

KOYULHISAR HYDRO ELECTRICITY POWER PLANT



Document prepared by: TÜV Rheinland

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Prepared By	TÜV Rheinland
Contact	Am Grauen Stein, 51105 Cologne, +49 221 806 3553, carbon@tuv.com , www.tuv.com/carbon
Approved By	Ralf Kober (Technical Reviewer)
Work Carried Out By	Norbert Heidelbergmann (Team Leader) Karla Alcantar Sanchez (Trainee)

Summary:

Validation of a 63 MWe HEPP according to VCS v.3 applying CDM methodology ACM0002. "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" v.12.1.0, in combination with the "Tool to calculate the emission factor for an electricity system", v.02.2.1 and the CDM Additionality Tool, v.5.2.1. Validation was made to a reasonable level of assurance also applying the requirements outlined in VCS v.3. The project information validated includes the VCS PD and all relevant information and supporting evidence acquired during the validation process. The first output of the validation process is a list of Clarification and Corrective Actions Requests (CL and CAR). Taking into account this output, the project proponent (PP) revised its project design document. The validation team has come to the conclusion that based on the on-site assessment and all available documentation the GHG assertion is made in accordance with the requirements of the VCS programme, is materially correct and fairly represents the GHG emissions data and information without material discrepancies.

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INTRODUCTION

This report summarizes the findings of the validation of the Koyulhisar Hydroelectric Power Plant project, performed on the basis of VCS criteria, as well as criteria given to provide for consistent project operations, monitoring and reporting.

The validation team consists of:

Norbert Heidelmann, TÜV Rheinland, Cologne, Germany
(Team Leader; CDM auditor for sectoral scopes 1, 13 and 15)

Dr. Karla Alcántar Sánchez, TÜV Rheinland, Cologne, Germany
(Trainee)

Ralf Kober, TÜV Rheinland, Cologne, Germany
(Technical Reviewer; CDM auditor and reviewer for sectoral scopes 1, 7, 13)

1.1 Objective

The purpose of the Validation Report is to confirm that the Koyulhisar Hydroelectric Power Plant project (hereafter the project) and all related project documentation conforms with all rules and requirements of the VCS Standard v.3 and the applied GHG methodology, here ACM0002, version 12.1. and its associated tools.

The validation serves as project design verification and is a requirement of all projects. The validation is an independent third party assessment of the project design. In particular, the project's baseline, the monitoring plan, and the project's compliance with relevant VCS criteria which are validated in order to confirm that the project design, as documented, is sound and reasonable, and meets the stated requirements and identified criteria.

Further the validation shall be made for an initial crediting period of 10 years (17.11.2009 - 16.11.2019) as being part of possible 3 x 10 years of crediting period in total. Therefore, this is to be considered the first validation process for this project. Upon successful validation the project shall be approved by the VCS program to be included as a registered VCS project generating Verified Carbon Units (VCUs).

1.2 Scope and Criteria

The criteria for validation are the rules and requirements of the VCS Standard V.3, in particular the principles articulated in section 2.4 of the VCS Standard V.3. The VCS-PD applies an approved methodology from the UN Clean Development Mechanism (CDM). In this context, the methodology ACM0002, version 12.1, the methodological tool "Tool to calculate the emission factor for an electricity system, version 2.2.1" and the CDM Additionality Tool, version 5.2.1 are additional criteria for the project.

The scope of validation is set in section 3 of the VCS Standard V.3. It includes the following key areas:

1. The VCS-PD is complete and fulfils the requirements of section 3.19 of the VCS Standard V.3
2. The chosen methodology ACM0002 is applicable to the project
3. The project boundary is identified in accordance with ACM0002
4. The baseline is chosen in accordance with ACM0002 and properly justified
5. The emission factor for grid-based electricity is established in accordance with the “Tool to calculate the emission factor for an electricity system”.
6. The data and parameters for the quantification of the GHG emission reductions are provided in accordance with ACM0002
7. The monitoring plan establishes a reliable GHG information system for obtaining, recording, compiling and analyzing data for the quantification of GHG emission reductions.
8. The additionality of the project is demonstrated in accordance with the CDM Additionality Tool

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

1.3 Level of assurance

The Validation Statement is made to a reasonable assurance level, and a materiality threshold of 5% is applied for identification of material omissions as required by VCS v.3 paragraph 5.3.1. item 4.

In order to comply with the requirements of VCS v.3 the validation shall be carried out selecting data and evidence to provide a reasonable level of assurance as stated in the VCS v.3 paragraph 5.3.1. item 1). In general it shall be adhered to the procedures as defined in ISO 14064-3.

1.4 Summary Description of the Project

The project is located on the geographic coordinates: Latitude: 40°16'13,48' North and Longitude: 37°50'55,58' East, on the downstream of two state owned dams: Kılıçkaya Dam (124 MW) and Çamlığöze Dam (33MW), operating as peak power plants with a maximum flow rate of 160 m³/s in Turkey. The project collects the water that leaves the spillway of Çamlığöze Dam and it is kept up to 5 hours behind the spill weir regulator. The water is transferred to a set of open canals and tunnels that bring the water to a head pond from which it is loaded to the penstock that brings pass the water to the power house where it reaches a multiple diversion weirs and a power station with 3 Francis-type turbines. Figure 1. One of these three turbines is installed as a standby unit, intended to operate only whenever one of the other two turbines will not be operating for the purpose of maintenance and repair. The head difference between the spill regulator and the tail water of 101 m and a project flow of 28 m³/sec.



Figure 1. Plate -Francis turbine at the power station.

The weirs have a reservoir with roughly 1,204,040 m² surface area. Figure 2. The turbines have a capacity of 21 MW each, totalling to 63 MW, according to the turbine purchase contract. The estimated net power supply to the grid is 220 GWh per year, this has been recalculated by considering, a well documented, 16% production loss due to the seasonal and topographic conditions (37, 40). The generated power will be supplied to the national power grid via a 154 kV transmission line.

The project aims at the reduction of greenhouse gases in Turkey by substituting emissions from fossil fuel fired power plants. The validation team was able to confirm the accuracy of the project description by reviewing maps and technical drawing during the site visit, as well as interviews and inspections conducted during the on-site audit.



Figure 2. Reservoir's area.

The project participant and the carbon consultant participated at the onsite assessment on October the 05th, 2011 were:

- Özgür Erol from the company Bereket Enerji Üretim San. ve Tic. A. Ş. Project finance manager (project participant)
- Özgün Gül from the company Bereket Enerji Üretim A. S., Environmental Officer (project participant)

- Emre Özer from the company Bereket Enerji Üretim A. S. Deputy Project finance manager.
(project participant)
- Zahid Karakaya from the company Turkuaz Karbon Varlik Yonetimi Enerji Pro. Dan. San. Ith. Ihr. Ltd.
Sti.. Managing Partner, PD developer
(carbon consultant)
- Asli Sezer Özcelik and Murat F. Özcelik from the company Ekobil Ltd., Managing Partners
(carbon consultant)

2 VALIDATION PROCESS

2.1 Method and Criteria

The overall validation, from Contract Review to Validation Report & Opinion, was conducted by using TÜV Rheinland's internal procedures. Mainly, in order to ensure transparency, a validation protocol was customized for the project. The protocol shows, in a transparent manner, criteria (requirements), means of verification and the results from validating the identified criteria. The validation protocol serves the following purposes:

- It organizes, details and clarifies the requirements of a VCS project is expected to meet;
- It ensures a transparent validation process where the validator will document how a particular requirement has been validated and the result of the validation.

Validation Schedule

Contract award for validation	2011- 09 - 09
Receipt of Draft VCS PD	2011- 09 - 20
Desk Review Findings	2011- 09 - 28
On-site assessment	2011-10 – 05/06
Validation Protocol	2011-10 - 07
Draft Validation Report	2011-10 -17
Internal Technical Review	2011-11 -08
Final Validation Report	2011-11 -11

The validation process begins when the PPs submit the VCS PD to the validation team along with additional supporting information, in particular spreadsheet for the calculation of the combined margin grid emission factor and the investment analysis. The validation team then reviews the documents and submits the desk review findings to the PPs. During the on-site visit, the validation team meets with the project company in a conference room as well as the project site. The validation team confirms that the

actual project conforms to the VCS PD, collects further supporting documents and discusses the desk review findings with the PPs. Following the site visit a validation protocol is shared with the PPs. The protocol lists all Corrective Action Requests (CARs) and Clarification Requests (CLs) The CAR/CLs are then closed by the PPs who are delivering additional supporting evidence and make necessary amendments to the VCS PD. Once all CARs/CLs are closed the validation team drafts the validation report. It is issued, after successfully passing the Internal Technical Review.

2.2 Document Review

The Project Description submitted by Ekobil Ltd., (who is not a project participant, it is acting as carbon consultants for this project and is also responsible for the transaction of the credits as stated in the PD) and additional background documents related to the project design and baseline, i.e. country Law, VCS Project Description Template, Approved methodology, Kyoto Protocol, Clarifications on Validation Requirements were reviewed.

To address TÜV Rheinland's corrective action request and clarification requests Ekobil Ltd., revised the Project Description and resubmitted it to the validation team in October the 12th, 2011. After further clarifications all corrective action requests and clarification requests were closed in November the 8th 2011. All documents were reviewed under the requirements of the related CDM Methodologies, tools and VCS v.3 rules.

The documents as indicated below have all been reviewed during the validation process and are referenced along the validation report.

No	Document	Comment	Date
1	VCS project description	<i>VCS project description v.1.4</i>	08.11.2011
2	1b-KoyulhisarPre-EIAPrjctIntFileAnexes.pdf	<i>Pre- Environmental Impact Annexes</i>	05.03.2004
3	1-KoyulhisarPre-EIAPrjctIntroductoryFile.pdf	<i>Preliminary Environmental Impact Assessment – Project Introduction File</i>	April 2005
4	2-EIA exemption certificate.pdf	<i>EIA Not Required Statement</i>	10.06.2005
5	3-Fish Ladder.pdf	<i>Drawing fish ladder</i>	24.07.2009
6	4b-Production Licence UpgradeRequest.pdf	<i>Production License upgrade</i>	17.11.2009
7	4-Production Licence.pdf	<i>Production License</i>	10.02.2005
8	5-Company Certification by Co Commerce.pdf	<i>Company certification</i>	12.07.2005

No	Document	Comment	Date
9	6_Koyulhisar Initial Feasibility Approval.pdf	<i>Initial feasibility approval</i>	28.06.2004
10	7-Water Usage agreement .pdf	<i>Water Usage</i>	12.10.2005
11	8-Stakeholder Consultation Documents.pdf	<i>Stakeholder consultation</i>	23.10.2006
12	10_Credit agreement / Koyulhisar36mio\$creditcontract.pdf	<i>Credit agreement</i>	07.08.2006
13	10_Credit agreement / Koyulhisar17.8\$creditadgingcontract.pdf	<i>Credit agreement 2</i>	03.09.2008
14	11-KoyulhisarBoardDecisionCarbonFinance.pdf	<i>Board Decision Carbon finance</i>	05.01.2009
15	12-KOYULHISAR NHS Record Construction Start.pdf	<i>Construction starts</i>	17.06.2009
16	13-Provisional Acceptance of first 2 Units.pdf	<i>Two turbines acceptance</i>	17.11.2009
17	14-Application Letter 3.rd Unit.pdf	<i>third turbine acceptance</i>	17.11.2009
18	15-Application to DSI for Approval of Revised Fizibility.pdf	<i>DSI approval of the feasibility</i>	03.09.2009
19	15bKoyulHisarRevizedFeasibilityTR.pdf	<i>Revised feasibility study</i>	August 09
20	16-TurkuazCarbonContract.pdf	<i>Carbon contract agreement</i>	02. Jul 11
21	29_bereketTaxPlate.pdf	<i>Taxes references (payment)</i>	24.11.1998

No	Document	Comment	Date
22	30_Koyulhisar Financial analysis.xlsx	<i>Supporting spreadsheet for calculation of combined margin emission factor for grid-based electricity. Supporting spreadsheet for investment analysis</i>	-----
23	31_Koyulhisar_CM_2010.xlsx	<i>Combine margin calculation</i>	2010
24	32_StateofThevoluntaryMarket2010.pdf	<i>Voluntary market information</i>	14.07.2010
25	17_6094_Renewable Energy Law.docx	<i>Renewable energy Law</i>	29.12.2010
26	26_Koyulhisar_grid conection agreement.pdf	<i>Grid connection agreement</i>	21.12.2005
27	18_Bereket Energy Product sheet.xls	<i>Energy production control sheet</i>	-----
28	19_By-Law on EIA.doc	<i>EIA Regulation English version</i>	17.07.2008
29	20_By-Law on EIA_tr.doc	<i>EIA Regulation Turkish version</i>	17.07.2008
30	21_Contract Agreement 1. and 2. unit.pdf	<i>Contract agreement for the three turbines</i>	28.06.2005
31	22_Koyulhisar coordinate 1.jpg	<i>Coordinate of the project figure 1</i>	06.09.2011
32	23_Koyulhisar coordinate 2.jpg	<i>Coordinate of the project figure 2</i>	06.09.2011
33	24_Koyulhisar Reservoir Area.pdf	<i>Reservoir area proof document</i>	2005
34	25_Ref_Worldbank_Study.pdf	<i>Reference for the financial analysis</i>	01.04.2009

No	Document	Comment	Date
35	27_Reading protocol.pdf 27a_Database readings.pdf	<i>Example of reading protocol</i>	Example report dated 03.10.2011
36	28_official guarantee letter of the meters.pdf	<i>Meters' Technical sheets</i>	10.06.2009
37	33_KOYULHİSAR HES jeoloji 2006.doc	<i>Geological conditions report</i>	2006
38	34_Koyulhisar Turbine Contract Agreement.pdf	Turbine purchase contract	26.06.2005
39	35_RenewableEnergyLaw6094Amendmend toRELaw5346.pdf	Law on Amendments on the law on Utilization of renewable energy resources for the purpose of generating electrical energy	29.12.2010
40	36_climate articles.zip	Climate articles	2010

The following table summarizes how the documents were used to validate key issues.

Validation criteria	Document references
Project Description	1-4, 9, 19, 27, 31-33, 38, 39
Baseline emissions	14, 16, 17, 26
Project start date and crediting period	6, 8, 15, 19
Project ownership	2, 6, 7, 8, 11, 12, 20-23, 30
Additionality - Investment barrier	14, 19, 20-23, 24, 34
Environmental	2, 3, 5, 9, 10, 13, 18, 19, 25, 28, 29, 33, 37, 39, 40
Monitoring	16, 17, 20, 35, 36

2.3 Interviews

The validation team interviewed the following persons:

- Özgür Erol from the company Bereket Enerji Üretim A. S. Project finance manager. He gave support in all related matters to the financial analysis (investment analysis, operation cost, financial, cash flow, etc.)
- Özgün Gül from the company Bereket Enerji Üretim A. S., Environmental Officer. She provided the documentation related to Environmental Impact Assessment, documents to support the environmental conditions of the site.
- Zahid Karakaya from the company Turkuaz Karbon Varlik Yonetimi Enerji Pro. Dan. San. Ith. Ihr. Ltd. Sti.. Managing Partner. He gave support in checking the documents related to the different validation criteria as well as providing any potential proof documents related to current conditions of the project such as reading protocols (35), fish ladder conditions, data recording process, etc. Moreover, he helped to solve the list of CARs and CLs previously sent by the Validation Team.
- Asli Sezer Özcelik and Murat F. Özcelik from the company Ekobil Ltd., Managing Partners. They clarified the distribution of generators on site and their importance along the whole process. Additionally, they produced an updated version of the PD.
- Emre Özer from the company Bereket Enerji Üretim A. S. Deputy Project finance manager. He gave support in all related matters to the financial analysis (investment analysis, operation cost, financial, cash flow, etc.)
- Enver Kaya, Operator on site from the gate upstream the canal. He described the system, that it is aimed at re-directing the canal by using a manual open-close system. The gate is mainly is open to re-direct the water flow in excess in case there are maintenance activities or there is an excess of flow which needs to be divided into two canals.
- Erhan Sahin, operator at the power plant of the project. He gave an overview of the training process an operator needs to attend in order to operate the power plant. Moreover he explained the meaning of the figures presented on the meter's panels and brake indicators, as well as the procedure follow during maintenance and starting up stages. Finally, he showed how the different readings related to self-consumption, generated electricity; peak values, etc. can be read from the main and back up meters just by using the menu -button in order to display the desired information.

2.4 Site Inspections

The site visit took place from October the 5th until October the 6th and included desk review and visits to the auxiliary power generators at the emergency drainage gates and the power plant.

2.5 Resolution of Any Material Discrepancy

The validation protocol was prepared following the site visit during which all issues identified during the desk review were discussed. All CAR/CLs have been resolved by PPs via provision of additional supporting evidence and appropriate changes to the PD, as shown in Annex A.

3 VALIDATION FINDINGS

In the following sections the findings of the final validation are stated. The validation findings for each validation subject are presented as follows:

- 1) The findings from the desk review of the project document and the findings from interviews during the follow-up visit are summarised. The findings were recorded in the Validation Protocol.
- 2) Where TÜV Rheinland has identified issues that needed clarification or that represented a risk to the fulfilment of the project objectives, a Clarification or Corrective Action Request, respectively, has been issued. The Clarification and Corrective Action Requests are stated, where applicable, in the following sections and are further documented in the Validation Protocol. In total for validation steps 11 Corrective Action Requests and 42 Clarification Requests have been raised.
- 3) Where Clarification and Corrective Action Requests have been issued, the response by the project participants to resolve these requests is summarized in the final validation report.
- 4) The final conclusions of the validation are presented consecutively.

3.1 Project Design

The Project Activity involves generation of electricity from renewable sources. The purpose of the Project Activity is to generate power in an efficient, clean, reliable and sustainable way with utmost respect on social and environmental reflections and to reduce emissions by partially substituting the electricity supply of fossil fuel fired power plants in Turkey.

The project's spatial boundaries are clearly described for the project installation and respective emissions reduction through electricity generation by renewable energy. The geographical coordinates are also included in the PD.

The crediting period will cover the interval of 17.11.2009-16.11.2019. The Technical Description presented in the PD shows a complete description of the project's system and gives sufficiently information about the used equipment. The employed technology does reflect current good practice concerning the installation and operation of hydro power plants. Under regular conditions the operational lifetime of the project will exceed this indicated time frame.

The project is a new power unit and it did not replace an old plant. The project consists of multiple diversion weirs and a power station with 3 Francis-type. One of these three turbines is acting as standby unit for purposes of maintenance and repair only. The weirs have a reservoir with roughly 1,204,040 m² surface area (33). The turbines have a capacity of 21 MWe each, totalling to 63 MW, according to the turbine purchase contract (38). The net power supply to the grid was initially estimated to be 262.365 GWh per year, according to the feasibility study (19), but it has been recalculated and very well documented (37,40) that 16% of the production capacity will be a loss due to the seasonal and topographic conditions; therefore the effective power supply is ex-ante determined to be 220.000 GWh/y. The generated power will be supplied to the national power grid via a 154 kV transmission line. The correctness of the project description was confirmed during the site visit. The description is in line with the feasibility study (19), the license (6), the turbine purchase contract (38) and the technical drawings reviewed on site.

The project is in line with Local Environmental requirements. In addition, the project with regards to economic, social and environmental impacts has been assessed and has been judged as being neutral or positive. The project location is clearly described in the PD and in line with the information provided in the feasibility study.

Various laws and regulations are applicable prior and during implementation of hydropower projects in Turkey. Annex 1 of the VCS-PD lists the applicable laws and regulations. The most important documentation is the license issued by the Energy Market Regulatory Authority (EPDK). The license for the project was issued in 2005 (7), upgraded in 2009 (6) and the EIA-Not Required Statement were issued in 2005 (4). The water utilization agreement was obtained in the same year (10).

According to section 1.1 of the VCS PD the project is owned by Bereket Enerji Üretim San. ve Tic. A. Ş. The ownership of the project can be verified by the EPDK license, the DSI water utilization agreement (10), the turbine purchase contract (38) and the EIA Not Required Statement (4). The ownership was also verified by interviews during onsite-visit.

3.2 Application of Methodology

3.2.1 Title and Reference

According to the VCS PD, the PP has applied the approved CDM methodology ACM0002 "Consolidated baseline methodology for grid-connected electricity generation from renewable sources" v.12.1. Version 12.1 of the methodology currently in effect. The methodology requires application of the "Tool to calculate the emission factor for an electricity system", v.02.2.1, the CDM Additionality Tool, v.5.2.1 and Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion", v 02.

3.2.2 Applicability

ACM002 is an approved CDM methodology and is explicitly supported by VCS Standard v.3. The project meets the relevant applicability conditions of ACM0002 and the "Tool to calculate the emission factor for an electricity system".

- The project is a newly installed grid-connected renewable electricity generation project.

- No other power project was operated previously at the site of the project activity;
- The project is a run-of-the-river power plant, and its power density is much higher than 10 W/m²
- The project does not involve co-generation

3.2.3 Project Boundary

The VCS PD defines the project boundary as the project power plant and all power plants connected physically to the electricity system that the project power plant is connected to. This is in line with ACM0002.

The relevant baseline emission source is CO₂ emissions from existing and new grid-connected power plants that are replaced by the project activity.

According to the methodology ACM0002 project emissions from water reservoirs of hydropower projects have to be considered. They are zero when the power density (installed capacity / reservoir surface area) exceeds 10 W/m² (33). According to the VCS-PD the power density is 52 W/m², which is based on the reservoir area and the installed capacity (19, 33); hence project emissions from the reservoir can be excluded.

The project applies 5 auxiliary diesel generators potentially resulting in emissions from the occasional use of these generators. These emissions will be determined based on the "Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion" (Version 02).

3.2.4 Baseline Scenario

ACM0002 defines the baseline as "Electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the "Tool to calculate the emission factor for an electricity system". Baseline emissions are calculated as the product of electricity produced by the project multiplied by the emission factor for the electricity system.

The initial PD was submitted on 20/09/2011. Both the tools and the guidance are the latest available versions at the time of PD submission to the DOE, and are found appropriate by the validation team. Clean Development Mechanism Methodologies are approved under the VCS program.

3.2.5 Additionality

The demonstration of additionality follows the CDM Additionality Tool, version 5.2. A three-step process is used, closely matching the requirements of the VCS Standard V.3. where Regulatory Surplus, Implementation Barriers and Common Practice criteria need to be fulfilled.

Step 1: Regulatory Surplus: The construction of hydro-electric power plants at the project location is not mandated by any Turkish law.

Step 2: Implementation Barrier: Investment Analysis

The PP used an investment analysis to demonstrate the project is not economically attractive in the absence of the VER revenue. The investment analysis is prepared following the Guidance for the assessment of investment analysis”.

The validation team reviewed the investment analysis provided as a supporting spreadsheet by the PP.

To determine whether the project is economically feasible without the revenue from the sale of verified emission reductions, the benchmark analysis is chosen. The company has made the investment decision based on this feasibility study (19) that was finalized on September 8th, 2006. The construction started in January 2009.

Equity IRR was selected as a financial indicator. The selected benchmark was assessed to be applicable to the type of IRR calculated as per the guidelines given in “The tool for the demonstration and assessment of additionality”. According to the tool a relevant benchmark for equity IRR can be derived from the World Bank study with its equity IRR of 15%.

Benchmark analysis is applied. This is appropriate since the company has the choice to either invest or not invest. There is no alternative power plant investment possible at the project site. The baseline alternative is power supply from the grid. The project could be implemented by an entity other than PP. PP have provided publically available data sources to derive benchmark rate. The required return on equity is based on a World Bank study and the stipulated terms for a medium-term loan are conservative based on the experience from other Turkish renewable energy projects.

All the financial indicators are taken from the revised feasibility data (19). The electricity sales price is taken as 5.5 EUR-Cent per kWh (7.3 USD-Cent per kWh), which is the minimum purchase guarantee of the State (25, page 77). Hence this sales price is accepted by the validation team. The annual net electricity generation is taken as 220,000 MWh in line with the generation license.

Equity IRR of Koyulhisar HEPP is calculated as 10,90% based on the parameters given in the table without considering the carbon revenue.

The documents used to validate all the assumptions in IRR calculation are given in the following table:

Parameters	Validated Value	Means of validation
Installed Power	63 MW	Production license (6,7)
Expected Annual Net Electricity Generation	220,000 MWh	Geological conditions report and climate articles (37, 40)
Electricity sales price	0,073 USD/KWh	Renewable Energy Law no:6094 (25)
Depreciation periods	Equipment: 20 years Construction: 45 years	Local rules and regulations
Annual Operation Cost	\$2,247,822	References were provided to the validation team
Total investment	\$ 98,870,000	Feasibility study report (19)
Loan	\$ 54,700,000	Loan Agreement, 9 years

The analysis of the Sensitivity Analysis applied to the following items: Investment Cost, Operating Cost and Electricity Revenue for a decrease of 5% and 10% and for an increase of 5% and 10%.

According to this sensitivity analysis; when the investment cost decreases 10%, the equity IRR of the project activity rises up to 13.3% without VCU revenues. The equity IRR value decreases with the rise of the investment cost downs to 9.1 %. Moreover, when the operational cost decreases 10%, the IRR of the project activity rises up to 11,1% without VCU revenues. The equity IRR value decreases with the rise of the operational cost downs to 10,7%. Finally, raising the electricity revenue 10%, the IRR of the project activity rises up to 12,4% without VCU revenues. The IRR value decreases with the decrease of the electricity revenue down to 9,3% without VCU revenues. None of the parameter deviations made within this sensitivity analysis will lead to an IRR on equity figure higher than the benchmark of 15%.

The electricity price for renewable power plants has been fixed by Renewable Energy Law (25) and no revisions are expected in the following years. Therefore no fluctuation is expected in the electricity revenue exists. The operational cost will be same during crediting period as the capacity of the power plant is limited by the license given (6) and no additions are applicable. Therefore, the maintenance and operational cost will be same as well as the number of personnel working for the plant.

Step 3: Barrier Analysis: Technological Barriers

Though not required, in order to strengthen the additionality aspects the PP has undertaken an analysis of the technical barriers that the project faces. Since the project relies on an open canal system located, at the North Anatolian Fault Zone, the productivity is reduced as a result of frequent mass flows that often

hinder the project activity. The validation team has observed such mass flows during on-site inspection and it can be confirmed that the described technical barrier exist. However, it is not possible to perform a quantitative analysis of the impact of the technical barriers on the project activity and performance.

Step 4: Common Practice Analysis

Common practice analysis is used to justify the additionality of the project as last step. The approach was to analyse activities in the private sector in Turkey which have been developed in a comparable environment, similar regulatory framework, investment climate, similar access to technology, and finance to the proposed activity.

The share of HEPP in general was verified by the official sectoral power projections¹. The analysis derived in the identification of eight projects with high similarities and has been very well supported by documents as evidence of the quantitative information. There is only one comparable hydropower plant located in the region of the project activity (Uzunçayır), but this project is also undergoing VCS validation. The validation team does acknowledge that the common practice analysis has been conducted appropriately and the project type is not common practice in the region.

As a result the validation team concludes that the additional proof has been conducted by the PP in a correct way following the rules of the CDM Additionality Tool, version 5.2., and that the project can be deemed as additional.

3.2.6 Quantification of GHG Emission Reductions and Removals

In section 3 of the VCS-PD emission reductions are calculated in accordance with equation (1) of ACM0002 / Version 12.1.0:

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

Where power generation (EG) and the emission factor has been calculated correctly according to the Tool to calculate the emission factor for an electricity system (Version 02.2.0). In particular PP have correctly applied the following steps:

Step 1: The relevant electricity system was correctly identified as Turkey's national grid. There are no price differences and no transmission constraints in the project area.

Step 2: PP have correctly chosen Option 1, i.e. to exclude off-grid power plants and include just grid power plants. This is appropriate for the case of Turkey.

Step 3: PP have correctly chosen the Simple OM method. They have demonstrated that the share of low-cost resources is below 50%. PPs have correctly chosen the ex-ante option to calculate the Simple OM. The most recent data are from 2007 to 2009 and have been taken from the Turkish Electricity Transmission Company (TEİAŞ) database.

¹ <http://www.teias.gov.tr/projeksiyon/KAPASITE%20PROJEKSIYONU%202010.pdf> (last visited on 1/7/2011)

Step 4: PP have correctly chosen Option B. The operating margin emission factor is calculated based on power sector emissions in the national GHG inventory divided by the total power production based on TEİAŞ data.

The emissions in the GHG inventory have been calculated based on the total fuel consumption in the electricity system, which have been multiplied with national default values for net calorific values and fuel-specific emission factors for liquid, solid and gaseous fuels. Using national default factors is the preferred option on pages 20, 21 of the Tool. The validation team considers the calculation method as in line with option B in step 4 of the Tool. For the preparation of the GHG inventory the total fuel consumption and total electricity generation of the electricity system was available.

The validation team has confirmed that using this calculation method does not result in systematically higher values for the operating margin emission factor and thus does not negatively impact the conservativeness of the calculations.

Step 5: PP have correctly chosen the group of power plants to be included in the BM. There are more than 5 power plants in the 20% of power generation volume that have been built most recently. PPs have chosen Option 1 (ex-ante option). Only power plants commissioned between 2005 and 2009 have been included.

Step 6: Equation (13) from the Tool is correctly applied by determining the CO₂ emission factor of each power unit as per the guidance in step (4) for the Simple OM. Finally, the Build Margin Emission Factor of the grid has been calculated by dividing the total CO₂ Emissions of the subject year by the total generation from the capacity additions of the same year, this means that it is the generation weighted average for the years 2005, 2006, 2007, 2008 and 2009.

Efficiency factors have been chosen in a transparent and conservative manner:

- Fuel Oil / Naphta / Diesel Oil: Default efficiency factor for combined-cycle plants has been applied. This is conservative.
- Natural gas: Default efficiency factor for combined-cycle plants has been applied. This is conservative.
- Coal & Lignite: Efficiency factors of 40% have been applied. PPs have demonstrated in a separate spreadsheet that this conservative. Emission factors at lower end of range were chosen as required by the Tool.

Moreover, equation (14) from the Tool is correctly applied. Weights have been correctly chosen as wOM=0.5 and wBM=0.5. The Validation Team therefore was able to verify the EF for the OM as 0.65689 and the BM to be 0.39963. As a result the CM is verified to be 0.52826.

For renewable energy projects as per methodology ACM0002 the leakage emissions are considered zero because the emissions sources can be neglected.

Anthropogenic emission reduction is a function of the expected net amount of electricity produced, for the given project, which amounts to 220,000 MWh per annum. Applying the emission factors and the estimated annual net electricity generation as explained in section 3.1 above, the amount of Emission

Reductions of $(220,000 \text{ MWh} * 0.52826 \text{ tCO}_2/\text{MWh}) = 116,217 \text{ tCO}_2$ are expected to occur from the operation of the project.

The assumptions for the project emissions and leakage made afterwards is found acceptable and suitable for the project activity by the validation team. The formulas and factors used in the calculation of GHG emissions are found to be transparent and correct by the validation team. The emission factors of fuels that are used in the calculations are taken from the IPCC default values at the lower limit of uncertainty at a 95% confidence interval as provided in table 1.4 of Chapter 1 of Vol.2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories, as suggested by the methodology.

The efficiency factors of power plants are taken from Annex 1 of the “Tool to calculate the emission factor for an electricity system (Version 02.2.0)”. The efficiency factors used are on the conservative side.

All data presented in the baseline calculations are provided from official sources. Therefore, uncertainties of data sets were not estimated. There are no uncertainties in the calculations.

3.2.7 Methodology Deviations

There are no methodology deviations.

3.2.8 Monitoring Plan

According to the VCS-PD ACM0002 is used as monitoring methodology. This is in line with VCS v.3.

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 the monitoring of several parameters, the main parameter in the monitoring plan is the quantity of the net electricity that is delivered to the grid ($EG_{PP-net, y}$), and this parameter will be the basis for the emission reduction calculations.

According to section 4.3 of the VCS-PD the gross electricity generated ($EG_{PP-gross, y}$), as well as the electricity consumed by the facility ($EG_{PP-self\ consumption, y}$) will be recorded by two redundant metering devices continuously (36). The difference will represent the net electricity that is going to be delivered to the grid. Two power meters will back up each other for accuracy, Figure 3, and are placed on the switchgear station where the power plant gets connected to the Turkish national grid. Calibration report of meters will be presented in any occurrence.

The meters will be read each month by TEİAŞ employees. A metering protocol will be signed by both TEİAŞ and a plant employee. These records will provide the data for the monthly invoicing to TEİAŞ and are accessible via the official PMUM website. The data from the PMUM website will be used for the monitoring report. The proposed measurement method is appropriate and in line with standard industry practice in Turkey.



Figure 3. Meters sealed and used by TEİAŞ for taking monthly readings

Metering devices need to meet the technical requirements of the Regulations for electricity meters (36). Metering devices are technically checked and certified by independent companies for their accuracy and at the moment of their acquisition they are sealed and certified. After installation, TEİAŞ tests both metering devices in order to ensure that the devices satisfy all requirements and are calibrated properly.

Maintenance and calibration of the metering devices will be made by TEİAŞ periodically, every 10 years or before in case of failure. If there is a noticeable difference between the readings of two devices, maintenance and tests of the metering devices and the associated equipment will be done before waiting for the periodical maintenance.

The emission reduction calculations will be based on the TEİAŞ reports as the power meters are placed where net electricity fed into the grid (Figure 3).

The internal energy consumption will be supplied from the plant generation and will be deducted from the total generation. When there is no electricity production in the plants, the internal consumption will be supplied from grid.

The amount of supplied has been reported in monthly TEİAŞ monitoring reports. In case of emergency, a diesel generator has been provided. There is an auxiliary diesel generator in the power house (180 KVA), and there will be four auxiliary power generators at the emergency drainage gates that control the canal flows. The diesel consumption, if applicable, will be recorded and calculated to project emissions.

Also as the Combined Margin emission factor is calculated ex-ante, the parameters used in the calculation of the emission factor is also included in the monitoring plan, but the frequency of monitoring for these parameters are once for each crediting period as per the definitions in the “Tool to calculate the emission factor for an electricity system”.

Table 1 shows the both important default parameter and parameters to be monitored as part of the monitoring plan.

Table 1. Main parameters available during validation and included in monitoring plan

Data	Parameter	Description Source of Data Unit	Monitoring Unit	Frequency	QA/QC Procedures to be Applied
EG_{pp} , gross, y	Quantity of electricity produced by the power plant, in year y	Two metering devices used in power plant, monthly records signed by TEİAŞ and plant manager and invoices will be used. Secondary source of data PMUM/MFRC website (column ISVM).	MWh	Continuous measurement and monthly recording	Two calibrated meters will act as backup for each other. Maintenance/calibration of the metering devices will be made by TEİAŞ when necessary. If the difference between the readings of two devices exceeds 0.2%, maintenance will be done before waiting for periodical maintenance.
EG_{pp} , self consumption, y	Quantity of electricity imported by the power plant from the grid for self consumption, in year y	Two metering devices used in power plant, monthly records signed by TEİAŞ and plant manager and invoices will be used. Secondary source of data PMUM/MFRC website and it will be calculated as the difference between the column ISVM, and UECM.	MWh	Continuous measurement and monthly recording	Two calibrated meters will act as backup for each other. Maintenance/calibration of the metering devices will be made by TEİAŞ when necessary. If the difference between the readings of two devices exceeds 0.2%, maintenance will be done before waiting for periodical maintenance.
PEFC , j,y	Quantity of diesel fuel for auxiliary power generator	Site manager's log book	Liter	Whenever applicable	Recorded amounts to be cross-checked with purchase receipts

The monitoring will be performed in-house by the project proponent (PP). The Project manager İhsan Şeker who is charged by the Bereket Enerji Üretim San. ve Tic. A. Ş. will be responsible for the keeping all relevant data and gathering electricity generated during the completion of the crediting period.

The collected data will be submitted to Turkuaz Karbon Varlık Yönetimi Enerji Proje ve Dan. San. İth. İhr. Ltd. Şti. who is responsible to calculate the emission reduction subject to verification; generation data will be used to prepare monitoring reports, which will be used to determine the vintage from the project

activity. All these reports will be submitted to the authorized designed operational entity before every verification period.

Overall the monitoring methodology is found appropriate and suitable for this particular project activity. The positions and responsibilities of the Verified Emission Reduction (VER) Monitoring Team are well defined in section 4.3 of the PD.

3.3 Environmental Impact

The project activity is covered by a preliminary environmental impact analysis (PIF). A full EIA is not required since the scale of the project is below the applicable. The PIF has not identified any significant environmental impacts. The validation team has confirmed during the site visit that the weir will be equipped with a fish ladder (5) (Figure 4) and that a minimum flow will be released to the river bed.



Figure 4. Current work in process of the fish ladder construction.²

The project owner is responsible in taking necessary precautions during construction phase and operational phase of the project in accordance with the laws and the agreement between General Directorate of State Hydraulics and the project owner.

Although there was no significant environmental impacts determined. The project owner presented to the authorities a summary of the impacts and the mitigation actions outlined in the Project Presentation Report. Moreover, it has been verified depending on the processes that the project complies with the legal requirements.

² The fish passage will be ready at the end of 2011 (Reference blue prints dated 24 July 2009).

3.4 Comments by stakeholders

Comments by stakeholders were received during a meeting on 13 November 2006 at Kılıçpınar village, in which local inhabitants were invited by sending invitation letters. The purpose of the meeting was to provide to the local stakeholders of the project, an idea about the characteristics of the project and answer their questions about the project and especially about the expropriation process.

The project company has contacted and informed the local government during the planning phase. Local residents are impacted by the project in two major ways. First, some private land is expropriated or bought by the project company and local residents are very interested in the expropriation process and the compensation amounts. Second, some local residents are able to find employment during the construction and operation phases of the project. The water in the project area is not used for any irrigation activities so that resource conflicts are limited. The project is located far away from residential areas and does not have any adverse environmental impacts to the surrounding.

The summary of the stakeholders' comments given in the PD were confirmed during the site visit. The minutes from the meeting held in November related to the comments were revised. Those confirmed the presence of the stakeholders and the content of the project activity explained.

The project owner has committed to set up appropriate measures that will have a positive socioeconomic effect. Additionally the Social Carbon Standard will be applied to the project which will stipulate a higher social benefit to be generated by the project activity. The objective of applying the standard is implementing a sustainable improvement process concerning environmental and social aspects.

4 VALIDATION CONCLUSION

Bereket Enerji Üretim San. ve Tic. A. Ş.

15 Mayıs Mh.. 832 Sk.

No:2 K:2 75. Yıl Esnaf Sarayı DENİZLİ

Turkey

11 November, 2011

RE: Validation Statement – Koyulhisar Hydro Electricity Power Plant, Turkey under VCS, first crediting period from 17.11.2009 to 16.11.2019.

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 DENİZLİ, Turkey, has engaged TÜV Rheinland to review and validate the VCS PD and all assertions related to the GHG project under VCS v.3. The GHG assertions, indicated in the VCS PD issued on 8.11.2011 v.1.4 which indicates annual achievable emission reductions of 116,217 t CO₂e per annum.

By generating electricity using renewable energy, the project is likely to result in reductions of GHG emissions partially displacing the electricity that would have been generated using fossil fuels. An analysis of the investment barrier demonstrates that the proposed project activity is not a likely baseline scenario. Emission reductions attributable to the project are hence additional to any that would occur in the absence of the project activity. Given that the project is implemented and maintained as designed, the project is likely to achieve the estimated amount of emission reductions.

We have 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, v.12.1.0. to a reasonable level of assurance by applying a materiality threshold of 5 %. The project information validated includes the VCS PD delivered to TÜV Rheinland and all relevant information and evidence acquired during the validation process as stated in the validation report made of 11th of November, 2011.

We have come to the conclusion that based on our review and all available documentation the GHG assertion is made in accordance with the requirements of the VCS program and is material correct and fairly represents the GHG emissions data and information without material discrepancies.

Cologne, 2011-11-11

Dr. Karla Alcántar Sánchez

Norbert Heidelbergmann

APPENDIX A – CAR / CL

No.		Table 2: List of Requests for Clarification (CL) and Corrective Action (CAR) VCS HEPP KOYULHISAR 2011			
CL	CAR	Observation	Reference	Project owner response	Validation team conclusion
1		Please provide the initial feasibility approval report (it is not possible to open the given file).	VCS PD, page 4, paragraph 4 - row 11	The PO has provided the document	ok
	1	Table 1, please double check the date for the application of the third unit	VCS PD, page 5	The date was corrected from 03/09/2009 to 09/03/2009	ok
2		Please specify in paragraph four page 4, the date of the pre-EIA or include reference to the Table 1.	VCS PD, page 4, paragraph 4 - row 7	The PD has been updated	ok
	2	Table 1, Please check the dates of the Application of the license and the first two units became operational (is it 11/17/2009 or 17/11/2009?)	VCS PD, page 5	The date was corrected	ok
3		Please provide the EIA regulation as proof why EIA is not needed	VCS PD, page 4, paragraph 4 -row 9	The PO has uploaded the EIA regulation	ok
	3	Please correct the project flow rate related to the conveying canal -1 (Trapezoid canal), the figure must be 84 m3/s according to the revised feasibility study	VCS PD, page 10	The PD has been updated to 84	ok
4		Please provide criteria that have been applied whether the EIA is necessary or not	VCS PD, page 4, paragraph 4 -row 10	The PD has been updated	ok
	4	Please include geographic coordinates within the section 1.9 "Project Location"	VCS PD, page 14	The PD has been updated	ok
5		Please update the status of the fish-ladder issue in the PD	VCS PD, page 4	The PD has been updated to include a paragraph saying that it is expected to be ready in 2-3 months, the fish ladder drawing dated 24/07/2009	ok
	5	Section 1.13 " Further information" mentions that an auxiliary diesel generator will be used. Is there any document to proof its acquisition, installation, etc.?	VCS PD, page 17	Proof documents such as purchase contracts have been revised	ok

No.		Table 2: List of Requests for Clarification (CL) and Corrective Action (CAR) VCS HEPP KOYULHISAR 2011			
CL	CAR	Observation	Reference	Project owner response	Validation team conclusion
6		Please provide a copy or screenshot from the DSI WEB Site	VCS PD, page 5, table 1	The website was checked with the PO, dates, company's name, etc.	ok
	6	Please include an example, how the values on table 5 for the sensitivity analysis have been calculated	VCS PD page 24, table 5	The calculations on the Excel file have been checked	ok
7		Please provide the Power Purchase Agreement	VCS PD, page 5, table 1	The grid connection agreement exists and have been provided to the validation team	ok
	7	Please use the same units for the Net Calorific value mentioned in paragraph 1 and table 10	VCS PD page 40	The units and figures have been revised	ok
8		Please provide documentation related to the MW of the two state owned dams, Kilickaya and Camlogöze	VCS PD, page 5, table 1	The MW were double check with the website www2.dsi.gov.tr/bolge/dsi19/sivas.htm#kilickaya and the PP will update the PD including a reference as a footnote	ok
	8	Please include an example of the calculations to get the values on Table 11	VCS PD page 40	The calculations on the Excel file have been checked	ok
9		Please provide protocol/proof of start of operation/initial operation (crediting period) 17/11/2009	VCS PD, page 5, paragraph 2 -row 3	The document "Provisional Acceptance Protocol by MoENR" dated 17/11/2009 was checked with the PP	ok
	9	The estimation of the Build Margin by using the total generation value derived to sum up all the plants built in 2007, 2008 and 2009 is not clear, please double check the calculation	VCS PD page 41, paragraph 4	check this after updating the financial analysis	ok
10		Please provide purchase agreements of the turbines and the construction contract with the general contractor (installation firm)	VCS PD, page 6, paragraph 1	The PP has provided to the Validation team the contract agreement for the three turbines with the technical specifications , important to mention that the document for the third turbine is	ok

No.		Table 2: List of Requests for Clarification (CL) and Corrective Action (CAR) VCS HEPP KOYULHISAR 2011			
CL	CAR	Observation	Reference	Project owner response	Validation team conclusion
				different from the other ones	
	10	Please describe if there is a risk of mistranscription during the process of taking the readings, how this is mitigated and verifying, Indicate if the entity can verify the recorded data from the spreadsheet against the raw data submitted by the devices.	VCS PD , page 48	A paragraph within the PD has been included by describing the process	ok
11		Please provide technical sheet or certificate related to capacity of the vertical axis Turbines 21 MW	VCS PD, page 6, paragraph 1	The PP has provided to the Validation team the contract agreement for the three turbines with the technical specifications , important to mention that the document for the third turbine is different from the other ones	ok
	11	Please describe if the verifying entity will be able to observe the meters physically on-site and if they will be able to compare the reading of the meter and the meter ID-number with the data found in the PMUM web-site and the excel spreadsheet.	VCS PD , page 48	A paragraph within the PD has been included by describing the process	ok
12		Please provide a reference document of the reported figures for the spill weir regulator - altitude of 724m and the tail water - altitude of 623 m	VCS PD, page 6, paragraph 1	The document was revised dated August 2009, the figures are ok, document "revised feasibility study"	ok
13		Please provide design details of the transmission line to confirm the Voltage of < 154 kV	VCS PD, page 8, paragraph 3, row 2	The grid connection agreement was checked and a reference included in the PD	ok
14		Please rectify the value of the total length of the penstock , feasibility study says 197,70 m	VCS PD, page 13, top of the table	The PD was updated the figure is 266,2 according to the revised feasibility report	ok
15		Please include a document reference about the granted production license for 40 years	VCS PD, page 14, paragraph 1, row 1	The PD includes a footnote to the production license dated 10/02/2005	ok

No.		Table 2: List of Requests for Clarification (CL) and Corrective Action (CAR) VCS HEPP KOYULHISAR 2011			
CL	CAR	Observation	Reference	Project owner response	Validation team conclusion
16		Please include the name and date of the proof documents related to section 1.12.1	VCS PD, page 16	The PD includes a footnote to the production license dated 10/02/2005, and certificate of activity dated 06/02/2011	ok
17		Please provide the detailed excel workbook summarizing the financial analysis mentioned in section 1.13	VCS PD, page 17	The PO has provided a detailed calculation worksheet	ok
18		Please include a website reference related to the methodologies cited in section 2.1	VCS PD, page 17	A reference has been included	ok
19		Please justify the reservoir area (m2) by including a document reference	VCS PD, page 18, point 4	The PD has been updated	ok
20		Please rephrase the outcome of step 1a by being specific about which Scenario has been chosen .Moreover, please keep a format sub-step and outcome of sub-step for the whole section 2.5	VCS PD, page 19	The PD has been updated	ok
21		Please provide Koyulhisar Financial Analysis document	VCS PD page 23	The PO has provided a worksheet	ok
22		Please provide a proof document of the Loan Agreement	VCS PD page 23, table 4	Credit agreement document has been revised	ok
23		Please provide the excel file to estimate the baseline	VCS PD page 19	A worksheet has been checked	ok
24		Please change the reference instead of Annex 1 should be Annex 4 and mention within the paragraph the name of the 2 power plants	VCS PD page 27, paragraph 3 at the bottom	The PD has been updated	ok
25		Please include a reference (footnote) from the source of the information related to similar projects	VCS PD page 31, paragraph 1	A footnote has been included within the PD	
26		Please check the writing up of the paragraph 3, it is confusing	VCS PD page 31, paragraph 3	The PD has been updated	ok
27		Please clarify the installed capacity of the hydropower plant Uzuncayic, is it 84 or 74 MWs as stated in table 8?	VCS PD page 32, paragraph 1	The PD has been updated	ok
28		For the sake of clarity please avoid the term CDM	VCS PD, Page 33, 36 etc.	The PD has been updated	ok
29		Please support why the Simple OM method is the option (a), is there a (b) as well and it is not mentioned?	VCS PD page 34, bottom	The PD has been updated	ok

No.		Table 2: List of Requests for Clarification (CL) and Corrective Action (CAR) VCS HEPP KOYULHISAR 2011			
CL	CAR	Observation	Reference	Project owner response	Validation team conclusion
30		Please make clear which are the Options A and B to estimate OM cited in paragraph 3	VCS PD page 35, paragraph 3	The PD has been updated	ok
31		Please rephrase instead of saying Option 1 (ex-ante option) use the first option. This will avoid misunderstandings	VCS PD page 35, last paragraph and page 42, paragraph 2	The PD has been updated	ok
32		Please clarify which are the options A1, A2 and A3 cited in step 6, paragraph 3. Moreover, double check the writing up of the paragraph because it is confusing	VCS PD page 37	The PD has been updated	ok
33		Please include the Table 10 immediately after finishing step 6, or a bibliographic reference. I guess it is the Table 10 from the tool. This is confusing because there is another Table 10 within the document and it is not the annual generation of that fu	VCS PD page 37	The PD has been updated	ok
34		Please give numbers to the tables within Annex 2, because it includes a lot of information and please make references within the document where it is needed	VCS PD page 40, paragraph 2	The PD has been updated	ok
35		There is a typo about the years used to estimate the BM, instead of 2008, 2008 should say 2009, 2008	VCS PD page 41, bottom	The PD has been updated	ok
36		Please provide official meter reading documentation by TEIAS including meter number and actual reading value of both devices with referenced and evidenced dates	VCS PD page 48	Reading protocol has been provided but the technical sheet	ok
37		Please describe in the PD how the reading and meter ID can be physically observed and if the the meters are sealed or not	VCS PD page 48	The PD has been updated and a description of the procedure to take the readings, together with personnel from TEIAS; has been included. The meters are sealed since the moment they have been bought, certificates have been revised	ok

No.		Table 2: List of Requests for Clarification (CL) and Corrective Action (CAR) VCS HEPP KOYULHISAR 2011			
CL	CAR	Observation	Reference	Project owner response	Validation team conclusion
38		Please provide calibration protocol or equivalent. Is there a contracted entity for installation, checking of the metering devices?	VCS PD page 49	The technical sheets for the meters have been revised, The minister of science industry and technology immediately seals the meters before putting them in sale.	ok
39		Please include the ID numbers of the main and auxiliary meters where it is appropriate	VCS PD page 49 paragraph 1	The PD has been updated by including the serial number and proof documents will be uploaded	ok
40		Please provide proof of feed-in tariff	VCS PD page 49 paragraph 1	Feed-in tariff No.6094 has been revised with the PP and there is no further power purchase agreement in place so everything will be sold based on the feed-in tariff	ok
41		Please clarify in detail the responsibilities of TEIAS respectively. The interfaces in terms of monitoring the electricity production are not clear. If necessary provide a flow chart diagram of the data-flux.	VCS PD page 49 paragraph 1	The clarification has been done	ok
42		Please describe if there is a risk of mistranscription during the process of taking the readings, how this is mitigated and verifying, Indicate if the entity can verify the recorded data from the spreadsheet against the raw data submitted by the devices	VCS PD , page 48	The PD has been updated by saying the readings are taken by TEIAS officer and on site officer to double check the readings, During the validation a reading protocol was checked	ok
43		Please correct the version number of the Tool to calculate the emission factor for an electricity system all along the PD	VCS PD, page 17	The version correction is made along the PD to v.02.2.1 in the version 1.3 of the PD	ok
44		Please update table 16, the number of tonnes of CO2 does not correspond with the amount declared in section 1,7 of the PD	VCS PD, page 44	Table 16 was erroneously left without the necessary updates. It is now updated in version 1.3 of	ok

No.		Table 2: List of Requests for Clarification (CL) and Corrective Action (CAR) VCS HEPP KOYULHISAR 2011			
CL	CAR	Observation	Reference	Project owner response	Validation team conclusion
				the PD.	
45		Please double check the reference to Annex 2	VCS PD, page 40	The PD has been updated by including a correct reference to Tables 1 and 2 in Annex -2	ok
46		Please check the calculation of the ERy on page 43	VCS PD, page 43	The calculation is corrected according to the generation value of 220,000 MWh.	ok
47		Please update the parameters in section 4,1- PD. The description is confusing.	VCS PD, page 45-47	All the parameters have been updated in version 1.3 of the PD	ok
48		Please update the parameters in section 4,2 -PD, according to the methodology ACM0002. The description is confusing. .	VCS PD, page 48	All the parameters have been updated in version 1.3 of the PD	ok
49		Please indicate a reference to the total cost 98,870,000 USD	Excel File IRR Calculation	The total invest cost is a detailed reflection of the total investment cost in the feasibility report with a correction for the US currency, The currency is taken as a waited average of all the credit withdrawal trenches, to be precise. However the investment decision date is considered as the date of financial closure, which is at the last quarter of	ok

No.		Table 2: List of Requests for Clarification (CL) and Corrective Action (CAR) VCS HEPP KOYULHISAR 2011			
CL	CAR	Observation	Reference	Project owner response	Validation team conclusion
				2006, Taking the mid year average US currency value of the following year 2007 of 1,3 TL=1 USD, that is slightly less than the currency we have used we get the total investment cost we have used in the feasibility analysis. This is also briefly explained in the PD version 1.3.	
50		Please verify the reference included to the regulation Law 6094 feed-in tariff for hydroelectric 7,3 \$/kWh date 29/12/2010. Moreover please provide the document related to TEIAS interconnection fee in English	Excel File IRR Calculation	http://www.ongurergan.av.tr/en-EN/Legislations.html provides an insight to the Turkish Energy Legislations. The guaranteed price is declared in The table at the end of the legislation and it is 73 Dolar Cents for both Hydroelectric Power Plants and Wind Power Plants. An English translation by Deren Law office is uploaded to the Box.net: http://www.box.net/shared/libqr0e51v6y0y1tbyuv	ok, the documents have been revised and support the figures used in the financial analysis
51		Please include the serial number of the meters page 49 of the PD (meter 1: 53030781 and meter 2: 53030782)	VCS PD page 49	The models and the serial numbers of the meters are added to the monitoring plan which is on page 53 of the PD version 1.3.	ok, the PD has been updated

No.		Table 2: List of Requests for Clarification (CL) and Corrective Action (CAR) VCS HEPP KOYULHISAR 2011			
CL	CAR	Observation	Reference	Project owner response	Validation team conclusion
52		Please provide evidence for the own capital and debt = 44.7%	Excel File IRR Calculation	The Credit agreement is provided to you on http://www.box.net/shared/71265spikkusgfjqmkdm . Dividing the amount of credit to the total investment cost we get this ratio.	ok , the credit agreement shows the amount of own capital included in the financial analysis
53		Please provide evidences for the parameter figures applied in the IRR calculation file, sheets "Investment Costs", "Operation Costs" and "Finance"	Excel File IRR Calculation	As explained above the total investment cost is sourced from the feasibility report with a correction to currency as officially reported in http://www.teias.gov.tr/istatistik2009/78.xls , year 2007 average is comparable to the currency we have used to correct the feasibility values. Operation costs are given based on actual, and the declared values are approved by a 3rd party accountant. The reference of the finance, credit loan is provided as document number 10 Credit agreements in box.net. These are also indicated in the version 1.3 of PD.	ok, the references has been included in the PD
54		Please specify why a reduction of the productivity of the project activity from 262365 to 220000 MWh seems reasonable against the mentioned technical hurdles	VCS PD, page 4	The potential impacts of the Climate Change over Europe and specifically Turkey is very well	ok, supporting information has been included in

No.		Table 2: List of Requests for Clarification (CL) and Corrective Action (CAR) VCS HEPP KOYULHISAR 2011			
CL	CAR	Observation	Reference	Project owner response	Validation team conclusion
				documented both in IPCC special reports and in scientific articles published related to Turkey. Accordingly there are two most vulnerable sectors that will be impacted due to the effects of climate change over the water resources are hydroelectricity based energy sector and agriculture. From this point of view we estimate that there will be about 1 month water shortage during the dry season, as the water will not be realised from the upstream Kiliçkaya them to save the entire water in the reservoir for irrigation purposes, and one month of production is estimated to be lost during the high season due to extreme and sudden torrential rains that would result mass flows and blockage of the open canal systems. Therefore the firm values reported based on the water availability values of the past 50 years when the climate change stress was not accounted for is deducted about 16%. This explanation is also added to the	the PD, project description

No.		Table 2: List of Requests for Clarification (CL) and Corrective Action (CAR) VCS HEPP KOYULHISAR 2011			
CL	CAR	Observation	Reference	Project owner response	Validation team conclusion
				version 1.3 of the PD. And the related articles are uploaded to the box.net	
55		Sub-step 2b of the investment analysis shall be elaborated for one approach only, either project IRR or equity IRR	VCS PD, page 20	We have provided in the financial analysis excel both of the approaches but we have removed any reference related to it in the PD version 1.3.	ok, the PD has been updated