

VERIFICATION REPORT

KUMKÖY HPP

NO.: VCS-21222158



Document Prepared By TÜV Rheinland Energie und Umwelt GmbH

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Summary:

TÜV Rheinland Energie und Umwelt GmbH has performed a VCS verification of the project Kumköy Hydroelectric Power Plant, Turkey, with 17.5 MW_e installed capacity. The verification is based on the currently valid documentation of the VCS Version 3 based on the UN Framework Convention on Climate Change (UNFCCC), Article 12 of the Kyoto Protocol, the CDM modalities and procedures and subsequent decisions by CDM Executive Board.

The verification team concludes that the project as described in the VCS Monitoring Report, Version 2.0 as of 15. April 2013, covers all the relevant requirements of the criteria mentioned above. The development and maintenance of records and reporting procedures is consistent with this report. The calculation and determination of GHG emission reductions from the project lies within the responsibility of the management of the project and it is carried out as defined in the project description.

The verification team confirms that the project is implemented as planned and described in the validated and registered project design documents. Installed devices essential for gathering information about the electricity generation and self-consumption run reliably and the monitoring system is in place.

The verification team confirms that the GHG emissions reductions are calculated without material misstatements. The opinion relates to the project's emissions reductions reported and related to the valid and registered project baseline and monitoring, and its associated documents.

A brief overview of the verification steps covers the following points:

1. Desk Review of the preliminary VCS monitoring report (Version 1, 1st April 2013), the registered PDD (Version 2.1, 28th February 2013), the validation report created by TÜV Rheinland Energie und Umwelt GmbH (1st March 2013), the applied baseline and monitoring methodology ACM0002 "Consolidated methodology for grid-connected electricity generation from renewable sources", v.13 (EB67).
2. On-site visit (10 April 2013)
3. Issue of the checklist with corrective action request (CARs) and clarification requests (CLs) (see Annex 2)
4. Desk review of the revised VCS monitoring report (version 1.01, 12th April 2012)
5. Review of proposed CARs and CLs
6. Issue of the final verification report & protocol (see Annex 1)

As a result TÜV Rheinland Energie und Umwelt GmbH issues a positive verification opinion to the project.

Based on the information we have seen and evaluated we confirm the following statement:

Reporting period: From 03-03-2011 to 31-03-2013 (includes both days)

Verified emission in the above reporting period:

Project emissions: 0 tCO₂

GHG Emission Reductions: 92,813 tCO₂

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1 INTRODUCTION

Kumköy Enerji Üretim A.Ş. as the project owner has commissioned an independent verification by TÜV Rheinland Energie und Umwelt GmbH of the project: Kumköy Hydroelectric Power Plant (HPP) 17.5 MW_e. Ekobil Environmental Services and Consulting Ltd. is the responsible party for the quantification of emission reductions (ER).

The verification activity is the periodic independent review and ex-post determination by an independent entity of the monitored reductions in greenhouse gas (GHG) emissions during the defined verification period. TÜV Rheinland Energie und Umwelt GmbH as the verification body of the project has been accredited by the American National Standards Institute (ANSI) as a validation/verification body (VVB) and, in addition, meets the competence requirements as set out in ISO 14065:2007.

1.1 Objective

This initial verification is aimed at verifying and certifying the Voluntary Carbon Units (VCUs) reported for the Kumköy Hydroelectric Power Plant 17.5 MW_e for the period 3rd March 2011 to 31st March 2013. The final verification report will assure that the project is implemented as planned and confirm that the monitoring system is in place and fully functional.

For the verification of both quantitative and qualitative information on GHG emissions are being considered. Quantitative data comprises the monitoring report submitted to the verifier by the project entity as well as underlying evidence such as calculation spreadsheets, monthly power production protocols, daily recoded power production data to be used as consistency check and electronic print-outs from the electricity regulation authority PMUM. Qualitative data comprises information on internal management controls, calculation procedures, procedures for data transfer and frequency of emissions reports, and internal audits of calculations and data transfers.

The verification follows the VCS Version 3 based on UNFCCC criteria, referring to the Kyoto Protocol criteria and the modalities as agreed in the Bonn Agreement and the Marrakech Accord.

1.2 Scope and Criteria

The verification comprises a review of the monitoring report over the monitoring period from 3rd March 2011 to 31st March 2013, based on the registered Project Description Document regarding the project design, monitoring parameters, monitoring plan, emission reduction calculations, monitoring methodology and all related evidences provided by project participant. Those documents have been reviewed and verified against VCS Version 3 requirements, UNFCCC rules and associated interpretations. The verification is based on validated project design document including baseline calculations.

The main scopes of this verification are:

- Verify whether the emission reductions generated by the project are in line with the VCS Verification Protocol and the information provided by the project participants contains all the necessary information to evidence the project's compliance with all criteria in the VCS.
- Verify that the project has been implemented as described in the Project Description (VCS PD) during the verification period.

- Confirm that the monitoring plan was implemented and fully functional to generate verified carbon units (VCU) without any double counting during the whole verification period.
- Give a conclusion whether reported data are accurate, complete, consistent, and transparent, with a high level of assurance and free of material error or misstatement.

In particular, the project baseline, monitoring plan and project compliance with relevant applicable protocols and criteria (i.e. UNFCCC, VCS, host Party and others) are to be verified in order to confirm that the project implementation, as documented, is sound and reasonable and meets the applicable criteria.

The correct application of the CDM approved baseline and monitoring methodologies: ACM0002 "Consolidated methodology for grid-connected electricity generation from renewable sources", v.13 (EB67) and "Tool to calculate the emission factor for an electricity system", v.03 were already validated by TÜV Rheinland GmbH on March 1st, 2013.

1.3 Level of assurance

The VCS Standard (version 3) requires the assurance level of the verified emission reductions to be reasonable. Therefore TÜV Rheinland Energie und Umwelt GmbH has focused on providing a reasonable level of assurance that the emission reduction methodology is appropriate and correctly applied, and that the emission reductions have been accurately monitored. If required, TÜV Rheinland Energie und Umwelt GmbH may discount verified emission reductions or request a discount of these by applying conservative assumptions for uncertainties in emission reduction calculations that cannot be fully quantified or that cannot give the desired level of assurance.

1.4 Summary Description of the Project

The Kumköy Hydroelectric Power Plant (HPP) project is located on the Yeşilırmak River in the Black Sea region of the Republic of Turkey. Kumköy HPP operates as a run-of-river project without a water conveyance system with an installed capacity of 17.5 MWe. The Kumköy HPP has a reservoir of 597,000 m² and uses 3 Bulb type turbines.

The Kumköy project is part of the Yeşilırmak Basin Development Plan, which also includes two large-scale energy production projects, the Hasan Uğurlu and the Suat Uğurlu dams located upstream from the Kumköy project. They have been operational for more than 20 years.

Although there are no confirmed implementation plans, other upstream irrigation projects are planned in the upper catchment area of the Hasan Uğurlu dam that would impact the water availability for power generation at Kumköy HPP. It has been estimated that the impact of future irrigation projects will affect the power production, and therefore emission reductions, of Kumköy HPP towards the end of the first crediting period. Based on the mean annual flow values of the Hydrological Analysis Feasibility Study, the average annual gross energy generation over a 20 year period has been calculated as 91,964 MWh.

Kumköy HPP has been originally developed by DSI in 1997, but due to budgetary reasons the construction has stalled. Some structures such as the weir had been built or where close to completion when the current project owner – Kumköy Enerji Üretim Anonim Şirketi – took over in 2007 but none of the electromechanical equipment was in place. So the project activity as a hydropower plant has been

developed by Kumköy Enerji Üretim Anonim Şirketi, who is the project owner as identified in the production license.

No EIA regulatory procedures had to be observed because the project was exempt from the regulations. The EIA exempt certificate has been provided to TÜV Rheinland Energie und Umwelt GmbH. However, an EIA project identifier file has been submitted to the environmental directorate as part of the standard procedure.

2 VALIDATION PROCESS, FINDINGS AND CONCLUSION

2.1 Validation Process

Table 1 outlines the validation schedule that was followed by the TÜV Rheinland Energie und Umwelt GmbH validation team.

Table 1: Validation schedule

16/11/2012	Contract award for validation
17/02/2013	Receipt of draft VCS PD
25-28/02/2013	On-site assessment
28/02/2013	Draft validation report
01/03/2013	Internal technical review
01/03/2013	Final validation report

The methods and criteria applied during the validation process were aimed at gathering the relevant information to confirm statements and assumptions made by the responsible party in the VCS PD /6/, especially the spreadsheet to calculate the baseline, grid emission factor and the emission reductions.

The revised data comprised the gross electricity generation, the electricity self-consumption and the net generated electricity fed in the grid. The calculation of the baseline emissions was validated by means of re-computation according to the approved methodology "Tool to calculate the emission factor for an electricity system", v.03 based on the spreadsheet provided. The use of this tool by the responsible party is in line with the VCS Standard version .3 requirements as approved methodologies and related tools shall be used for the identification of the baseline emissions.

Additionally, all primary data that was included in the spreadsheet was traced back to its origin supplied by TEİAŞ (grid operator in Turkey) and double checked with the imported figures.

The revised, DSI approved feasibility study has been used to validate all relevant project details concerning the technical design and the plausibility of claimed achievable emission reductions.

In the course of the site inspection, the TÜV Rheinland validation team carried out interviews with project representatives, carbon consultant, and relevant project stakeholders (Table 2).

Table 2: Overview of interviews during the on-site validation visit

Name	Position/ Organisation	Topic
Mr Bora Köprülü	Kumköy HPP Manager	Regulation, rules and regulation compliance, sustainability and environmental issues.
Mr Uzer Alp Demir	Chief Engineering Manager	History of project development, financial information
Dr Asli Sezer Özçelik	Carbon Consultant, Ekobil Ltd.	Primary contact for verification
Mr Murat Özçelik	Carbon Consultant, Ekobil Ltd.	

Upon receipt of the draft VCS PD a list of CAR/CL solely derived from the desk review of the draft VCS PD was forwarded to the responsible party, including requests for documents. After receiving all requested documentation and undertaking the site visit, TÜV Rheinland GmbH was able to validate the assertions made in the VCS PD. For reason of confidentiality some information concerning the financial details of the project has not been disclosed, however the received documents were revised for the purpose of validation. No material discrepancies were observed during the validation process.

2.2 Validation Findings

2.2.1 Gap Validation

Not applicable.

2.2.2 Methodology Deviations

No methodology deviations were observed.

The determination of the baseline was done according to the following methodologies: ACM0002 "Consolidated methodology for grid-connected electricity generation from renewable sources", v.13 (EB67) and the UNFCCC methodological tool to calculate the emission factor for an electricity system, v.03, applicable under VCS Version 3.

In addition, the following methodology related tools and relevant guidelines are applied:

- "Tool for the demonstration and assessment of additionality" Version 07.0.0
- "Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion" Version 02
- "Guidelines on the assessment of investment analysis" Version 05
- "Guidelines on Common Practice" Version 01.0

The justification of the baseline was comprehensively given in the VCS PD /6/ taking into account: the scale of the project (being > 15MW), VCS Version 3 requirements, the fact that the project results in the creation of a new reservoir (greenfield) and the project boundaries.

The project emissions from the reservoir are considered "0" because the power density is greater than 10 W/m². Project emissions from fuel combustion from the on-site diesel generator can be neglected as the fuel consumption confirmed that it is being used for emergency purposes only.

As per the methodology outlined in the "Tool for the Demonstration and Assessment of Additionality" v 07.0.0, the additionality assessment was performed in three steps: "Identification of project alternatives", "Investment analysis" and "Common practice analysis". Based on this assessment the validation team concluded that the project is additional.

2.2.3 New Project Activity Instances

This section does not apply because Kumköy HPP does not constitute of grouped projects.

2.3 Validation Conclusion

TÜV Rheinland Energie und Umwelt GmbH conducted the validation of the GHG assertion in accordance with the requirements of the VCS Version 3, the standard ISO 14064-3 and the approved UNFCCC methodology ACM0002, v13.0.0 to a reasonable level of assurance by applying a materiality threshold of 5%. In the course of the validation process, the submitted VCS PD /6/, substantiations and any additional supportive documents reflected in Chapter 2.2, have been reviewed in the validation report issued on 01/03/2013.

The validation team came to the conclusion that based on the review and all available documentation the GHG assertion was made in accordance with the requirements of the VCS program and fairly represents the GHG emissions data and information without material discrepancies.

3 VERIFICATION PROCESS

3.1 Method and Criteria

The verification is based on the validated project design document, including emission baseline, and the monitoring report. These documents are reviewed against VCS Version 3 requirements. TÜV Rheinland Energie und Umwelt GmbH has, based on the recommendations in the "Validation and Verification Manual", employed a risk-based approach in the verification, focusing on the identification of significant risks and reliability of project monitoring and generation of emission reductions.

The verification includes the next steps: a desk review of the project design document and monitoring report; an on-site visit and follow-up interviews; resolution of outstanding issues; and the issuance of the final verification report and opinion.

3.2 Document Review

Table 3 outlines the documentation reviewed during the verification process.

Table 3: List of reviewed documents

No	Document	Date submitted
1	VCS Standard, version 3.3 (published 4 Oct 2012)	
2	VCS Program Guide, version 3.4 (published 4 Oct 2012)	
3	VCS Guidance: Validation and Verification Manual (published 4 Oct 2012)	
4	UNFCCC CDM Validation and Verification Manual	
5	UNFCCC ACM0002 "Consolidated methodology for grid-connected electricity generation from renewable sources", v.13, EB67	
6	VCS PD Kumköy HPP, final version	28/02/2013
7	Meter photos (main, back-up)	10/04/2013
8	Name plates of turbines - photos	10/04/2013
9	VCS Monitoring Report Kumköy HPP, v.1	01/04/2013
10	PMUM data spreadsheet (Mar 2011)	06/04/2013
11	TEİAŞ meter reading protocols (Mar 2011 - Feb 2013)	29/03/2013
12	PMUM data spreadsheets (Mar 2011 - Feb 2013)	29/03/2013
13	Water level data (Mar 2011 - Mar 2013)	29/03/2013
14	First reading protocol - meter testing (23 February 2011)	29/03/2013
15	Factory calibration records (06 February 2011)	27/02/2013
16	Revised Feasibility Report for Kumköy HEPP, 2008	17/02/2013
18	Emission reduction spreadsheet for Kumköy, v.1	01/04/2013
19	Emission reduction spreadsheet for Kumköy, v.1.01	11/04/2013
20	VCS Monitoring Report Kumköy HPP, v.1.01	11/04/2013
21	Hourly meter recordings (Mar 2011-Mar 2013) - access via TEİAŞ online system	11/04/2013

22	Calibration appointment - email (14 February 2013)	27/02/2013
23	GPS readings from Kumköy reservoir	10/04/2013
24	Correction of first meter reading protocol by TEİAŞ - email explanation PO	11/04/2013
25	VCS Monitoring Report Kumköy HPP, v.2 (final version)	15/04/2013
26	Emission reduction spreadsheet for Kumköy, v.2 (final version)	15/04/2013

3.3 Interviews

Table 4: Overview of interviews during the on-site verification visit

Name	Position/ Organisation	Topic
Mr Bora Köprülü	Kumköy Enerji Üretim A.Ş. HPP Coordinator	Operation, maintenance, regulation, coordination of electricity accounting, rules and regulation compliance, responsible for data recording and management.
Mr Arif Gökey	Kumköy HPP Manager	
Mr Numan Sıdkı Rahim Aslan	Environmental officer, Ministry of the Environment and Urban Planning	Environmental permits
Dr Aslı Sezer Özçelik	Carbon Consultant, Ekobil Ltd.	Primary contact for verification
Mr Murat Özçelik	Carbon Consultant, Ekobil Ltd.	

3.4 Site Inspections

An on-site inspection was conducted with the purpose to clarify whether the project had been carried out as described in the VCS PD /6/, assess relevant documents and interview people in order to verify the project conditions.

Table 5: Audit plan for the VCS verification onsite visit

Audit, 10 April 2013		
11:00	Kumköy HPP, Office	Audit related to responsibilities and general performance, general document check - Interview: Bora Köprülü, Arif Gökey
16:00	Kumköy HPP, Powerhouse	Document check for power production, SCADA gear, diesel generator, investigation of site specifics according to monitoring plan
17:30	TEİAŞ transformer station, Kumköy	Main and back-up meters
Audit, 12 April 2013		
14:00	Ministry of Environment and Urban Planning, Samsun branch	Environmental permits - Interview: Mr Numan Sıdkı Rahim Aslan

The on-site visit at the Kumköy Hydroelectric Power Plant confirmed that monitoring and reporting is carried out consistently and in line with established procedures and as per the requirements of the monitoring plan mentioned in the registered VCS PD /6/.

3.5 Resolution of Any Material Discrepancy

This process is aimed at resolving any outstanding issues, which need to be clarified prior to TÜV Rheinland GmbH's conclusion on the project design and monitoring results. In order to ensure transparency, a verification protocol is customised for the project. The protocol shows in a transparent manner criteria (requirements), means of verification and their results against the identified criteria.

Findings established during the verification can either be seen as a non-fulfilment of CDM criteria and VCS Version 3, or where a risk to the fulfilment of project objectives is identified. Corrective action requests (CAR) were issued where mistakes have been made with a direct influence on project results. Moreover, clarifications (CL) were requested where additional information is needed to fully clarify an issue.

4 VERIFICATION FINDINGS

The findings of the verification are stated in the following sections. The verification criteria (requirements), the means of verification and its results against the identified criteria are derived from an internal verification protocol and reflect the requirements of VCS v.3.

4.1 Project Implementation Status

The project has started operation on 3 March 2011. The verification of the project closely follows the validation process that was conducted towards the end of the two year eligibility period for retroactive validation.

The project activity is a newly built hydro power station, which has generated GHG emission reductions by avoiding CO₂ emissions from electricity generation from fossil fuels. Operation of the project does not lead to GHG emissions in itself. Thus, it is confirmed that the project was not implemented to create GHG emissions primarily for the purpose of subsequent removal or destruction.

During the onsite assessment, it was physically observed by the verification team that the power generation equipment and necessary facilities are in place as described in the registered VCS PD /6/. By checking their nameplates /8/, the project activity was confirmed to install two water turbines with a combined installed capacity of 17.5 MW_e.

In addition to the capacity installed and the electricity generation and consumption, the SCADA system records the water levels which are utilized to monitor the reservoir's surface area and calculate its power density. Hourly records of water levels of the entire monitoring period /13/ were made available to the verification team. Furthermore GPS coordinate readings /23/ have been taken during the verification site visit to confirm the correctness of the reservoir surface area.

The two meters are installed at the TEIÅŞ switchyard. The meters are identified as the main meter (serial number: 53042294) and back-up meter (serial number: 53042295) /7/. Both monitoring meters have been factory calibrated prior to the start of the project and are in compliance with the relevant regulation. The verification team has reviewed the calibration records /15/ of the installed monitoring meters. The next calibration visit has been visited but will take place after the verification process has been completed. These records will be checked during the consequent verification. For the time being the factory calibration records confirm that the calibration frequencies and measurement accuracies of the meters are in compliance with the monitoring plan of the registered VCS PD /6/.

The verification team concludes that the project has been implemented as described in the VCS PD /6/.

4.2 Accuracy of GHG Emission Reduction or Removal Calculations

The project owner claims the reduction of CO₂ emission by replacement of grid emission factor based electricity generation. The emission reductions are the baseline emissions using the combined margin emission factor of the grid.

The GHG emission reductions were calculated correctly using the quantity of net electricity generated and the CO₂ emission factor for an electricity system of 0.53323 tCO₂/MWh in accordance with the baseline methodology outlined in the validated VCS PD /6/ and applicable under VCS Standard Version 3.

The emission reductions of the project were calculated as the baseline emissions with consideration of both project emission and leakage as zero.

It shall be noted that records of the back-up meter, used for QA purposes, are only available from Oct 2012 onwards. The respective PMUM data has been used instead to ensure the accuracy of the main meter readings during the period up to Oct 2012. The difference of the main and back-up meters is less than 0.2% (CLASS2) as required by national legislation ("Elektrik Piyasasında Kullanılacak Sayaçlar Hakkında Tebliğ" – Communiqué for metering devices to be used in the electricity market).

The VCS PD contains information on both, gross and net electricity production of the project activity. The initial emission reduction estimations in the validation report have been based on the gross emission production, whereas the realized emission reductions verified in this report are based on net electricity production as required by the methodology.

All calculations made in the emission reduction calculation spreadsheets /19/ have been verified through recomputation by the verification team. The data used in the spreadsheet has been transferred manually and was tracked back to its origin at a coverage rate of 100% using the monthly hand written TEİAŞ meter reading protocols /11/ for the entire monitoring period of 03 March 2011 until 31 March 2013. The consistency of all values and monthly generation amounts has been verified.

These values have then been spot checked against the PMUM data /12/ as well as the hourly TEİAŞ records /21/.

The total electricity generation during the monitoring period have been verified as shown in Table 7.

Table 7: Overview of the electricity generation during the monitoring period

Monitoring period	Gross electricity generation (MWh)	Self-consumption electricity (MWh)	Net electricity generation (MWh)
03. March 2011 – 31. March 2013	174,530	471	174,059

The net amount of electricity supplied to the grid is determined as 174,059 MWh. The GHG emissions in the given monitoring period are therefore calculation as:

$$\begin{aligned}
 BE_y &= EG_{PJ,y} * EF_{grid,CM,y} \\
 &= 174,059 \text{ MWh} * 0.53323 \text{ tCO}_2/\text{MWh} \\
 &= \mathbf{92,813 \text{ tCO}_2} \text{ (conservatively rounded down)}
 \end{aligned}$$

The verification team considered that the monitoring of the project is complete and in compliance with the selected monitoring methodology, UNFCCC methodology ACM0002 "Consolidated methodology for grid-connected electricity generation from renewable sources", v.13 (EB67), and the grid emission factor in compliance with the "Tool to calculate the emission factor for an electricity system", v.03.

4.3 Quality of Evidence to Determine GHG Emission Reductions or Removals

TÜV Rheinland GmbH was able to verify that adequate monitoring mechanisms have been implemented at Kumköy HEPP by the end of the monitoring period. The electricity generation and consumption parameters have been monitored on a monthly basis. This was verified during the site visit by checking the TEİAŞ protocols against the emission reductions calculation spreadsheet in order to assess the correctness of the reported data.

It shall be noted that initially the back-up meter readings were not included in the official monthly meter readings by TEİAŞ. However, as of October 2012 the back-up meter readings have been recorded as in the protocol as well. This practice will be continued in the future.

The plant manager has shown evidence of the meter's calibration /15/ as required by the Measurement and Measuring Tools Inspection Regulation", Date: 24/07/1994, Official Gazette Number: 22000 - Article 9, in which periodical inspections of "gauges for electric, water, coal gas, natural gas and, current and voltage measuring transformers has to be made once in 10 years". This is in line with the monitoring plan and national requirements. The accuracy of the meters is high, relative to the applied materiality threshold of 5%. Errors in meter readings are monitored by the operator TEİAŞ by comparison of both meter readings /11/ from the main and back-up meters.

Meter readings from the back-up meter are only available from Oct 2012 onwards, but shall continue to be recorded in the future. In case the deviation between the two meters exceeds 0.2%, they are replaced by TEİAŞ.

The emission reductions have been correctly calculated as **92,813 tCO₂**. A complete set of data (monthly TEİAŞ meter reading protocols /11/, hourly meter recordings available on the TEİAŞ online system /21/ and PMUM data /12/) was available for the entire monitoring period of 03 March 2011 to 31 March 2013. As no further uncertainties or quality restrictions affect the calculations, the verification team has reviewed the above-mentioned evidences and considered that the calculations are in compliance with VCS v.3 requirements.

4.4 Management and Operational System

The monitoring plan used for determining the emission reduction by the project is based on the approved methodology ACM0002. The aim of the plan is to maintain credible and transparent measurement and collection of data for precise calculation of emission reduction during the crediting period.

The monitoring plan includes two parameters for the calculation of the emission reduction, namely the electricity gross production ($EG_{PP-gross, y}$) and the electricity self-consumption ($EG_{PP-self\ consumption, y}$). These two parameters are continuously monitored by two independent metering devices.

The monitoring plan in the VCS PD /6/ describes how the requirements related to the data acquisition and storage are being met. As described in the monitoring report and physically observed by the verification team during the on-site visit, two bidirectional meters /7/ were installed at the TEİAŞ switchyard, approximately 1 km away from the project site, to measure electricity exported to and imported from the grid. The back-up meter ensures accuracy and exclusion of false readings. Both the values for the gross electricity generation and self-consumption are measured by these devices.

TEİAŞ is the responsible party for recording the electricity generation, ensuring the accuracy of the meter readings and uploading the data to the PMUM database. TEİAŞ monitors the meter readings remotely and records the data on an hourly basis /21/. These records are then uploaded onto the TEİAŞ online system which can be accessed by the PO using a password. The monthly meter readings themselves are being undertaken by TEİAŞ staff accompanied by a Kumköy Enerji Üretim A.Ş. employee. These monthly meter protocols /11/ are recorded by hand and a copy is passed on to the PO who stores it according to the monitoring plan. The TEİAŞ records provide the data for the monthly invoicing and are accessible via the official PMUM website. The plant manager ensures correctness of the data by cross checking it against the online PMUM records /12/ as well as the data on the TEİAŞ online system /21/.

The data collection process in place has been verified onsite to be as follows:

- TEİAŞ reads the metering devices and thus monitors the electricity generation and consumption on a continuous basis. These hourly records /21/ are accessible to PO by the TEİAŞ online system.
- A TEİAŞ and a Kumköy Enerji Üretim A.Ş. employee carry out monthly meter readings by visiting the meters in person and recording the values by hand. These monthly meter readings of the electricity generation and consumption data are agreed upon and signed by both employees and a copy is passed on to the PO who files it.
- The PO cross-checks the records against PMUM data and stores the records electronically according the monitoring plan. The hourly meter recordings from the TEİAŞ online system are also stored electronically.
- The PO forwards the electronic copies of the monthly meter reading protocols as well as the hourly recordings to the carbon consultant for the purpose of emission reduction calculations.
- The carbon consultant transfers the data into the excel spreadsheet for the emission reduction calculations.

The verification team assessed the data collection procedures by means of physical observation, interview and documentation review. It could be clarified that the monthly meter readings are currently done by hand written records rather than remotely.

Two shortcomings in the monitoring activity as described in the VCS PD /6/ could be identified during the verification process:

- (1) The back-up meter readings were recorded from October 2012 onwards only. Before then the monthly meter reading protocols only include the values from the main meter. However, the accuracy of the main meter readings could be confirmed by comparing the data to the official PMUM data. In the future, the recordings of the back-up meter values as of October 2012 will continue.
- (2) As described in the VCS PD /6/ it was envisaged that the staff involved in the monitoring activities would receive a specific training to ensure that they are aware of their responsibilities and conduct the monitoring activities in line with the monitoring plan. Due to the short time between the validation and verification processes (less than 2 months) such a training has not been

provided. Due to the nature of the staff's job of working in the power plant, they have undertaken adequate monitoring. For the future, the PO intends to offer this training to the monitoring team and FAR (1) has been included in the verification report.

The verification team deems these shortcomings as minor; they have not adversely affected the monitoring of the parameters or the quality of the data used for the emission reduction calculations during this first monitoring period.

5 VERIFICATION CONCLUSION

The verification team of TÜV Rheinland Energie und Umwelt GmbH has performed the verification for the Kumköy HPP in Turkey on the requirements of VCS Version 3 and UNFCCC criteria for the CDM, as well as criteria given to provide for consistent project operations, monitoring and reporting.

The verification team concluded that the project as described in the VCS Monitoring Report (version 2, 15 April 2013), meets all relevant requirements of the above-defined criteria. TÜV Rheinland Energie und Umwelt GmbH therefore issues a positive verification opinion.

The verified emission reductions during the concerned monitoring period (03 March 2011 – 31 March 2013) are displayed as follows:

GHG Emission Reductions or Removals	tCO ₂ e			
	03 March 2011 – 31 December 2011	1 January 2012 – 31 December 2012	1 January 2013 – 31 March 2013	Total
Baseline Emissions	39,014.30	39,959.22	13,840.14	92,813
Project Emissions	0	0	0	0
Leakage	0	0	0	0
Net GHG emission reductions or removals				92,813

6 VERIFICATION STATEMENT

Kumköy Enerji Üretim A.Ş.
Hacı Halim Mahallesi Yeni
Demiryolu Cad. No: 62
41135 Kartepe KOCAELİ
Türkiye

16/04/2013

RE: Verification Statement for Kumköy Hydro Electricity Power Plant, Turkey under VCS, first monitoring period from 03.03.2011 to 31.03.2013

Kumköy Enerji Üretim A.Ş., with a registered office at Hacı Halim Mahallesi Yeni, Demiryolu Cad. No: 62, 41135 Kartepe KOCAELİ, Türkiye has engaged TÜV Rheinland Energie und Umwelt GmbH to review and verify the VCS Monitoring Report and all assertions related to the GHG project under VCS v.3.

We have conducted the VCS Verification in accordance with the requirements of the VCS Version 3 based on the UN Framework Convention on Climate Change (UNFCCC), Article 12 of the Kyoto Protocol, the CDM modalities and procedures. The project information has been verified and the VCS Verification Report "VERIFICATION REPORT 21222158 - Kumköy HEPP, Turkey" delivered on 16/04/2013 includes all relevant information and evidence acquired during the verification process.

We have come to the conclusion that based on our review and all available documentation the assertions are made in accordance with the requirements of the VCS program and are material correct and fairly represents the required parameters without material discrepancies. The Emission Reductions claimed for the monitoring period 03.03.2011 to 31.03.2013 are verified to be 92,813 tCO₂ distributed amount the years as indicated below:

GHG Emission Reductions or Removals	tCO ₂ e			
	03 March, 2011 – 31 December, 2011	1 January, 2012 – 31 December, 2012	1 January, 2013 – 31 March, 2013	Total
Baseline Emissions	39,014.30	39,959.22	13,840.14	92,813
Project Emissions	0	0	0	0
Leakage	0	0	0	0
Net GHG emission reductions or removals				92,813

Cologne, 16 April 2013



Andrea Nüsse

ANNEX 1: VERIFICATION PROTOCOL¹

 TÜVRheinland® Precisely Right.	Quality Management				Number: QMA 2.533.02		
					Version: 1.2		
	Table 3: Verification requirements Based on the VCS Standard, version 3.3 (published 4 Oct 212)				Valid as of: 14/01/2013		
					Created by: Wollenweber		
					Approved by: N. Heidelmann		
Checklist question	Ref.	MoV[1]			Findings, comments, references, data sources	Draft conclusion	Final conclusion
	DR	I	FA				
1. Implementation							
1.1 Have all physical features proposed in the registered PDD been implemented at the project site? 3 bulb type turbines (6.073 MWm each) Reservoir (597,000 m2) Powerhouse	8 23			X X X	The project has been implemented as validated. The installed capacity of each turbine as per nameplate is 6.073 MWm which corresponds to 5.83 Mwe, resulting in a total capacity of 17.5 Mwe.		OK
1.2 Has the project activity been operated in accordance with the project scenario described in the registered PDD and relevant guidance?	6	X		X	During the retroactive validation procedure it has already been confirmed that the project is operating in accordance with the scenario described in the registered PDD and relevant guidance. This was reinforced during the consequent verification process.		OK
1.3 If the project activity is implemented on a number of different locations, has the Monitoring report provided the verifiable starting dates for each site?					Not applicable since the project is located at one single site.		OK
2. Monitoring plan and methodology							
2.1 Is the monitoring plan established in accordance with the monitoring methodology?	9	X	X	X	The applied methodology is consistent throughout all documents. No parameters have been neglected.		OK

¹ Verification requirements (based on VCS Standard Version 3.2; §56, §57 and §62 of the CDM Modalities and Procedures and on CDM Verification and Verification Manual, Annex 1 of EB55)

2.2 In case the implemented monitoring plan defers from the monitoring methodology, has any requests for revision to or deviation from the monitoring methodology been officially communicated to the CDM EB (if applicable methodology is subject to EB approval)?	6 9	X	X		The implemented monitoring plan does not differ from the initial monitoring methodology.		OK
2.2.1 Have the above changes to the monitoring plan been approved by the CDM EB?					Not applicable as no changes have been made.		OK
3. Monitoring and the monitoring plan							
3.1 Is monitoring established in full compliance with the monitoring plan, contained in the registered PDD (or new monitoring plan approved by the applicable standard)							
<i>Monitoring period</i>	10	X			The monitoring period is consistent with the crediting period and the PDD. The SCADA system records hourly meter readings. Every month a TEİAŞ reads the meters and records the electricity production as well as internal consumption. In addition these hourly records are available to the PO via the TEİAŞ online system. The meter set up is as described in the PDD. The parameters are in line with the PDD.		OK
<i>Parameters</i>	6, 9	X					
<i>Meter Ser.-No., physical location, transcription</i>	6, 7	X		X			
3.2 Are all baseline emission parameters monitored and updated in accordance with monitoring plan, monitoring methodology and relevant CDM EB decisions?							
<i>EF(combined) EG(PP-gross) and EG(PP-selfconsumption) See parameters in section 4</i>	6, 9	X			The combined emission factor (EF) has been determined ex-ante and is applicable for the entire crediting period. The EF has been validated. For details on EG(PP-gross) and EG(PP-self consumption) see section 4.		OK
3.2.1 Was the monitoring equipment for baseline emission parameters controlled and monitoring results recorded as per approved frequency?							
<i>On-site implementation of data transfer & management</i>	11	X	X		The electricity production and consumption is continuously measured through the main and back-up meters. Hourly records are available via the TEİAŞ online system. The PO downloads monthly overviews of the hourly recordings and stores them electronically. In addition, the SCADA system continuously records the electricity production. Every month TEİAŞ staff and a Kumköy Enerji A.Ş. employee read the electricity production and consumption and sign the hand written record. This is being done in person, not remotely. A copy of this record is then sent to the PO who files it accordingly.		OK
3.2.2 Was the monitoring equipment for baseline emission parameters calibrated in accordance with QA&QC procedures described in the registered monitoring plan?							
<i>Calibration certificates for all meters</i>	11 12 15 22	X	X		The meters have been factory calibrated. Another calibration check will be undertaken by TEİAŞ this year. Therefore, the calibration records are valid and in order. Records of the back-up meter are only available starting from October 2012. Since then, no difference between the records of the main and back-up meters above the limit of 2% have been observed.		Records of the back-up meter, used for QA purposes, are only available from Oct 2012 onwards. PMUM data has been used instead to ensure the accuracy of the main meter readings. OK

					To ensure the accuracy of the main meter readings until October 2012, the PMUM data has been compared to the meter records. No unusual discrepancy could be found during this or the following period.		
3.3 Are all project emission parameters monitored and updated in accordance with monitoring plan, monitoring methodology and relevant CDM EB decisions? <i>FC(iy) and A(PJ) see below parameters</i>	6 9	X			Project emissions through on-site fuel consumption and reservoir emissions were identified in line with the monitoring methodology.		OK
3.3.1 Was the monitoring equipment for project emission parameters controlled and monitoring results recorded as per approved frequency? <i>Transcription procedure on site</i>	13	X			Hourly recordings of the water level using the SCADA system.		OK
3.3.2 Was the monitoring equipment for project emission parameters calibrated in accordance with QA&QC procedures described in the registered monitoring plan? <i>E.g. name plates of turbines, google earth image</i>	8, 23	X		X	The monitoring equipment is in accordance with the QA/QC procedures described in the monitoring plan. Name plates and GPS coordinates of the reservoir have been used to check the accuracy of the project emission monitoring.		OK
3.4 Are all leakage emission parameters monitored and updated in accordance with monitoring plan, monitoring methodology and relevant CDM EB decisions?					Not applicable as the leakage emissions equal zero as per ACM0002.		OK
3.4.1 Was the monitoring equipment for leakage emission parameters controlled and monitoring results recorded as per approved frequency?					Not applicable.		OK
3.4.2 Was the monitoring equipment for leakage emission parameters calibrated in accordance with QA&QC procedures described in the registered monitoring plan?					Not applicable.		OK
3.5 Were all monitoring parameters available and verifiable through the whole monitoring period?					All monitoring parameters were available and verifiable during the whole monitoring period. From March 2011 until October 2012 no records for electricity production and consumption was available from the back-up meters, which are used for QA purposes. Instead PMUM data has been used to check the accuracy of the main meter readings.		OK
3.5.1 In case, only partial monitoring data is available and PP(s) provide estimations or assumptions for the rest of data, was it possible to verify those estimations and assumptions?	9 11	X	X		All monitored data is available, the exception being the recordings of the back-up meter until October 2012. As this data is only used for QA purposes no estimations or assumptions had to be made.		OK

Reference: <http://cdm.unfccc.int/EB/026/eb26rep.pdf>, § 109(b)						
3.6 Was management and operation system established and operated in accordance with the monitoring plan?	6 9	X	X		The data management system has been established in accordance with the monitoring plan. The data will be kept on file for at least 2 years after the end of the first crediting period.	OK
3.7 Was it possible to verify that involved management and operation personnel is fully aware of the responsibilities and perform all operations according to the registered monitoring plan and internally developed manuals?	6 9	X	X		The monitoring of the monitored parameters is being undertaken by the respective Kumköy Enerji Üretim A.Ş. staff as per the monitoring plan. However, this is due to the nature of their job of working in the power plant rather than the allocation of responsibility and training as part of the VER team. To fulfill the training requirements as per monitoring plan, the PO shall organize such a training to the monitoring team.	FAR 1 OK
4. Parameters						
4.1 Monitored parameter Title: EG(net electricity production) Description: Net electricity supplied to the grid Units: MWh Estimated value (ex-ante): 91,96 4 MWh (gross, annually!) Measured value (ex-post): 174,059 MWh (net, over the entire monitoring period!)	16 11, 12				The electricity production and consumption are recorded by bi-directional meters. These recordings are used to calculate the net electricity production. For the period of March 2011-Oct 2012 only the readings of the main meter are available. The PMUM data is used as the control measure to ensure the correctness of the data. The VCS PD provides information on both, gross and net electricity production. Whilst the initial emission reduction estimation during the validation process was based on the gross electricity production, the verification process confirms the realized emission reductions based on the net electricity supplied to the grid as defined in the methodology.	OK
Monitored parameter Title: Cap(PJ) Description: Installed capacity Units: W Estimated value (ex-ante): 17,500,000 Measured value (ex-post): 17,500,000	8				The installed capacity has been confirmed by the details of the name plates as well as the SCADA system.	OK
Monitored parameter Title: A(PJ) Description: Reservoir surface area					The reservoir area can be calculated using the water levels which are recorded hourly by the SCADA system. Using SCADA records of the reservoir water levels in 2011, 2012 and 2013 and the water depth-surface area correlation	OK

Units: m2					graph shown in Annex 5 of the VCS PD indicate that the actual reservoir surface area was 600,000 m2.		
Estimated value (ex-ante): 597,000					GPS coordinates of the 3 points at the banks of the reservoir have been taken to verify the results.		
Measured value (ex-post): 600,000	6, 13, 23						
5. Calculations							
5.1 Have all the calculations related to the baseline emissions been carried according to the formulae and methods described in the registered PDD and applied methodology? <i>Validated EF(CM) 0.53323 tCO₂ / MWh</i>	6 9 18				The calculations for the baseline emissions are correct and in line with the methodology outlined in the PDD.		OK
5.2 Have all the calculations related to the project emissions been carried according to the formulae and methods described in the registered PDD and applied methodology?	6 9 18				The calculations for the project emissions are correct and in line with the methodology outlined in the PDD.		OK
5.3 Have all the calculations related to the leakage emissions been carried according to the formulae and methods described in the registered PDD and applied methodology?					Not applicable - Leakage emissions equal zero as per ACM0002.		OK

ANNEX 2: LIST OF CORRECTIVE ACTION REQUESTS (CAR) AND CLARIFICATION (CL)

CAR	CL	List of Requests for Corrective Action (CAR) and Clarification (CL)			
		Observation (CAR/CL)	Reference	Summary of project owner response	Validation team conclusion
	1	"...over the 20 year span the average annual energy generation potential of the project is calculated to be 91,964 MWh." Please clarify that this is the gross electricity production.	VCS Monitoring report – p.4	Yes, this was the amount of electricity which is the gross electricity produced by the project. And this number was used in VER estimations in the PDD, however in the monitoring report the net amount of realized electricity exports are used for the VER calculations.	OK
	2	In the monitoring procedures of the validation report it has been stated that a team manager will be assigned, that the responsibilities of all employees in the monitoring program will be defined and that those employees will undergo training. Furthermore, it states that a formal set of monitoring procedures will be established. Please specify in the monitoring report the current situation.	VCS Monitoring report – p.15	Please see the version 1.01 of the monitoring report the current situation is outlined in the new version.	OK
1		Data transfer and management: Currently the meter records are not read remotely by TEİAŞ nor are the records entered into an electronic spreadsheet at the end of each month. Please update the monitoring report accordingly.	V CS Monitoring report – p.16	A clarification is added to the version 1.01 of the monitoring report. The data is remotely read, and input to an internet software that can also be accessed by the PO but the indices and the amount of electricity is recorded on meter reading protocols manually and signed by the TEİAŞ officer and by the project owner. This situation is also explained and clarified in the new version of the monitoring report.	OK

ANNEX 3: LIST OF FORWARD ACTION REQUESTS (FAR)

#	Forward Action Request (FAR)	Reference
1	The VCS PD describes that the VER team (responsible for monitoring the relevant parameters) shall receive a training to ensure there are aware of their responsibilities and perform the monitoring in line with the report. This training has not yet been conducted. During the next monitoring period such a training shall be offered to the monitoring team to ensure that the monitoring activities are carried out with the monitoring plan.	VCS Monitoring report – p.15