,y}$ (%)

Specific electrical efficiency for all relevant energy sources (natural gas, lignite, coal/anthracite, fuel/motor oil).

	Discussion and verification assessment
Purpose of data	Data used for the calculation of $EF_{grid,BM,y}$
Verified value	See Table 14, in the validated PDD.
Source of value	Validated ex-ante. Default values provided at the Annex 2 of the “Tool to calculate the emission factor for an electricity system” version 02.2.1
Justification	Values are checked from registered VCS PD and validation report

Opinion:

In the opinion of assessment team, the assumptions, emission factors and default values that were applied in the calculations have been justified.

Assessment of Data and Calculation of GHG emission reductions:

According to the approved methodology ACM 0002 (Version 13.0.0) Emission Reductions are calculated as

$$ER_y = BE_y - PE_y$$

Where:

ER_y Emission reductions in year y (t CO₂e)

BE_y Baseline Emissions in year y (t CO₂)

PE_y Project Emissions in year y (t CO₂e)

Baseline Emissions

Baseline emissions are determined using the formula:

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

Where:

BE_y Baseline emissions in year y (tCO₂)

$EG_{PJ,y}$ Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y (MWh/yr)

$EF_{grid,CM,y}$ Combined margin CO₂ emissions factor in year y (tCO₂/MWh)

And

$$EG_{PJ,y} = EG_{Facility,y}$$

$EG_{Facility,y}$ = Quantity of net electricity generation supplied by the project plant to the grid in year y (MWh/y)

The Combined margin CO₂ emissions factor in year y (tCO₂ /MWh), $EF_{grid,CM,y}$, is fixed ex-ante for the duration of the crediting period and is 0.53985 tCO_{2e}/MWh. The electricity supplied to grid for this monitoring period is 5,287,307.89 MWh.

Project Emissions

As the methodology states the PE_y in case of a hydro power project can be calculated:

“Emissions from water reservoirs of hydro power plants (PEHP,y)

For hydro power project activities that result in new reservoirs and hydro power project activities that result in the increase of existing reservoirs, project proponents shall account for CH₄ and CO₂ emissions from the reservoir, estimated as follows:”

“...the power density of the project activity (PD) is greater than 4 W/m² and less than or equal to 10 W/m² :”

During this monitoring period the maximum lake level is observed to be 650 m, rounding up this value gives a maximum water level of 650 m at this level reservoir lake covers an aerial extent of 11,530,000 m². The project capacity during the monitoring period was 275,520,000 W therefore the power density of the project calculates as (275,520,000 /11,530,000=23.89 W/m²) which is

>10 W/m² therefore.:

$$PEHP,y = 0$$

Where:

PEHP,y Project emissions from water reservoirs (tCO_{2e}/yr)

Although there will be auxiliary diesel generators installed within the project boundary, the emissions from these have been deemed negligible as per the ACM0002 (version 13.0.0) methodology which is acceptable to the verification team.

Leakage

No leakage has been considered for the project activity.

Emission reductions

Emission reductions are calculated as follows:

$$ER_y = BE_y = EGPJ,y * EF_{grid,CM,y}$$

= 2'854'350 tCO₂e (Rounded down)

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/Zoom 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 'Ekobil Environmental Services and Consultancy Ltd.', has performed the independent verification of the emission reductions for the VCS project activity (VCS ID- 1464) "Alkumru Hydroelectric Power Plant" in Turkey for the monitoring period 01-December-2013 to 30-September-2020 as reported in the Monitoring Report Version 1.01 dated 20/10/2020. The Limak Hidroelektrik Santral Yatırımları Anonim Şirketi and the respective project proponent 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 ACM 0002 version 13.0.0, the monitoring plan contained in the registered VCS PD /04/ and VCS guidelines version 4, Monitoring Report (Version 1.01 dated 20/10/2020) 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-December-2013 to 30-September-2020 are fairly stated in the Monitoring Report Version 1.01 dated 20/10/2020. The GHG emission reductions were calculated correctly on the basis of the approved baseline and monitoring methodology ACM 0002, version 13.0.0, and the VCS standard.

Verification period: From 01-December-2013 to 30-September-2020

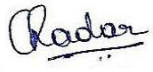
Verified GHG emission reductions and removals in the above verification period:

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)
2013	16,970	0	0	16,970
2014	273,633	0	0	273,633
2015	391,738	0	0	391,738
2016	503,458	0	0	503,458

2017	388,799	0	0	388,799
2018	353,982	0	0	353,982
2019	548,571	0	0	548,571
2020	377,199	0	0	377,199
Total	2,854,350	0	0	2,854,350

Approved by

Chandrakala R.



Director

Date: 22-October-2020

4K Earth Science Private Limited

Place: Bangalore, India

APPENDIX I: LIST OF DOCUMENTS

/1/	/1.1/ Monitoring Report, Version 01, dated 02/07/2020 (Initial Version) /1.2/ Monitoring Report, Version 1.01 dated 20/10/2020 (Final Version)
/2/	/2.1/ Draft Emission Reduction calculation sheet (corresponding to initial Version of VCS MR) /2.2/ Final Emissions Reduction calculation Sheet (corresponding to final Version of VCS MR)
/3/	VCS Standard Version 4
/4/	Registered VCS PD version 2.1 dated 10/12/2012
/5/	Web-Link for the Registered project activity for Validation Report and Grid Emission factor calculation https://registry.verra.org/app/projectDetail/VCS/1464
/6/	Certificate of commissioning of Unit 1, 2, 3 and 4
/7/	Connection Agreement (Agreement between TEİAŞ and the PP)
/8/	System Usage Agreement (Agreement between TEİAŞ and the PP)
/9/	Technical specification of the main equipments (Turbine, Generator etc.)
/10/	Photographic evidence Name plate photos of major equipments Generator name plates Main and back-up meters displaying the serial numbers (photos)
/11/	Training record
/12/	Single line diagram along with meter location
/13/	Amended production licence for Alkumru HEPP (3 turbines, installed capacity of 87.09 MWe each=261 MWe, electricity generation capacity 875.84 GWh) Approval by the Ministry of Environment and Urban Planning for the addition of the 4th turbine (14.25 MWe) to reach a total installed capacity of 275.52 MWe
/14/	Graph to identify the reservoir's surface area using the water level measurements Correlation graph - Reservoir volume and surface area

/15/	Calibration certificates for the energy meters corresponding to this monitoring period.
/16/	Monthly export and import values available on the TEIAS and EPIAS PORTAL which are government authorities
/17/	Periodic calibration is indicated as 10 years in article 9 of the following regulation: https://www.mevzuat.gov.tr/File/GeneratePdf?mevzuatNo=6381&mevzuatTur=KurumVeKurulusYonetmeligi&mevzuatTertip=5
/18/	Daily production reports for the monitoring period

APPENDIX II: VERIFICATION FINDINGS

Clarification Requests

CL ID	01	Section no.	-	Date: 01/09/2020
Description of CL				
As verified during the remote zoom audit, 4 units have been installed under the project activity and main and check meter is installed for each unit for the electricity export measurement however only three units are mentioned under the monitoring parameter EGPP-gross, y (section 4.2 of the MR).				
Project participant response				Date: 02/09/2020
<i>This was a copy paste type of error from the. Previous monitoring report now corrected please see version 1.1 of the. MR.</i>				
Documentation provided by project participant				
Revised MR				
DOE assessment				Date: 08/09/2020
Correction has been done in the revised MR /01/ and found OK. The meter details have been verified from during the remote zoom meeting and the photographic evidence /10/. Hence this CL is closed.				

CL ID	02	Section no.	-	Date: 01/09/2020
Description of CL				
Under section 2.2 of the monitoring report, the mechanism for on-going communication with local stakeholders needs to be clarified.				
Project participant response				Date: 02/09/2020

The following explanation is added under section 2.2:

The project site is located in South Eastern Turkey where the literacy rates are relatively lower compared to other parts of the country. As such there is an ad-hoc basis ongoing communication between the project office and the local stakeholders. The local stakeholders have the telephone numbers of the project site management, in general they communicate with help of the village headman (Muhtar). In addition to this at every occasion such as the religious or national holidays, the project site personnel and the local inhabitants get together.

There is also a hot line that is active at all times that the local stakeholders can reach out and mention. Their requests or complains.

Please see version 1.1 of the MR.

Documentation provided by project participant

Revised MR

DOE assessment

Date: 08/09/2020

Correction has been done in the revised MR /01/ and found ok. The on-going mechanism for communication with Local Stakeholder has been defined and found OK. Hence this CL is closed.

Corrective Action Requests

CAR ID	01	Section no.	-	Date: 01/09/2020
Description of CAR				
1. On page 1 of the monitoring report, Title of the project activity is not consistent with other sections of the MR.				
2. On page 1 of the MR, the mentioned monitoring period is inconsistent with the other sections of the monitoring report.				
Project participant response				Date: 02/09/2020
1. Corrected please check the version 1.1 of the MR				
2. Corrected please check the version 1.1 of the MR				
Documentation provided by project participant				
<i>Revised MR</i>				
DOE assessment				Date: 08/09/2020
Correction has been done in the revised MR /01/ and found OK. Hence this CAR is closed.				

CAR ID	02	Section no.	-	Date: 01/09/2020
Description of CAR				
As verified during the remote zoom audit and from the supportive documents, 4 th additional unit has already installed under the project activity in 2014 however the same is not clear under various sections of the monitoring report.				
Project participant response				Date: 02/09/2020
<i>We have corrected the wording throughout the report please see version 1.1 of the MR.</i>				

Documentation provided by project participant	
<i>Revised MR</i>	
DOE assessment	Date: 08/09/2020
Correction has been done in the revised MR /01/ and found OK. Hence this CAR is closed.	

CAR ID	03	Section no.	-	Date: 01/09/2020
Description of CAR				
The total GHG emission reductions or removals generated in this monitoring period needs to be mentioned under section 1.1 of the MR (As per the MR filling guidelines).				
Project participant response				Date: 20/10/2020
<i>Please see version 1.1 of the MR, at the end of the section 1.1 we have added this sentence:</i> “During this monitoring period (December 1, 2013 to September 30, 2020, both days inclusive), the Alkumru HPP produced a total amount of 2'854'350 CO_{2e} tonnes of emission reductions. ”				
Documentation provided by project participant				
<i>Revised MR</i>				
DOE assessment				Date: 20/10/2020
Correction has been done in the revised MR /01/ and found OK. Hence this CAR is closed.				

CAR ID	04	Section no.	-	Date: 01/09/2020
Description of CAR				
1. For the monitoring parameters “EGPP-self consumption, y” and “EGPP-gross, y” (Under section 4.2 of the MR), PP need to mention the calibration frequency and validity for all the monitoring equipment. 2. For the monitoring parameter “EGPP-self consumption, y”, PP need to describe the measurement procedure for this monitoring period as the same is not clear in the MR. 3. For the monitoring parameter “CapPJ”, PP need to mention the value corresponding to this monitoring period.				
Project participant response				Date: 02/09/2020
1. Please see version 1.1 of the MR the requested information is added and the. Calibration certificates are given in the below link. 2. Measurement procedure is described at Appendix 2 with a list of meters 3. Please see version 1.1 of the MR the requested information is added				
Documentation provided by project participant				

Calibration certificates: https://app.box.com/s/mxe8z0i524kbsd53as7ekud4788jyhf8 Meter. Test Reports: https://app.box.com/s/n84ozyoeg8x56gijn802p9lx9gawfclu Meter Calibration reports provided in the 1st MR period: https://app.box.com/s/mtytzpapc1q11jb5sz3h7ikp4nt19ci9	
DOE assessment	Date: 08/09/2020
Correction has been done in the revised MR /01/ and found OK. Hence this CAR is closed.	

Forward Action Requests

FAR ID	Section no.	Date:
Description of CAR		
NA		
Project participant response	Date:	
Documentation provided by project participant		
DOE assessment		
Date:		

APPENDIX III: TEAM COMPETENCE

Certificate of Competence						
Name	☒ Mr. ☐ Ms.	Chetan Swaroop Sharma				
Qualification Procedure	Fulfills 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:			
<i>Authorized Technical Area</i>	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:			
<i>Country/Countries</i>	India		
Compliance check by: Anand S. R.			

<u>Certificate of Competence</u>						
Name	☒ Mr. ☐ Ms.	Narendra Kumar .R				
Qualification Procedure	Fulfills 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
<i>Appointed</i>	Yes	Yes	Yes	Yes	Yes	No
<i>Appointed Date</i>	29-07-2019					
Authorized to work as Technical Expert for:						
<i>Authorized Technical Area</i>	Sectoral Scope	TA Code	Technical Area within the scope			
	Energy industries (renewable - / non-renewable sources)	1.1	Thermal energy generation			
	Energy industries (renewable	1.2	Renewables			

	- / non-renewable sources)		
	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		
<u>Compliance check by:</u> Anand S. R.			

APPENDIX IV: ABBREVIATIONS

BM	Build Margin
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
MP	Monitoring Period
MR	Monitoring Report
MW	Mega Watt
MWh	MegaWatt hour
PD	Project Description
PP	Project proponent
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