VERIFICATION REPORT NR 21222980

Koyulhisar Hydro Electricity Power Plant

Turkey

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Summary:

On 19/09/2012, TÜV Rheinland Energieund Umwelt GmbH was assigned to perform verification of the second monitoring period for the VCS project activity Koyulhisar HEPP against the most recent VCS verification criteria at the time of delivery of Monitoring Report. Since the first version of the Monitoring Report for the 2nd monitoring period (curent) was delivered to the VVB on 12/08/2013, the verification is performed against the verification criteria set under the VCS standard v.3.3, VCS Program Guide v3.4 and all other relevant requirements and considering the reasonable materiality threshold of 5% (as defined in ISO 14064 - 3). In addition it is worth mentioning that TÜV Rheinland Energie und Umwelt GmbH was contracted prior to 04/10/2012, and therefore the specified rules on rotation of VVBs (VCS Standard v3.3 §5.3.13) is not applicable.

The Koyulhisar HPP is a hydroelectricity power plant on the Kelkit Stream within the jurisdiction of Koyulhisar town, with installed capacity of 63MW, average annual electricity generation of 262,365 MWh and estimated annual GHG emission reductions of 116,217 tCO_2.

The verification services are requested by PP and cover the second monitoring period from 01/11/2011 until 31/07/2013, for the registered VCS project activity Koyulhisar HPP. The verification is performed in accordance to the VCS requirements as specified within the VCS standard v.3.3, VCS Program Guide v3.4.

The verification is performed in 3 main steps, namely

- *desk review – covering all provided documents, i.e. current monitoring report, previous monitoring report, PDD, ER calculation sheets, EG records, manuals, etc*
- *on-site visit – confirming the correctness of the monitoring report, interviews with PP, observation of data processing and storage, confirmation of metering devices, plausibility checks*
- *issuance of verification protocol, including CAR/CL list and eventually verification report for the monitoring period in question*

Finally based on the provided documentation and site inspection, TÜV Rheinland Energie und Umwelt GmbH issues a positive verification opinion on the Koyulhisar HPP, confirming that for the monitoring period from 01/11/2011 to 31/07/2013, GHG emission reduction of 214,674 tCO_2 are realised from the aforementioned project activity.

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1 INTRODUCTION

1.1 Objective

As per VCS Standard v3, 'verification is the periodic ex-post independent assessment by a validation/verification body of the GHG emission reductions and removals that have occurred as a result of the project during the monitoring period, conducted in accordance with the VCS rules. The Koyulhisar HPP has been developed as VCS project activity, and contributes to the global GHG emission reductions since 17/11/2009. The project underwent the 1st monitoring period (17/11/2009 – 31/10/2011) of the 1st crediting period, for which emission reductions of 213,059 t CO_2 were verified. Besides, it was confirmed that the project is implemented as planned and the monitoring system is in place and fully functional.

The verification of 2nd monitoring period comprises of qualitative and quantitative evaluation of the emission reduction generated in the period from 01/11/2011 to 31/07/2013.

1.2 Scope and Criteria

Verification is defined in the VCS Standard v3.3 as a risk-based process and therefore is performed in compliance with ISO 14064-3:2006 and ISO 14065:2007, considering the stipulated VCS rules and requirements for the verification process.

Therefore, the verification of the 2nd monitoring period for the Koyulhisar HPP is performed by implementing the VCS Standard v3.3, VCS Program Guide v3.4, where the ER calculation and verification are based on the latest version of respective CDM methodology and methodological tools.

In the process of verification of 2nd monitoring period, the VVB analysed the provided monitoring report and ER calculation spreadsheets, on hand of supporting documents, such as Koyulhisar HPP PDD, ER and baseline calculations, monitoring plan, 1st monitoring report and the corresponding verification report, records on electricity generation and self-consumption as well as records on diesel fuel consumption, certificates on calibration of metering devices, etc.

1.3 Level of assurance

The level of assurance shall be reasonable, with respect to material errors, omissions and misrepresentations, for both validation and verification.

The final verification is based on the latest monitoring report for the 2nd monitoring period v1.2, dated 04/09/2013, supporting documents disclosed to the auditor, own background research and investigations and information collected through performing interviews during on-site assessment. The correctness of the verification conclusion is guaranteed throughout the credibility of the above mentioned sources of information.

The Verification Statement (see section 5) is made to a reasonable assurance level, and a materiality threshold of 5% is applied for identification of material omissions as required by VCS v3.3 paragraph 5.3.1 item 4. In general it shall be adhered to the procedures as defined in ISO 14064-3.

1.4 Summary Description of the Project

Koyulhisar HPP is planned and implemented, by Bereket Enerji Üretim San. Ve Tic. A. Ş, as hydroelectricity power plant on the Kelkit Stream, within the jurisdiction of Koyulhisar town of Sivas Province, with geographic coordinates 40º16”13,48’ N and 37º50”55,58’ E.

The project consists of following main units

- a set of open canals and tunnels
- a reservoir, with area of ca. 1.2 km^2
- a head pond from which water is loaded to the penstock
- a powerhouse station with 3 Francis-type turbines, 21 MWe each, and total installed capacity of 63 MWe.

As identified in the FSR, based on water availability, water velocity and the project technical design, the Koyulhisar HPP was foreseen to generate 262,365 MWh of electricity per year. However, in the VCS PD the annual electricity generation is indicated as 220,000 MWh. It is enlightened that the 16% production loss is due to the upstream government owned dams (Kılıçkaya Dam - 124 MW and Çamlıgöze Dam - 33MW) and the specific seasonal and topographic conditions. Based on Turkey’s Combined Margin Emission Factor (**EF_{CM}= 0.52826 tCO2e/MWh**), which was proved to be reasonable and conservative during VCS validation, the expected annual GHG Emission reductions generated by the project activity are estimated to 116,217 tCO2/year

During the first monitoring period, for the period 17/11/2009 – 31/10/2011, it was confirmed that the net electricity generation is ca. 403,323 MWh, resulting in measurable and accounting GHG emission reductions of 213,059 tCO, which were reported in the VCS Verification Report for Koyulhisar Hydro Electricity Power Plant for monitoring period 17/11/2009 – 31/10/2011[1] .

Table 1: Project milestones

Date	Milestone	Reference
28/06/2004	The initial Feasibility Approved by DSI	Approval letter of DSI
18/01/2005	Water Usage Agreement co-signed with DSI	DSI Water usage Agreement
02/10/2005	Electricity Production License issued by Energy Market Regulatory Agency (EMRA)	EMRA License
01/06/2005	EIA Exemption Certificate issued	See Annex-3
07/08/2006	Financial Closure and Investment Decision date	Credit Agreement(first Trench)
06/01/2009	Construction Started	NHS Record
03/09/2009	Application for the addition of the third unit and approval of revised feasibility	Application Letter to DSI
August 2009	Final version of Revised Feasibility released	Feasibility Report
17/11/2009	The First two units of the project became operational (Project Start Date)	Provisional Acceptance Protocol by MoENR

[1] VERIFICATION REPORT 21218413 - Koyulhisar HEPP, Turkey v1.0, issued on 21/12/2011

17/11/2009	Application for license Revision to EMRA	Application Letter to EMRA
02/09/2011	Turkuaz Contracted for Carbon Finance	Contract
10/09/2011	Validating DOE Contracted	Mail Order
23/08/2012	DSI Approval For Revised feasibility (The adendum to Water usage Agreement))	Adendum to water usage agreement

Table 2: Significant dates to project's monitoring

Date	Milestone
11.11.2011	Final Validation Report
17.11.2009	Date of commissioning of the plant /start of 1st monitoring period
13.08.2009	Calibration date of meters (Main Meter-S.n. 53030781 and the control meter-S.n. 53030782)
12.08.2019	End of Calibration validity
31.10.2011	End of the 1st monitoring period
1.11.2011	Start of 2nd monitoring period
31.07.2013	End of the 2nd monitoring period
16.11.2019	**End of first crediting period**

2 VALIDATION PROCESS, FINDINGS AND CONCLUSION

2.1 Validation Process

Validation of Koyulhisar HPP has been performed in accordance to the internal procedures of the accredited VVB (TÜV Rheinland Emergie und Umwelt GmbH) for validation of VCS projects, which strictly follow ISO 14046-3 and ANSI accreditation to ISO 14065.

The core validation consisted of the following phases:

- desk review of the project design document, emission reduction and investment analysis calculation spreadsheets
- on-site visit (site inspection) and follow-up interviews with project stakeholders, including the plant manager, plant owner representative and carbon consultant.
- resolution of outstanding issues including material discrepancies and the issuance of the draft validation report
- Internal technical review and issuance of final validation report.

2.2 Validation Findings

2.2.1 Gap Validation

N.A. - This section does not apply since the project was not subject to any VCS approved GHG program.

2.2.2 Methodology Deviations

The validation team assessed the proposed project activity and related project description in detail and witnessed that the selected methodology and methodological tools are implemented accurately without any deviations.

Following approved CDM methodology and methodological tools were applied for development of Koyulhisar HPP VCS PD and justified to be applicable:

- ACM0002 “Consolidated methodology for grid-connected electricity generation from renewable sources”, v12.1.0
- “Tool for the demonstration and assessment of additionality” v05.2.1
- “Tool to calculate the emission factor for an electricity system” v02.2.1
- “Tool to calculate project or leakage CO2 emissions from fossil fuel combustion” v02

2.2.3 Project Description Deviations

In the course of 2nd VCS verification, it was determined that the project activity is implemented as described in the validated VCS PD for Koyulhisar HPP and confirmed during the 1st monitoring period. The verification team witnessed that the power plant is operational and generates electricity by using 2 of 3 installed generation units with total installed capacity of 63 MWe.

Therefore, no deviations from the project description are identified.

2.2.4 New Project Activity Instances

This section does not apply because there are no grouped projects.

2.3 Validation Conclusion

TÜV Rheinland conducted the Validation of the GHG assertion in accordance with the requirements of the VCS program requirements, the standard ISO 14064-3 and approved UNFCCC methodology ACM0002 to a reasonable level of assurance by applying a materiality threshold of 5 %. The project information validated included the VCS PD delivered to TÜV Rheinland and all relevant information and evidence acquired during the Validation process as stated in the VCS Validation Report issued on 11/11/2011.

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 was material correct and fairly represented the GHG emissions data and information without material discrepancies.

3 VERIFICATION PROCESS

3.1 Method and Criteria

The verification is based on the Monitoring Report v1.2 and the validated project design document, including baseline calculations and the monitoring plan. These documents are reviewed against VCS Version 3 requirements, stipulated in the VCS Standard v3.3 and the VCS Program Guide v3.4. 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 essential components of the verification process for the relevant monitoring period, 01/11/2011 – 31/07/2013 are specified as:

- desk review of the 2nd monitoring report and supporting documents
- on-site visit and follow-up interviews,
- resolution of outstanding issues, and
- issuance of the final verification report and opinion

Those components are thoroughly discussed in the following sub-chapters.

3.2 Document Review

In the course of the verification of GHG emission reductions generated by Koyulhisar HPP during the 2nd monitoring period from 01/11/2011 until 31/07/2013, bundle of documents, incl. methodologies, methodological tools, protocols, reports, official letters, etc., have been provided to the verification team. Furthermore, confidential information, such as contracts and agreements, was disclosed to the last as well. Full list of documents reviewed in the verification process is outlined below

Table 3: List of official documents, supportive workbooks and other evidences reviewed in the course of the verification of the 2nd monitoring period of Koyulhisar HPP VCS Project.

Ref Nr & Document/Name		Comment
/1/	VCS Guidance - Validation and Verification Manual v3.0	The manual is followed strictly in order to fulfil the VCS requirements for the verification of GHG emission reductions generated by the Koyulhisar HPP
/2/	VCS Program Guide, v3.4	The latest available version of the VCS Program Guide, released on 04/10/2012, which is to be obeyed
/3/	VCS Standard, v3.3	The latest available version of the VCS Standard, released on 04/10/2012, which is to be obeyed
/4/	EB67 ACM0002 "Consolidated baseline methodology for grid-connected electricity generation from renewable sources", v12.1.0.	The CDM approved consolidated baseline and monitoring methodology applied for the development of the Koyulhisar HPP VCS project activity, where the indicated version is the latest available at the time of validation
/5/	EB63 Annex 19 "Tool to calculate the emission factor for an electricity system", v2.2.1	The CDM methodological tool applied for the estimation of the expected GHG emission reductions generated by the Koyulhisar HPP, here the indicated version is the latest available at the time of validation
/6/	VCS Project Description for Koyulhisar Hydro Electricity Power Plant, v1.4	The final VCS PD, which was issued on 08/11/2011 by Turkuaz Karbon Varlık Yönetimi Enerji Proje ve Dan. San. İth. İhr. Ltd. Şti. And approved by the assigned VVB.
/7/	Final VCS Validation Report for Koyulhisar Hydro Electricity Power Plant, v1.0	Final validation report was issued by the assigned VVB on 11/11/2011
/8/	VCS Monitoring Report for Koyulhisar Hydro Electricity Power Plant for Monitoring period 17/11/2009 – 31/10/2011, v2.0	Final monitoring report for the 1st monitoring period, which was issued on 14/12/2011
/9/	VCS Verification Report for Koyulhisar Hydro Electricity Power Plant for Monitoring period 17/11/2009 – 31/10/2011, v1.0	Final verification report for the 1st monitoring period, issued on 21/12/2011
/10/	VCS Monitoring Report for Koyulhisar Hydro Electricity Power Plant for Monitoring period 01/11/2011 – 31/07/2013, v1.0	Draft monitoring report for the 2nd monitoring period, which was issued on 12/08/2013
/11/	KoyulhisartoTUV-RNFP(2ndMRPeriod) v1.0.xlsx	Extensive Excel workbook, delivering project input data from power plant commissioning onwards, providing the raw data and illustrating their processing and quality assessment. Worksheet on ER calculations, which is used for re-calculation, are also included in the workbook. Parts of the tables are included in the Monitoring Report.
/12/	SignedMeterReadingProtocols Nov2011June2013.pdf	The meter reading protocols delivered by the TEIAS to the PO by the end of each month. Therefore the protocols are dated as the beginning of the following month. the protocols have been signed by both representatives of the TEIAS and the PO. The ER calculations are based on data delivered from those monthly reports on electricity consumed from and delivered to the Koyulhisar TM, where the relevant metering equipment is installed.
/13/	Daily reports	Number of daily reports (07/04/2012; 10/09/2012; 18/01/2013; 27/04/2013 and 30/07/2013) on electricity generation of the Koyulhisar HPP was observed by the VVB. The document is used to crosscheck the operational units and electricity generation and

		consumption. In addition the monitoring system and the quality of data gathering and reporting were proved. Consistency check
/14/	PMUMFormsControlDataNov2011June2013.pdf	Bundle of PMUM monthly reports on the electricity delivered to and consumed from the national grid for the period November 2011 – July 2013 on hour base. Used for QA/QC
/15/	Purchase receipt for diesel fuel	The receipt for purchase of fuel for the auxiliary diesel generators were provided to the VVB. The consumed diesel fuel during the monitoring period is cross-checked by the purchased fuel for the same period. The project emissions caused by the used diesel fuel on project site is calculated based on the consumed diesel and default diesel parameters.
/16/	Calibration Test Reports for meter ACTARIS SL7000-Serial Number: 53030781	Calibration certificate for the main electricity metering device Serial number ACTARIS SL7000-Serial Number: 53030781. The electricity meter is a two-way meter, meaning that it measures the electricity delivered to the national grid as well as the one obtained from it. The calibration test was performed on 13/08/2009
/17/	Calibration Test Reports for meter ACTARIS SL7000-Serial Number: 53030782r	Calibration certificate for the back-up electricity metering device Serial number ACTARIS SL7000-Serial Number: 53030782. The electricity meter is a two-way meter, meaning that it measures the electricity delivered to the national grid as well as the one obtained from it. The calibration test was performed on 13/08/2009
/18/	Meter Compliance Certificate	A certificate issued by a sub-contractor of TEIAS on 10/08/2009 to certify that the 2 meters comply with the regulations of the host country. The certificate is required since the metering devices are imported.
/19/	Single line wiring diagram	Part of the signed agreement between TEIAS and the PP, used to prove technical implementation and the incorporation of the meters as two way meters to make sure the power consumption of the plant is recorded by this meter(s).
/20/	VCS Monitoring Report for Koyulhisar Hydro Electricity Power Plant for Monitoring period 01/11/2011 – 31/07/2013, v1.2	Final monitoring report for the 2nd monitoring period, which was issued on 04/09/2013

3.3 Interviews

In the course of the site inspection, the verification team carried out interviews with plant manager, carbon consultant, and relevant project stakeholders.

Table 4: People involved in the verification process

Participant	Position	Institution
Dr. Aslı Sezer Özçelik	Consultant	Ekobil Ltd
Denitsa Gaydarova-Itrib	VVB	TÜV Rheinland GmbH
Özgün Gül Koparan	Environmental Relations/ Hydro-biologist	Bereket Enerji Üretim A.Ş.
Hüseyin Gürarslan	Environmental engineer	Bereket Enerji Üretim A.Ş.
Sena Polat	Environmental engineer	Bereket Enerji Üretim A.Ş.
Veli Aygül	Civil Engineer	DSI

Ihsan Şeker	Electrical Engineer, Site Manager	Bereket Enerji Üretim A.Ş.
Ahmet Yildiz	Chief of staff	Bereket Enerji Üretim A.Ş.
Hüseyin Özer	Director of forest management	Koyulhisar Forestry Directorate
Mehmet Yılmaz	Chief clerk	Koyulhisar district Governorate
Adnan Alemdar.	Muhtar (Aşağıkale Village head)	Aşağıkale village
Enver Kiliç	Muhtar (Kalebaşi village head)	Kalebaşı Village
Süleyman Coşkun	Worker at Canal maintenance team	Bereket Enerji Üretim A.Ş.

The signed list of participants is included as annex c – list of participants to the Site Assessment on 26/08/2013 & 27/08/2013

3.4 Site Inspections

The obligatory site visit took place from 25/08/2013 to 27/08/2013 in Sivas, Turkey and on the project site (Koyulhisar HPP) Koyulhisar town, of Sivas Province,Turkey. The objective of the on-site visit is to confirm that project is managed and operates in accordance to the registered VCS PD v1.4. Furthermore, validity and authenticity of delivered supporting documents as well as consistency of the monitoring and reporting with the established procedures and the validated monitoring plan suggested in the VCS PD v1.4 is confirmed. The site visit was carried out by means of interviews with the persons indicated in section 3.3, document review as indicated in section 3.2 and monitoring system check.

3.5 Resolution of Any Material Discrepancy

In order to ensure transparency a verification protocol, which shows in a transparent manner criteria (requirements), means of verification and VVB findings and final VVB conclusions, is customised for the project. All findings and outstanding issues, identified during the desk review and discussed during the site inspection, are included in a list of Corrective action requests (CAR) and clarifications (CL).

All CAR/CLs, which are organized in *Annex B*, have been resolved by PPs via provision of additional supporting evidence and appropriate revision of the Monitoring Report. For the purpose of completeness, the completed verification protocol is also enclosed to the verification report in *Annex A*.

4 VERIFICATION FINDINGS

4.1 Project Implementation Status

- Implementation status of the project activity

Koyulhisar HPP was commissioned in November 2009, as indicated in the VCS PD v1.4 /6/ and the Monitoring Report /8/ for the 1st monitoring period. The power plant encompasses 3 Francis turbines; each with 21 MW installed capacity. During the site visit, the turbine nameplates were perceived and the indicated installed capacity was approved. The verification team confirmed the project is implemented without any deviations from the VCS PD v1.4 /6/ and as certified by the VVB within the Validation report /7/ from November 2011.

Koyulhisar HPP VCS project activity underwent verification of the 1st monitoring period and thus the VCS Verification Report for Koyulhisar Hydro Electricity Power Plant for Monitoring period 17/11/2009 – 31/10/2011, v1.0 /9/, which confirms that for the mentioned period the project generated 218,948 tCO_2 GHG emission reductions, was issued on 21/12/2011.

- Implementation status of the monitoring plan and the completeness of monitoring

The final monitoring report /10/ follows the monitoring plan for Koyulhisar HPP VCS project activity, which is presented in VCS PD v1.4 /6/ and is in compliance with the approved methodology ACM0002 v12.1.0 /4/. During the verification process the suggested plan is proved to be applicable and credible for the 2nd (current) monitoring period.

The electricity metering equipment (see Table 5) are installed, calibrated and maintained by external parties, which are officially approved and subcontracted by TEIAS. Furthermore, calibration and maintenance of metering devices are entirely and only responsibility of the TEIAS.

Since the metering devices are imported, the Meter Compliance Certificate /18/, issued by the Aktifenerji Inşaat San.Tic. Ltd. on 10/08/2009, was required in order to confirm that the devices are in compliance with the national requirements on electricity metering devices.

As per the calibration test reports /16/ & /17/, the devices were tested on 13/08/2009 and all devices passed the test (see Table 5), i.e. the determined deviation was within the acceptable range. Furthermore, the Meter Compliance Certificate /18/ clearly states that meter re-calibration is not required within the first 10 year.

Table 5: Electricity metering equipment for Koyulhisar HPP

Location	*Meter Name*	*Brand and Model*	*Serial Number*	*Class*
Koyulhisar HPP Control room	Main	Actaris SL7000	53030781	Active: 0.5 Reactive: 2.0
	Back-up	Actaris SL7000	53030782	Active: 0.5 Reactive: 2.0

The listed metering devices, which correspond to the ones listed in the Koyulhisar HPP VCS PD v1.4 /6/, were perceived by the verification team during the on-site visit and their accuracy, calibration and maintenance was discussed. The Carbon consultant provided the VVB with a self-developed excel workbook, which serves for supervising the consistency of electricity generation data delivered by different sources, i.e. the TEIAS signed meter reading protocols /12/, the daily reports by plant manager /13/ and the PMUM data /14/.

Furthermore, as declared in the Koyulhisar HPP VCS PD v1.4 /6/ the diesel fuel consumption is also subject to monitoring and for the purpose the log book and the purchase receipts /15/ since the beginning of the 2nd monitoring period are collected and analysed. Therefore, The assessment of this parameters ($PE\_FC_{j,y}$) follows the validated monitoring plan.

In course of the site visit, carbon consultant expressed their intention to remove the parameter 'Fuel Consumption' from the monitoring plan for the future monitoring periods, since it contributes to less than 1% of the emission reductions generated by the power plant. In addition, the applied methodology does

not require monitoring of this parameter. Therefore, the VVB considered the exemption of the parameter 'Fuel Consumption' from the monitoring plan as reasonable and in line with the methodology ACM0002 v12.3.0

- Any remaining issues from previous validation or verification.

The Koyulhisar HPP is observed to operate as enlightened in the validated Koyulhisar HPP VCS PD v1.4 /6/ and observed during the 1st monitoring period by the VVB. As pointed out in the Final VCS Validation Report for Koyulhisar Hydro Electricity Power Plant, v1.0 /7/ and the VCS Verification Report for Koyulhisar Hydro Electricity Power Plant / Monitoring period 17/11/2009 – 31/10/2011, v1.0 /9/, no remaining issues resulted from the validation of the project and the verification of the 1st monitoring period

4.2 Accuracy of GHG Emission Reduction or Removal Calculations

The Monitoring Plan describes how the requirements related to the data acquisition and storage are being met. As described in the validated Monitoring Report /20/ and physically observed by the VVB during the on-site visit, 2 bi-directional meters (see Table 5), i.e. 1 main and 1 back-up meters, were installed in the control room of Koyulhisar HPP to measure electricity exported to and imported from the national grid.

The accuracy of the meters is 0.2 % (CLASS 02S) as required by national legislation ("Elektrik Piyasasinda Kullanilacak Sayaclar Hakkinda Teblig" (Communiqué for Metering Devices to be used in the Electricity Market). Based on the disclosed meter relevant documents, i.e. Meter Compliance certificate /18/ and the observations during the site visit, VVB confirmed that the implemented measuring equipment corresponds to the one listed in the VCS PD /6/ and is in compliance with the Turkish national law. In addition, the provided Calibration Test Reports /16/ & /17/ for the upper mentioned electricity meters, evidence the calibration process. The only entity which has the right to calibrate, maintain, exchange or decide on the metering devices is the TEIAS (Turkish Electricity Transmission Company) or any subcontractor appointed by TEIAS.

The process of calculation of emission reductions was thoroughly discussed during the site visit with the carbon consultant, the plant manager and the chief technician. Therefore, VVB confirmed that the main source of data for determining project's baseline emissions is the official meter reading protocols /12/ for the monitoring period delivered by TEIAS on a monthly basis, which corresponds to the validated VCS PD /6/. Plant manager clarified that TEIAS retrieved those data by a remote system, named OSF and send signed protocols to the PM. The meter reading protocols contain information on gross electricity (EG_{gross}) delivered to the Turkish national grid and electricity obtained from the grid ($EG_{self\ consumption}$) on a hour basis. Thus, carbon consultant developed a monitoring workbook /11/ where the monthly net electricity generation is determined, so that

$$\mathbf{EG_{net}=EG_{gross}-EG_{self\ consumption}}\ .$$

The workbook was carefully studied by the VVB, and the enclosed calculation re-computed. Following the requirements of the methodology ACM0002 v12.3.0 and using the combined margin emission factor for the system, which was determined ex-ante during projects validation, i.e. EF_{CM} = 52826 tCO_2/MWh, as illustrated in Table 6.

Table 6: Baseline emission reductions from Koyulhisar HPP

Period	$EG_{net}=EG_{gross}-EG_{self\ consumption}$	BL (tCO_2)
01/11/2011 – 31/12/2011	21,111	11,152
01/01/2012 – 31/12/2012	220,756	116,617
01/01/2013 – 31/07/2013	164,512	86,905
TOTAL	406,380	**214,674**

As the monitored and metered data recorded on the monthly TEIAS records is directly input to the emission reduction calculations the accuracy is considered very high in light of the materiality threshold of 5%.

- Project emissions

As discussed in the previous sections and indicated in the VCS PD /6/, the consumption of fuel diesel for the 4 auxiliary diesel generators, which are installed on project site, is also subject to monitoring. During the performed site visit, VVB was able to confirm the correct execution of the approved monitoring plan. Therefore VVB witnessed that for the period 01/11/2011 – 31/07/2013, ca. 580 l diesel fuel was consumed by the auxiliary diesel generators. Carbon consultant determined the corresponding emissions by using the default values adopted from the IPCC report, as 1.587 tCO_2 for the entire 2nd monitoring period (see Table 7)

Table 7: Koyulhisar HPP Project emissions due to combustion of fossil fuel (diesel) within the project area

Diesel Fuel (L)	Mass (Gg))	COEF ($kgCO_2/Gg$))	PE (tCO_2)	Share of the ER
580	0.0004901	3,238,840	1.587	**ca. 0.001%**

The VVB witnessed that the calculation of the project emissions, due to combustion of fossil fuel within the project area, are conducted accurately, based on reliable sources and in line with the approved methodology ACM0002 v 12.3.0. Thus, since the previous mentioned methodology suggests that emissions from auxiliary diesel generators could be neglected, and it was determined that for the monitoring period, these emissions correspond to less than 0.001% of the total generated emission reductions for the same period, carbon consultant declared that Koyulhisar HPP generates no project emissions, i.e.

$$PE_{DG}=0\ tCO_2$$

Finally, the verification team confirms that the total emission reduction (ER) from Koyulhisar HPP for the monitoring period from 24/05/2012 to 31/07/2013 is calculated correctly as

$$\mathbf{ER} = BL - PE_{DG} - LE = \mathbf{214{,}674\ tCO_2}$$

In conclusion, all calculations made in the monitoring workbook /11/ have been verified through re-computation by the Verification Team. The data used in the spreadsheet was tracked back to its origin at a coverage rate of 100% using the monthly TEIAS records. The consistency of all values and monthly generation amounts has been verified. The monthly generation data was again checked for consistency

by cross checking with daily production records of several months, where hourly records are taken by the plant operating staff and by cross check to the PMUM database.

4.3 Quality of Evidence to Determine GHG Emission Reductions or Removals

The monitoring procedure follows strictly the CDM methodology ACM0002 ver12.3.0 and the validated monitoring plan included in VCS PD /6/ Emission reduction calculations are based on the net electricity generation records delivered by the TEIAS to the PM /12/. In order to ensure data accuracy and reliability, the values implied for the emission reduction calculation are compared to ones obtained from other unbiased source. Hence the net electricity generation is determined by extraction of electricity consumed by the power plant from the national electricity grid from the gross electricity generated by the power plant and delivered to the grid. The data for gross electricity generation (EG_{gross}) and the self consumption ($EG_{self\text{-}consumption}$) are determined by the TEIAS from the main TEIAS meter, which is located in the control room of Koyulhisar HPP, and cross-checked by the TEIAS back-up meters. In addition the readings are also compared to the PMUM database. Additionally, carbon consultant presented an excel workbook, which also serves as quality management system, i.e. collect records on electricity generation by various source and evaluating their accuracy.

TÜV Rheinland Energie und Umwelt GmbH verifies that adequate monitoring mechanisms have been implemented at Damlapinar HEPP. The required parameters have been monitored on a monthly basis. This was verified during the site visit when the plant records were verified to assess the correctness of the reported data.

4.4 Management and Operational System

VVB scrutinized the monitoring plan used for determining the emission reduction by the project and confirmed that it is based on the approved methodology ACM0002 and follows strictly the VCS requirements. 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 validated monitoring plan includes 3 parameters for the calculation of the emission reduction, namely the electricity gross production (EG_{gross}),the electricity self-consumption ($EG_{self\ consumption}$) and the Fossil fuel consumption from auxiliary diesel generators. The first 2 parameters are continuously monitored by two independent metering devices at power plant.

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. The TEİAŞ records provide the data for the monthly invoicing and are accessible via the official PMUM website. It should be considered that the PMUM data reflect the transmission line losses and could be ca. 5% lower than the TEIAS data.

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

- TEİAŞ remotely reads the metering devices and thus monitors the electricity generation and consumption on a continuous basis.
- TEİAŞ signs the monthly records of the electricity generation and deliver them to the PP
- The PP cross-checks the records against their own daily readings, stores the records electronically and backs them up on a hard drive as well as on a CD.

- The PP forwards the electronic copies to the carbon consultant for the purpose of emission reduction calculations.
- The carbon consultant transfers the data into the monitoring workbook.

The data is collected according to well defined data collection procedures. The monitoring and reporting of parameters is in accordance with the established operational procedures as observed during the onsite visit. No documented instructions were requested and reviewed.

5 VERIFICATION CONCLUSION

The verification team of TÜV Rheinland Energie und Umwelt GmbH performed the verification for the Koyulhisar HPP in Turkey against the VCS Standard v3.3 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 v1.2 /10/ 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 (01/11/2011 – 31/07/2013) are displayed as follows:

GHG Emission Reductions	tCO_2
Baseline Emissions	214,674
Project Emissions	0
Leakage	0
Total GHG emission reductions or removals	**214,674**

And allocated as

Vintage	GHG Emission Reductions (tCO_2)
01/11/2011 – 31/12/2011	11,152
01/01/2012 – 31/12/2012	116,617
01/01/2013 – 31/07/2013	86,905
TOTAL	**214,674**

6 VERIFICATION STATEMENT

Bereket Enerji Üretim San. Ve Tic. A. Ş.
15 Mayıs Mh. 832 Sk. No:2 K:2 75. Yıl Esnaf Sarayı
DENİZLİ /Türkiye 09/09/2013

RE: Verification Statement – Koyulhisar Hydro Electricity Power Plant, Turkey under VCS, 2nd monitoring period from 01/11/2011 to 31/07/2013

Bereket Enerji Üretim San. Ve Tic. A. Ş.with registered office at 15 Mayıs Mh.. 832 Sk. No:2 K:2 75. Yıl Esnaf Sarayı Denizli, Turkey, has engaged TÜV Rheinland Energie und Umwelt GmbH to review and verify the VCS Monitoring Report for the 2nd monitoring period from 01/11/2011 to 31/07/2013 for Koyulhisar HPP VCS project activity and all assertions related to the GHG project against the latest VCS version 3 requirements.

The verification of the Emission Reductions generated from the VCS project activity for the indicated period is conducted in accordance to the VCS standard v3.2, VCS Program Guide v3.4, the standard ISO 14064-3 and the approved CDM methodology ACM0002 v12.3.0 and methodological tools to a reasonable level of assurance by applying a materiality threshold of 5%. The project information has been verified and the VCS Verification Report "VERIFICATION REPORT 21222980 - Koyulhisar HPP, Turkey" issued on 09/09/2013. The Verification Report includes all relevant information and evidence acquired during the Verification process.

Based on the on-site inspection and review of all available documentation, the validation team comes to the conclusion that the assertions are made in accordance with the requirements of the VCS program and are material correct and fairly represent the required parameters without material discrepancies. The Emission Reductions claimed for the 2nd monitoring period (01/11/2011 – 31/07/2013) of the first crediting period, are verified to be 214,674 tCO2, which is allocated as following:

- 11,152 tCO2 from 01/11/2011 to 31/12/2011;
- 116,617 tCO2 from 01/01/2012 to 31/12/2012;
- 86,905 tCO2 from 01/01/2013 to 31/07/2013

Cologne, 09/09/2013

Denitsa Gaydarova-Itrib

ANNEX A

Table 8: Verification Protocol

TÜVRheinland® Precisely Right.	**Quality Management Process Description**	Number:	QMA 2.533.A03
		Version:	2
	Annex 3: Verification requirements Based on the VCS Standard, version 3.3 (published 4 Oct 2012)	Valid as of:	14.01.2013
		Created by:	Wollenweber
		Approved by:	N. Heidelmann

Checklist question	Ref.	MoV[1] DR	MoV[1] I	MoV[1] FA	Findings, comments, references, data sources	Draft conclusion	Final conclusion
1. Implementation							
1.1 Have all physical features proposed in the registered PDD been implemented at the project site?		x		x	yes, during the site visit VVB observed that the project operates as described in the registered VCS PD and the monitoring report	ok	OK
1.2 Has the project activity been operated in accordance with the project scenario described in the registered PDD and relevant guidance?		x			yes, 3 generation units, turbines, are installed where 2 of them are generating electricity. And 1 is used in cases of maintenance	ok	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?		x		x	Observed during site visit project consists of 1 project location	ok	OK
2. Monitoring plan and methodology							
2.1 Is the monitoring plan established in accordance with the monitoring methodology?					yes, the monitoring plan complies with the approved methodology and is consistent with the monitoring plan suggested in hte PDD	Ok	OK
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)?					N.A. - see 2.1. - monitoring plan is corresponding to the one indicated in the VCS PD	Ok	OK
2.2.1 Have the above changes to the monitoring plan been approved by the CDM EB?					N.A.	Ok	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)					yes	ok	OK

Monitoring period					01/11/2011 - 31/07/2013		
Parameters					EG_gross; EG_self.consump; fossil fuel consumption		
Meter Ser.-No., physical location, transcription					2 meters (Actaris SL 7000 SL761), located in power plant		
3.2 Are all baseline emission parameters monitored and updated in accordance with monitoring plan, monitoring methodology and relevant CDM EB decisions?					yes		
EF(combined)					EF_CM is not monitored, since the EF is calculated as ex-ante		
EG(PP-gross) and EG(PP-selfconsumption) See parameters in section 4					data in EG_gross and EG_self.consump are retrieved in accordance to the monitoring plan, approved during project's validation, which is compliance with the applied approved CDM methodology	Ok	OK
3.2.1 Was the monitoring equipment for baseline emission parameters controlled and monitoring results recorded as per approved frequency? *On-site implementation of data transfer & management*					yes, the metering devices were controlled during hte site visit. It was determined that the metering equipment corresponds to the one indicated in the VCS PD. The monitoring data are collected and perceived as described in the VCS PD.	Ok	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? *Calibration certificates for all meters*					the electricity metering devices were installed and calibrated by the authorized company and in compliance with the national legislation, i.e. communiqué for Metering Devices to be used in the Electricity Market. Calibration certificates were provided to the VVB. Per legislation, calibration is	ok	OK
3.3 Are all project emission parameters monitored and updated in accordance with monitoring plan, monitoring methodology and relevant CDM EB decisions? *FC(iy) and A(PJ) see below parameters*					yes, project emission parameters, fossil fuel consumption, has been monitored in accordance to the applied CDM methodology and as described in the validated VCS PD	OK	OK
3.3.1 Was the monitoring equipment for project emission parameters controlled and monitoring results recorded as per approved frequency? *Transcription procedure on site*					Yes – log book	OK	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?					no calibration required.	OK	OK

E.g. name plates of turbines, google earth image							
3.4 Are all leakage emission parameters monitored and updated in accordance with monitoring plan, monitoring methodology and relevant CDM EB decisions?					N.A.	N.A.	OK
3.4.1 Was the monitoring equipment for leakage emission parameters controlled and monitoring results recorded as per approved frequency?					N.A.	N.A.	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?					N.A.	N.A.	OK
3.5 Were all monitoring parameters available and verifiable through the whole monitoring period?					yes, the monitoring parameters were monitored as per monitoring plan. VVB witnessed row EG data. The collection of data is sufficiently explained and the quality of data guaranteed. The parameters were verifiable at any time of the monitoring period.	ok	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? Reference: <http://cdm.unfccc.int/EB/026/eb26rep.pdf>, §109(b)					N.A.	N.A.	OK
3.6 Was management and operation system established and operated in accordance with the monitoring plan?					yes, in addition a monitoring manual was also set up by the carbon consultant, a workshop was provided to the relevant people.	ok	OK
3.7 Was is it possible to verify that involved management and operation personal is fully aware of the responsibilities and perform all operations according to the registered monitoring plan and internally developed manuals?					the employees involved in the monitoring of carbon project are observed to be aware of their responsibilities and duties.	to be prove on site	OK
4. Parameters							
4.1 **Monitored parameter** Title: Units:					total gross electricity generation of the power plant EG_gross; MWh	ok	OK

Estimated value (ex-ante): Measured value (ex-post):					yes		
Monitored parameter Title: Units: Estimated value (ex-ante): Measured value (ex-post):					Electricity consumed by the power plant from the Turkish national grid EG_self.consump MWh yes	ok	OK
Monitored parameter Title: Units: Estimated value (ex-ante): Measured value (ex-post):					Fossil fuel consumption L yes	ok	OK
4.2 **Default parameter** Title: Indication: Unit Default/Used value:					Combined margin Emission factor for Turkey EF_{CM} T CO_2/MWh 0.5332	ok	OK
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? *Validated EF(CM)*					Yes, the baseline emissions are calculated accordingly using the net electricity generation and the combined margin emission factor (see 4.2 above)	ok	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?					Yes, the calculations of project emissions in the case include only possible emissions from the resulting reservoir area, which finally is determined to be small enough, so that PE = 0	ok	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?					N.A.	N.A.	OK

ANNEX B

Table 9: List of Requests for Corrective Action (CAR) and Clarification (CL)

CAR	CL	Observation (CAR/CL)	Doc Reference No.	Summary of project owner response	Validation team comments	Validation team conclusion
x		CAR 1. Please revise the description in order to illustrate the real situation. The project is operational and therefore relevant information and data are to be included.	VCS MR 1.1	Please see version 1.1 of the Monitoring Report	Closed	Ok
x		CAR 2. Please indicate 1st monitoring period as milestone	VCS MR 1.1 table 1	The first monitoring period was indicated as a milestone in "Table 2: Significant dates for the project monitoring period "	Closed	Ok
x		CAR 3. Please indicate the date of DSI approval for the revised FSR. I suppose it is already approved	VCS MR 1.1 table 1	Please see version 1.1 of the Monitoring Report	Closed	Ok
	x	CL 1. Please notice that provided purchase receipt indeed sum up to 580L, however it seems that 100 L were required for the period from 09/2012 till 12/2012, but what about for the time before, meaning from 11/2011 till 09/2012. Please provide any previous purchase receipt. Basically, it would not influence the final conclusion that those emissions are neglectable, but just for completeness of the report.	VCS MR 3.2	Not all the fuel was used but we have made our calculations as if all of it was used. The purchase is relatively high as one generator was stolen.	Closed	Ok
	x	CL 2. I suppose it shall be also mentioned that TEIAS perform the monthly readings also remotely and the reports are mailed to the PO. Isn't it the case for this power plant?	VCS MR 3.3	Yes TEIAS is also remotely reading the data but they are still visiting the site monthly and signing the protocols.	Closed	Ok
x		CAR 4. please provide data for EG in July and revise the ER calculations respectively	KoyulhisartoTUV-RNFP(2ndMR Period) v1.0.xlsx	Updated Please see version 1.1 of the Monitoring Report	Closed	Ok
	x	CL 3. please clarify, why in the 2nd (current) monitoring period, more diesel fuel is used than during the 1st one.		The Diesel fuel used in the calculations is the fuel documented by purchase receipts however the plant manager admitted that they lost one generator due to teft and lost both the generator and the fuel in its tank.	Closed	Ok
	x	CL 4. please clarify the value 0.101 which appears in cell 'VER calculation'H13:J13. you can either neglect hte PE, as indicated in the	KoyulhisartoTUV-RNFP(2ndMR	This was a typing error this is now corrected in the Excel book, and the monitoring report version 1.1.	Closed	Ok

	MR2, or consider the real measure PE, as calculated in 'GeneratorPower(2)' I would prefer if set the PE=0	Period) v1.0.xlsx			
x	CAR 5. please correct the value of cell 'monthlyVER'C41 to = 'Data Summary'!N18	KoyulhisartoTUV-RNFP(2ndMR Period) v1.0.xlsx	This was a typing error this is now corrected in the Excel book, and the monitoring report version 1.1.	Closed	Ok

ANNEX C – LIST OF PARTICIPANTS TO THE SITE ASSESSMENT ON 26/08/2013 & 27/08/2013

/ Koyulhisar HPP

TÜVRheinland®
Precisely Right.

Monitoring Period 01/11/2011 to 31/07/2013
VCS Verification
Social Carbon Point ONE

On-Site-Assessment
Date: 26/08/2013

LIST OF PARTICIPANTS

KATILIMCI LISTESI

Participant (name) Katılımcı (adi)	Position Meslek	Institution Kurum/İşveren	Signature Imza
Aslı Öztürk	Consultant	Ekobil Ltd.	
Özgün GÜL KOPALAN	Hidrobiyolog	Bereket Enerji Üretim A.Ş.	
Hüseyin GÜRARSLAN	Environmental Engineer	Bereket Enerji Üretim A.Ş.	
Serdal POLAT	Environmental engineer	Bereket Enerji Üretim A.Ş	
İhsan SE			

/ Koyulhisar HPP

Monitoring Period 01/11/2011 to 31/07/2013
VCS Verification
Social Carbon Point ONE

TÜVRheinland®
Precisely Right.

On-Site-Assessment
Date: 27.8.2013

LIST OF PARTICIPANTS

KATILIMCI LISTESI

Participant (name) Katılımcı (adi)	Position Meslek	Institution Kurum/İşveren	Signature Imza
Aslı Özçelik	Consultant	Ekobil Ltd.	
Veli Aygül	İnşaat Müh.	DSİ 192 Şube Müdürü	
İhsan ŞEKER	Elektrik Müh	Bereket Enerji	
Özgün GÜL KOPARAN	Hidrobiyolog	Bereket Enerji Üretim A.Ş.	
Ahmet YILDIZ	Personel Şefi	Bereket Enerji üretim A.Ş	
Sena POLAT	Çevre Mühendisi	Bereket Enerji üretim A.Ş	
Hüseyin GÜRARSLAN	Çevre Mühendisi	Bereket Enerji Üretim A.Ş.	
Murat Özçelik	Consultant	Ekobil Ltd.	
Denitsa Gaydarova-Iteit	DOE / VVB	TÜV Rheinland GmbH	
Hüseyin ÖZER	Orman İşletme Müdürü	Koyulhisar Orman İş.Md.	
Mehmet YILMAZ	Yazı İşl. Md.	Koyulhisar Kaymakamlığı	
Adnan KLEMENDİK	Aşçı	Eta Lastiği	
Enver Kılıç	Kalebaşı Köyü. Mh.	Çiftçi	
Süleyman Coşkun	Kemal kantarcı ekibi	Bereket enerji üretim	