

VALIDATION REPORT

AKBAS HYDROELECTRIC POWER PLANT, TURKEY



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Project Title	Akbas Hydroelectric Power Plant
Version	1.0
Report ID	21219679

Report Title	Validation report for Akbas Hydroelectric Power Plant Turkey, No. 21219679
Client	Arı Su Enerji Üretim Anonim Şirketi
Pages	45
Date of Issue	13/02/2013
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Summary:

TÜV Rheinland Energie und Umwelt GmbH is contracted for the validation of the Akbas HPP with installed capacity of 12.257 MWe against the VCS Standard version 3.2.0. The validation is performed by applying CDM methods AMS-I.D. “Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity category I – Renewable Energy Projects” version 17 in combination with the “Tool to calculate the emission factor for an electricity system” version 02.2.1, the “Tool to calculate project or leakage CO2 emissions from fossil fuel combustion” version 02.0 and the “Guidelines on the demonstration of additionality of small-scale project activities” version 09.0. During the desk review, VSC PD, ER workbook, investment analysis workbook and other supporting evidence were assessed and resulted in short list of Clarification and Corrective Action Requests (CL/CAR included as *Appendix*). On-site visit was conducted on 21/11/2012 – 24/11/2012, which provided clarification on project history, milestones and development. The respective responses to CLs/CARs and required revisions of project design document lead to issuance of validation report with positive opinion. GHG emissions data and information are fairly represented without material discrepancies and declared GHG emission reductions are materially correct

VVB identifies Akbas HPP project to be eligible to VCS ver. 3.2 requirements and additional in accordance with the CDM methodology AMS-I.D. ver17.

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1 INTRODUCTION

The validation report summarises outcomes of the assessment of Akbas HPP project, i.e. project description document, additionality assessment and emission reduction calculations, against the VCS standard version 3.2 criteria by means of CDM Methodology AMS-I.D. version 17 and belonging tools and guidelines as well as criteria given to provide for consistency in project operations, monitoring and reporting.

Name	Position	Scope	location
Roland Wollenweber	Technical reviewer	Auditor for sectoral scopes 1, 5, 6	Cologne/ Germany
Denitsa Gaydarova-Itrib	Auditor	1, 3, 6	Cologne/ Germany

1.1 Objective

Validation of project documentation is the 2nd major step in development of VCS project cycle. It is PP responsibility to develop VCS PD and contract approved VVB for the validation process. The objective of a validation is to have an independent third party assessing project design, i.e. VCS PD, emission reduction calculations, monitoring plan and projects compliance with VCS version 3.2 as well as with relevant UNFCCC and host country criteria. In particular, VVB ensures that the PDD, including monitoring plan, additionality analysis and emission reduction calculations, is comprehensive, accurate and credible and meets the identified criteria.

Validation is a requirement for all VCS projects and is seen as necessary to provide assurance to stakeholders of project's quality and intended amount of voluntary emission reductions (VERs) or so-called voluntary carbon units (VCUs).

1.2 Scope and Criteria

The validation scope is defined as an independent and objective review of the project description (VCS PD), which includes among others the assessment of monitoring plan, emission reduction calculations and additionality assessment.

Validation is performed in compliance with VCS criteria stated in the VCS standard v3.2 and VCS program guide v3.3. In addition criteria stipulated by the "Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity category I – Renewable Energy Projects" AMS-I.D. version 17 in combination with the "Tool to calculate the emission factor for an electricity system" version 02.2.1, the "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion" version 02.0 and the "Guidelines on the demonstration of additionality of small-scale project activities" version 09.0., since the mentioned are implemented in project description.

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 final validation is based on the latest project description, VCS PD v2, dated 01/02/2013, supporting documents disclosed to the validator, own background research and investigations and information

collected through performing interviews during on-site assessment. The validation opinion is assured throughout the credibility of the above mentioned sources of information.

The Validation Statement (see section 4) is made to a reasonable assurance level, and a materiality threshold of 5% is applied for identification of material omissions as required by VCS v3.2 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

At the time of validation the proposed project was in the construction phase and is to be constructed as run-of-river hydroelectric power plant on the Buyuk Menderes River, within the Aegean Geographical District of Turkey, with installed capacity of 12.257 MWe. At the downstream of the Akbas HPP a large scale irrigation project developed by the General Directorate of State Hydraulic Works (DSI) is in operation, within which scope a dam without fish ladder exists.

Akbas HPP entails concrete, full-bodied uncontrolled weir, 3,648 m long conveyance tunnel, just several meters long water conveyance canal between the weir and the tunnel, head pond, penstock and power house. The coordinates of the structures are defined in the FSR report as well as in the EIA exemption letter and are confirmed by means of on-site measurements and Google Map

Based on the turbine purchase agreement, the validation team proved that 3 horizontal Francis turbines are utilized for electricity generation. As per the amended EMRA generation licence the project is estimated to yield average annual electricity generation of 45,520 MWh/year. Based on the combined emission factor of the Turkish national electricity grid, an annual average emission reduction of 24,573 tCO₂/year is determined.

As per EMRA generation licence, the tentative project start date, namely the time when the hydroelectric power plant starts generating electricity and thus GHG emission reductions, has been indicated as 03/08/2014 in the VCS PD, and was confirmed to be reasonable by the construction manager. Other important milestones are listed below

Table 1: Milestone of Akbas HPP

03/08/2010	EMRA generation licence EÜ 2679-3/1664 to Arı Su Enerji Üretim Ltd. for the Akbaş HPP was issued for 49 years
17/02/2011	EMRA approved the amendment request in the Generation Licence.
11/03/2011	Revised Water Usage Agreement was issued
21/04/2011 ¹	Memorandum of Understanding between the Employer (ARI-SU Enerji) and the Contractor (Andritz Hydro and Indar Electrics) was signed for the Supply and Installation of Electro-Mechanical Equipment for Akbas Hydro-Electric Power Plant
22/04/2011	Akbas HPP Project Hydrological Evaluation Report was prepared
20/05/2011	Construction started
01/07/2011	EIA Exemption Certification was granted to the Akbas HPP project by the Denizli

¹ This date is considered as the investment decision date

Provincial Representation of Ministry of Environment and Urban Planning	
10/01/2012	Loan Agreement was signed
27/02/2012	Loan Agreement was amended
03/08/2014	Expected commissioning date

2 VALIDATION PROCESS

2.1 Method and Criteria

Validation of Akbas HPP has been performed in accordance to the internal procedures of TÜV Rheinland Energie und Umwelt GmbH for validation of VCS projects, which strictly follows ISO 14046-3 and ANSI accreditation to ISO 14065². During preparation stage following tasks are accomplished:

- Selection of an appropriate validation team
- Development of the audit plan
- Preparation of project and standard specific validation protocol, which shows in a transparent manner, criteria and requirements, means of validation and the results from validating the different identified issues

The core validation consisted of the following phases:

- desk review of the project design documents
- on-site visit (site inspection) and follow-up interviews with project stakeholders
- resolution of outstanding issues including material discrepancies and the issuance of the draft validation report
- Internal technical review and issuance of final validation report.

The following sections outline each step in more detail.

2.2 Document Review

The desk review phase is characterised with the assessment of project description and emission reduction workbooks substantiated by additional supportive documents, all of which have been provided by the carbon consultant.

The following table outlines the documents reviewed as part of the validation process:

Ref No.	Reference Document	Date
/1/	Project Description template, v3.0	08/03/2012
/2/	VCS Program Guide, v3.3	01/05/2012

² TÜV Rheinland Energie und Umwelt GmbH was awarded a Certificate of Accreditation by ANSI on....

/3/	VCS Standard, v3.2	01/02/2012
/4/	VCS Program Definitions, v3.3	01/05/2012
/5/	EB61 AMS-I.D. "Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity category I – Renewable Energy Projects" version 17	03/06/2011
/6/	EB63 Annex 19 "Tool to calculate the emission factor for an electricity system", v2.2.1	29/09/2011
/7/	EB65 Annex 21 "Tool for the demonstration and assessment of additionality", v6.0.0	25/11/2011
/8/	EB62 Annex 5 "Guidelines on the assessment of investment analysis", v05	15/07/2011
/9/	EB68 Annex 27 "Guidelines on the demonstration of additionality of small-scale project activities" v09.0	20/07/2012
/10/	EB41 Annex 11 "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion" v 02.0	02/08/2008
/11/	EB66 Annex 63 "Glossary of CDM terms", Version 6.0	02/03/2012
/12/	VCS PD Akbas HPP, Turkey i. Version 01 ii. Version 1.1 iii. Version 2.0	28/05/2012 21/12/2012 01/02/2013
/13/	Financial analysis Akbass HePP i. Version 1 ii. Version 1.1	28/05/2012 21/12/2012
/14/	Emission reduction calculation Akbas HePP i. Version 1 ii. Version 1.1	28/05/2012 21/12/2012
/15/	Extracts from the Loan Agreement	10/01/2012
/16/	Memorandum of Understanding between the Employer (ARI-SU Enerji) and the Contractor for the Supply and Installation of Electro-Mechanical Equipment for Akbas Hydro-Electric Power Plant	21/04/2011
/17/	Contact with carbon consultant (Ekobil)	22/08/2011
/18/	EMRA Generation Licence EÜ/2679-3/1664	03/08/2010
/19/	Revised Water Usage Agreement	11/03/2011
/20/	Expropriation decision	07/12/2010
/21/	Revised Feasibility Study Report	01/08/2010
/22/	EIA Certificate	01/07/2011
/23/	Hydrologic Evaluation Report for the Akbas HEPP project	April 2011
/24/	Wetland Activity Permit Certification for Akbas HEPP project	15/09/2011
/25/	Final Project Introduction File	08/06/2011
/26/	Board decision on development and realisation of Akbas HEPP as Greenhouse Gas Mitigation Project by the Company	08/06/2011
/27/	Turkish National Grid Line Diagram (http://www.teias.gov.tr/4grupmd/atcharita.htm)	
/28/	Turkish electricity transmission corporation research planning and coordination	2009

	department (2009) Turkish electrical energy 10-year generation capacity projection (2009-2018)	
/29/	Turkish Electricity Transmission Corporation; Research Planning and Coordination Department (2011) Turkish electrical energy 10-year generation capacity projection (2011-2020)	2011
/30/	Turkish Constitutional Law, Materials in English by Kemal Gözler	
/31/	Labour Law, Law No: 4857	22/05/2003
/32/	Trade Unions Act, Law No. 2821	05/05/2003
/33/	Law on Protection of Cultural and Environmental Assets, Law No: 2863	21/07/1983
/34/	ELECTRICITY MARKET BALANCING AND SETTLEMENT REGULATION TEIAS	2004
/35/	Haselsteiner, R., Heimerl, St., Kohler, B., Recla, R., Bilmez, C., Mesci, Ü. and Arch, Al. (2009) Efficient Design, Construction and Maintenance of Hydropower Plants in Turkey.	2009
/36/	The Law on Utilization of Renewable Energy Resources	2005
/37/	TEIAS spreadsheets	
/38/	European Environmental Agency (2012) Efficiency (electricity and heat) production from conventional thermal plants, 1990, 2009 http://www.eea.europa.eu/data-and-maps/figures/efficiency-electricity-and-heat-production-3	2012
/39/	ABB (2011) Trends in global energy efficiency; Turkey: Energy efficiency report	2011
/40/	IEA ETSAP (2010) Technology Brief E12; Hydropower http://www.iea-etsap.org/web/e-techds/pdf/e07-hydropower-gs-gct.pdf	May 2010
/41/	IRENA (2012) Renewable Energy Technologies: Cost analysis series; Volume 1: Power Sector; Issue3/5; Hydropower http://www.irena.org/DocumentDownloads/Publications/RE_Technologies_Cost_Analysis-HYDROPOWER.pdf	June 2012
/42/	ENERGY MARKET REGULATORY AUTHORITY (2011) Electricity Market Report 2010	17/11/2011
/43/	Extract from the final Contract Agreement on Supply and Installation of Electro-Mechanical Equipment for Akbas Hydro-Electric Power Plant	20/06/2011

2.3 Interviews

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

Name	Organisation	Topic
Dr.Asli Sezer Özçelik (Carbon consultant)	Ekobil Ltd.	<ul style="list-style-type: none"> ▪ Project start; ▪ Project implementation; ▪ Local permits and local requirements ▪ Applied project technology ▪ Physical conditions ▪ Project history ▪ Project barriers ▪ Project status
Murat Özçelik (Environmental Consultant)	Ekobil Ltd.	<ul style="list-style-type: none"> ▪ Discussion on additionality, baseline scenario and emission reduction calculation; ▪ Feasibility study; ▪ Environmental and social impacts and/or community benefits; ▪ Financial issues; ▪ Supporting documents;
Hüseyin Alpan (project manager)	Yilsan Holding	<ul style="list-style-type: none"> ▪ General project perception; ▪ Project history and implementation ▪ Financial issues; ▪ Supporting documents; ▪ Substantiation of loan and loan conditions; ▪ Clarification on high project cost ▪ Contribution to the regional sustainable development; ▪ Safety training of employees
Murat Vardar (Engineer / Environmental Scientist)	Denizli Provincial Directorate of Environment & Urban Planning	
Uğur Çoban (Biolog)	Denizli Provincial Directorate of Environment & Urban Planning	
Çağlayan Karakoç	Chief Account Officer acting on behalf of District Revenue Officer	
Ayşe Kıymaz (villager)	Managing the bakkal (shop owner/keeper)	
Ayşe Kaplan (villager)	Selling grape juice	
Caylan Ozgür (IT & administration)	IAri Su Enerji Üretim A.Ş.	
Metin Gür	Chief Account officer	
Huriye Yeter	Accountant	

2.4 Site Inspections

The on-site inspection took place from 21/11/2012 to 24/11/2012 in the city of Denizli (Turkey), the Çal town (Turkey) and on the project site (Akbas HPP). The objective of the on-site inspection is to acquire details on project development and operation, and prove validity and authenticity of delivered supporting documents. The audit plan was provided to the carbon consultant and PP and agreed upon. The site inspection was carried out by means of interviews with the persons indicated in section 2.3 (above).

2.5 Resolution of Any Material Discrepancy

The validation protocol, which comprises all issues identified during the desk review and discussed during the site inspection. All CAR/CLs have been resolved by PPs via provision of additional supporting evidence and appropriate changes to the VCS PD, as indicated in Annex B.

3 VALIDATION FINDINGS

3.1 Project Design

The outcomes of the thorough validation process and the VVB judgement on the Akbas HPP are summarised below, as required per VCS Standard, v3.2./3/

- Project scope, type, technologies and measures implemented, and eligibility of the project

Proposed project activity is proved to refer to sectoral scope 1: Energy industries (renewable and non-renewable, by scrutinising the VCS PD v1 /11/ and additional project distinctive documents such as EMRA Generation Licence /18/, Project Introduction File /25/, Feasibility Study Report /21/, DSI water Usage Agreement /21/, etc. Based on the mentioned documents as well as in the process of the site inspection, validation team ensured that the project is designed as and is being constructed as Hydroelectric Power Plant, which is planned to deliver electricity to the Turkish national grid, i.e. proposed project activity belongs to the type electricity generation from renewable sources.

During the site inspection, the validation team experienced the construction phase of Akbas HEPP project, whereas it was easily perceived that the project is run-off-river hydroelectric power plant. The FSR report /21/, obligatory permits and the EMRA generation licence /18/ confirm total installed capacity of the HEPP of 12.257 MWe with 3 Francis turbines with horizontal axis, i.e. 2x5.134 MWe & 1x1.989 MWe. In addition, the disclosed Memorandum of Understanding /16/ reveals slightly different values for the single turbine capacities. Therefore, the total installed capacity is included in the monitoring plan. The annual average electricity generation over the 1st crediting period is estimated to be 45,52 MWh/year. Dr. Asli Özçelik explained that besides hydrological and climatic conditions, the electricity generation is dependent on the water release by the DSI irrigation project, developed upstream from the weir structure.

The project manager, Mr Alpan, declared as part of the follow-up interview that the hydroelectric power plant is not grouped³, but stand-alone project, since it consists of 1 generation unit (power plant) from single project activity. The visit to the project site and inspection of project component approved the statement.

³ As defined in the VCS Program Definition v3.3 /4/

In addition, the validation team witnessed that the proposed project activity fulfils VCS program specific issues⁴, i.e.

- Handle CO₂, one of the six Kyoto protocol greenhouse gasses
 - VSC project design and validation report are provided in English, site inspection and interviews are also conducted in English.
 - PP claims real and measurable emission reduction credits.
 - PP applies for 10 years crediting period
 - Project is submitted to VCS registry within 2 years after operation (Project is not in operation yet)
- Project proponent

ARI SU ENERJİ ÜRETİM A.Ş. is identified as project proponent (PP) and project owner (PO) within the VCS PD /12/, by reference to the EMRA generation licence /25/, Water Usage Agreement /26/ and other permits and project-relevant documents.

Ekobil Ltd. is identifies as project proponent (PP), being involved in the preparation of VCS PD, etc. as per the Contract with carbon consultant /17/.

- Project start date

The project start has been estimates as 01/06/2013 based on the project schedule. In the course of the site inspection the project manager confirmed that constructions are in line with the preliminary schedule and no significant delays of project completion, and therefore HEPP commissioning, are expected.

- Project crediting period

PP selected project crediting period of 10 years, beginning from the 01/06/2012, which is in compliance with the VCS Standard v3.2 /3/ section 3.9.1.

- Project scale and estimated GHG emission reductions or removals

In compliance with the VCS Standard v3.2 /3/ and substantiated by the emission reduction calculation, which are validated and proved as accurate by the VVB in the subsequent sections, the proposed project activity is referred to as project, since the expected annual GHG emission reductions are estimated to be 23,218 tCO₂/year.

With regard to the CDM methodology, which is implied for the assessment of project additionality and for the determination of emission reductions, Akbas HPP is classified as small scale project, i.e. project's installed capacity (12.257 MWe) is less than the 15 MW benchmark as defined in the Glossary of CDM terms v6.0 /11/.

⁴ Refer to section 2 of the VCS Standard v3.2

- Project activities

As observed during the site inspection, Akbas HPP is run-of-river hydro power plant, which with the help of concrete, full body, uncontrolled weir diverts water from the Göksu River into the conveyance system composed of tunnels, accelerates it through a penstock, which trifurcates, and discharges it into 3 turbines with horizontal axes and eventually release it back to the river. However, the construction manager mentioned during the on-site visit and following communication that when they dig the tunnel they go along a straight line and they have a determined slope. Therefore along their way they may come to the surface for a short while and go back to underground again. Furthermore he added that if these surfacing spots are too separate from each other than they design a canal to complete the gap between two tunnels; otherwise they just pass it by a conduit.

The latest amendment of EMRA generation licence /18/, which is approved on 03/08/2010, points out total installed capacity of 12.257 MWe, which is accordingly denoted within the VCS PD /12/, and the Feasibility Study Report /21/ approved by the DSI. It is interesting to mention that the Water Usage Agreement /19/ is awarded to installed capacity of 12.257 MWe and EIA certificate /22/ – for the rounded up capacity of 12.26 MWe.

- Project location

Proposed project activity is located on the Buyuk Menderes River within the Aegean Geographical District of Turkey, in the borders of Çal Town of Denizli Province. During the site inspection, geographic coordinates of the weir and the powerhouse are confirmed to be as indicated in the VCS PD..

- Project compliance with applicable laws, statutes and other regulatory frameworks

Projects compliance with the regulation of the host country (i.e. the Republic of Turkey) was demonstrated within the VCS PD /12/, where Annex 1 lists all relevant legally binding regulation. The EMRA Generation Licence /18/, the EIA-Not Required Statement /22/ and the Water Usage Agreement /19/ are some of obligatory documents.

- Ownership and other programs

By reference to the EMRA generation licence /18/ and other legal document, validation team confirms that the project owner is accurately indicated in the VCS PD /11/ as ARI SU ENERJİ ÜRETİM A.Ş.

The interviews with PO and Carbon Consultant during site inspection indicated that the project has not participated and is not registered under other GHG Programs and has not generated any other form of environmental credits.

3.2 Application of Methodology

3.2.1 Title and Reference

VCS standard allows the implementation of all approved UN CDM methodology for development of VCS project activity.

The latest version of the “Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity category I – Renewable Energy Projects” AMS-I.D. version 17 /5/ (hereafter AMS-I.D. v17) is used to develop the proposed project activity under VCS. Additionally methodology related tools and relevant guidelines are applied as well, namely

- “Tool for the demonstration and assessment of additionality” Version 06 /7/
- “Tool to calculate the emission factor for an electricity system”. Version 02.2.1 /6/
- "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion" Version 02 /10/
- “Guidelines on the assessment of investment analysis” Version 05 /8/
- “Guidelines on the demonstration of additionality of small-scale project activities” v09.0 /9/

3.2.2 Applicability

The selected approved methodology AMS-I.D. v17 /5/ covers small scale projects activities which occur as grid-connected electricity generation from renewable sources. The applicability of the methodology to the proposed project activity is discussed in detail in the VCS PD /12/, following the applicability criteria listed within the methodology.

The validation team determined the applicability of AMS-I.D. v17 /5/ to the Akbas HPP considering the methodology-specific conditions as follows:

Applicability criteria of the methodology AMS-I.D. v170	Criteria fulfilled	Determination by the validation team
<p>This methodology comprises renewable energy generation units, such as photovoltaic, hydro, tidal/wave, wind, geothermal and renewable biomass:</p> <p>a) Supplying electricity to a national or a regional grid; or</p> <p>b) Supplying electricity to an identified consumer facility via national/regional grid through a contractual arrangement such as wheeling.</p>	<p><input checked="" type="checkbox"/> Yes</p> <p><input type="checkbox"/> No</p>	<p>The validation team observed that according to the EMRA generation licence /18/, the revised Feasibility Study Report /21/ and the Project Introduction File /25/ the proposed project activity is designed as a Hydroelectric Power Plant (renewable energy generation), which would supply electricity to the Turkish national grid.</p> <p>To a) - During the on-site visit, the validation team observed the progress in construction works on the weir, the transmission units, power house, etc.</p> <p>To b) – N.A.</p>

<p>This methodology is applicable to grid-connected renewable power generation project activities that</p> <p>a) install a new power plant at a site where no renewable power plant was operated prior to the implementation of the project activity (greenfield plant);</p> <p>b) involve a capacity addition</p> <p>c) involve a retrofit of (an) existing plant(s)</p> <p>d) involve a replacement of (an) existing plant(s)</p>	<p><input checked="" type="checkbox"/> Yes</p> <p><input type="checkbox"/> No</p>	<p>As per EMRA generation licence /18/, Project Introduction File /25/ and Water Usage Agreement /19/ the project is developed as hydroelectric power plant, at a site where no renewable power plant was previously operated.</p> <p>To a) - Therefore, the project is identified as greenfield power plant. During the on-site inspection VVB experienced from the locals that no HEPP was in operation at the area earlier.</p> <p>To b) - N.A.</p> <p>To c) - N.A.</p> <p>To d) - N.A.</p>
<p>Hydro power plants with reservoirs that satisfy at least one of the following conditions are eligible to apply this methodology;</p> <p>(a) The project activity is implemented in an existing reservoir with no change in the volume of reservoir;</p> <p>(b) The project activity is implemented in an existing reservoir, where the volume of reservoir is increased and the power density of the project activity, as per definitions given in the project emissions section, is greater than 4 W/m²;</p> <p>(c) The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the project emissions section, is greater than 4 W/m².</p>	<p><input checked="" type="checkbox"/> Yes</p> <p><input type="checkbox"/> No</p>	<p>To c) – The Akbas HEPP is designed as a run-of-river hydro power plant, where the water body created to store water upstream the weir is considered as reservoir, i.e. the project activity results in a new reservoir.</p> <p>As per Akbas HEPP weir lake coverage area map, which is part of the FSR /21/ the area of the reservoir is determined to be 6,980 m² and Power density is calculated to be 1,756 W/m², which is greater than 4 W/m² and even than 10 W/m².</p> <p>Thus the project fulfils also this condition of the selected methodology. The power density is calculated as per methodology “ACM0002, Version 13.0.0”.</p>
<p>If the new unit has both renewable and non-renewable components (e.g. a wind/diesel unit), the eligibility limit of 15 MW for a small-scale CDM project activity applies only to the renewable component. If the new unit co-fires fossil fuel, the capacity of the entire unit shall not exceed the limit of 15 MW.</p>	<p><input checked="" type="checkbox"/> Yes</p> <p><input type="checkbox"/> No</p>	<p>The proposed project activity is a greenfield hydroelectric power plant, and no non-renewable components are integrated.</p>
<p>Combined heat and power (co-generation) systems are not eligible under this category</p>	<p><input checked="" type="checkbox"/> Yes</p> <p><input type="checkbox"/> No</p>	<p>The purpose of the proposed project activity is only power generation. No heat generation (co-generation) has been planned.</p>

<p>In the case of project activities that involve the addition of renewable energy generation units at an existing renewable power generation facility, the added capacity of the units added by the project should be lower than 15 MW and should be physically distinct from the existing units.</p>	<p><input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p>	<p>The proposed project is a greenfield power plant, i.e. not addition of renewable energy generation units at an existing renewable power generation facility.</p>
<p>In the case of retrofit or replacement, to qualify as a small-scale project, the total output of the retrofitted or replacement unit shall not exceed the limit of 15 MW.</p>	<p><input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p>	<p>The proposed project is a greenfield power plant, i.e. not retrofit or replacement.</p>

Provided that all applicability criteria defined within the approved methodology AMS-I.D. v17.0.0 are proved to be fulfilled, Validation team deduces that the selected methodology is applicable for the proposed project activity.

3.2.3 Project Boundary

According to the AMS-I.D. v17 /5/, “The spatial extent of the project boundary includes the project power plant and all power plants connected physically to the electricity system¹⁰ that the CDM project power plant is connected to.”

During the site inspection and interviews with project manager, it was determined that electricity generated in Akbas HPP will be transmitted to the Adıgüzel HPP Transformer Substation by 14 km long transmission line and supplied to the Turkish national grid. Thus, project boundary is accurately characterized within the VCS PD /12/ as the “*net electricity generated and supplied to the Turkish national grid*”. Furthermore, emission sources and gasses included in or excluded from the project boundary are clearly identified.

3.2.4 Baseline Scenario

The baseline scenario for a new grid-connected renewable power plant is prescribed by the selected methodology AMS-I.D. v17.0.0 /5/ as

“the 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 into the grid.”

and accordingly implemented within project description for Akbas HPP, considering that the last was proved to be a new grid-connected renewable power plant.

Additionally, the carbon consultant specified that the “baseline emissions are equal to power generated by the project activity that is delivered to the Turkish national grid, multiplied by the baseline emissions factor (EF_y) which is calculated as the Combined Margin (CM)”.

Therefore, reported baseline scenario is consistent with the AMS-I.D. v17.0.0 /5/.

3.2.5 Additionality

According to the VCS standard v3.2 /3/ “Additionality shall be demonstrated and assessed in accordance with the requirements set out in the methodology applied to the project.” For assessment of additionality, the selected methodology AMS-I.D. v17.0.0 refers to “Guidelines on the demonstration of additionality of small-scale project activities” v09.0. Therefore it has been explicated that the Akbas HePP project would not have occurred due to an investment barrier, i.e. a “financially more viable alternative to the project activity would have led to higher emissions.” For the purpose, carbon consultant followed step 2: Investment analysis of “Tool for the Demonstration and Assessment of Additionality” v6.0.0 /7/ and additionally applied “Guidelines on the assessment of investment analysis” v05 /8/.

As indicated in the Table 1: Milestone of Akbas HPP (section 1.4 of the document), project start date (i.e. date of investment decision, as in the sense of CDM methodology) is identified as 21/04/2011, i.e. the signing of Memorandum of Understanding between the Employer (ARI-SU Enerji) and the Contractor (Andritz Hydro and Indar Electrics) for the Supply and Installation of Electro-Mechanical Equipment for Akbas Hydro-Electric Power Plant, which is the first actual commitment of the PO to the Akbas HPP.

Validation team examined thoroughly the provided additionality assessment within the VCS PD /12/ and the supplementary “AkbasHPPFinancialAnalysis” workbook /13/. Details are provided in the following subchapters.

- Investment analysis

The investment analysis is based on the benchmark approach, which is determined to be the only applicable and most appropriate method. Default benchmark values per country and sector are provided in the “Guidelines on the assessment of investment analysis” v05 /8/. Since the republic of Turkey is not included in this table, carbon consultant adopted the benchmark determined for group 1 activity in a country with the same Moody’s index (namely Ba2).

As per the guidelines v05 /8/, the expected return on equity is composed of four elements (a) a risk free rate of return; (b) an equity risk premium; (c) a risk premium for the host country; and (d) an adjustment factor to reflect the risk of projects in different sectoral scopes. Apparently, the only country dependent factor is (c) risk premium for the host country, which is estimated using the Moody’s rating for the host country. In this case the estimated benchmark for IRR on equity for Turkey is the same as the benchmark for IRR on return for a country with the same Moody’s index, i.e. Ba2. Thus the validation team confirms the correctness of the selected benchmark of 12.5% for proposed project activity in Turkey.

Detailed workbook on the financial analysis for the Akbas HPP /13/ is provided to the validation team. The file demonstrates the calculation of the internal rate of return on equity, including all assumptions and intermediate calculations. The parameters are presented in transparent and traceable manner, so that the validation team was able to prove the correctness and credibility of any input data and assumption.

Confidential information such as *Memorandum of Understanding between the Employer (ARI-SU Enerji) and the Contractor for the Supply and Installation of Electro-Mechanical Equipment for Akbas Hydro-Electric Power Plant* /16/, extract from the final *Contract Agreement on Supply and Installation of Electro-Mechanical Equipment for Akbas Hydro-Electric Power Plant* /43/ and *Extract from Loan Agreement* /15/ were disclosed to the validation team in order to substantiate actual values and/or prove the accuracy of assumptions, which are employed in the investment analysis. In addition, investment analysis is based on

the revised Feasibility Study Report /21/, which was completed on 01/08/2010, and approved by DSI. In view of the fact that time between investment decision and FSR finalisation is comparably short, less than 9 months, the validation team considers implementation of data provided within the FSR as reasonable and adequate.

The most important parameters, incl. source, value and substantiation are listed below.

Parameter 1	Total investment cost
Value applied for the IRR calculation:	30,174,108 USD
Source of the value:	FSR /21/ and the Memorandum of Understanding (MOU) for the Supply and Installation of Electro-Mechanical Equipment /16/
Justification by the validation team according to §113 of VVM: (cross checking and comparison as applicable)	<p>The value used for the calculation of equity IRR within the investment analysis is the expected investment cost at the time of decision-making (April 2011). The costs for manufacturing, supply and installation of complete Power House equipment of Akbas HPP are obtained from the MOU /16/ and all other costs are derived from the FSR /21/.</p> <p>The Values for investment costs in the Feasibility study are derived from the DSI Unit Prices, where value added tax (VAT) is not included. Additionally, PP calculated the VAT (18%⁵) on investment cost excluding those for electromechanical equipment, as per VAT Law No 3065⁶. Since the paid VAT on investment costs is refunded, PP presents it in the investment as income distributed over the following years.</p> <p>The pointed figure $\frac{30,174,108 \text{ USD}}{12,257 \text{ kW}} \cong 2,461.8 \text{ USD/kW}$</p> <p>is comparable to the unit investment cost for green-field hydro power plant estimated by the IEA ETSAP /40/ for the year 2008, namely 1,750 to 6,250 USD/kW. It is also indicated that the unit cost is not country specific and very site-specific The International renewable Energy Agency (IRENA) /41/ published in 2012 similar typical installed cost, i.e. 1,300 to 8,000 USD/kW.</p>

⁵ Value Added Tax No: 3065, Official Gazette No 18563, dated 02/11/1984; put into force on 01/01/1985

⁶ Full exemption of delivery of machine and equipment referred in Investment Incentive Certificates (Article 13)

Parameter 2	Operation cost
Value applied for the IRR calculation:	858,013.89 USD
Source of the value:	Combination of costs for maintenance and spare parts as well as renewal costs from the FSR /31/ and costs for labour estimated properly by Carbon Consultant by using a calculator that calculates those costs based on Turkish pay roll system. Value is used in the VCS PD /11/ and workbook on financial analysis /12/
Justification by the validation team according to §113 of VVM: (cross checking and comparison as applicable)	The O&M costs for the proposed project activity are coming up to 2.7% of total investment costs. The calculation of the O&M costs was thoroughly checked by the validation team, with the outcome that provided estimations are reasonable and based on reliable sources. Furthermore the cost was compared to the once IRENA /41/ research which estimated typical O&M cost to be 1% to 4% of total investment.

Parameter 3	Loan – to – equity ratio
Value applied for the IRR calculation:	49.7% to 50.3%
Source of the value:	Calculated in the financial analysis workbook /13/ based on the estimated investment costs (see Parameter 1) and expected loan (see Parameter 4 and 5)
Justification by the validation team according to §113 of VVM: (cross checking and comparison as applicable)	The ration is based on the investment costs and the estimated loan. The sources of the primary data as well as the intermediate steps for the determination of the ration were observed and confirmed by the validation body

Parameter 4	Interest rate
Value applied for the IRR calculation:	XX % (confidential information)
Source of the value:	Assumption made carbon consultant based on their expert opinion and former experience
Justification by the validation team according to §113 of VVM: (cross checking and comparison as applicable)	The value used for the calculation of equity IRR within the investment analysis is defined as the margin + LIBOR rate. Thus the interest rate was fixed to the one estimated at the time of investment decision. The actual loan agreement /15/ was disclosed to the validation team, so that the last approved the appropriateness of the assumption. Consequently, the VVB confirms the credibility of the interest rate value, applied for the investment analysis.

Parameter 5	Repayment period
Value applied for the IRR calculation:	10 years
Source of the value:	Assumption made carbon consultant based on their expert opinion and former experience
Justification by the validation team according to §113 of VVM: (cross checking and comparison as applicable)	The assumed repayment period for the loan is comparable to other projects developed in the same investment environment. Furthermore, the actual loan agreement /15/ was disclosed to the validation team, so that the last approved the appropriateness of the assumption. In addition the repayment period does not expand beyond the operational lifetime of the proposed project activity

Parameter 6	Electricity feed in tariff
Value applied for the IRR calculation:	0.085 USD/KWh
Source of the value:	EMRA report for year 2010 p.64
Justification by the validation team according to §113 of VVM: (cross checking and comparison as applicable)	Validation team assessed the applied value and its source. As it is indicated in the VCS PD, the value corresponds to the average electricity price of ca.125 TL/MWh, which was identified by the EMRA in the Electricity Market report for the year 2010 /42/. The currency exchange rate adopted for the investment analysis is applied to the value in order to transfer it into USD/kWh. Furthermore the VVB experienced that the feed in tariff is considered constant over the 45 years period of investment analysis It has been justified as the only reasonable assumption at the time of investment decision, since electricity price is highly dependent on the market demand and supply and electricity generation for hydroelectric power plant is dependent on climatic conditions and river water regime. In particular higher electricity price is experienced in the summer months when the HPP experience lower electricity generation. The implemented electricity feed in tariff is conservative since it is higher than electricity feed in tariff, which is guaranteed by EMRA Law on Utilization of Renewable Energy Resources /36/.

Parameter 7	Operational lifetime
Value applied for the IRR calculation:	45 years
Source of the value:	Assumption made by Carbon consultant
Justification by the validation team according to §113 of VVM: (cross checking and comparison as applicable)	The operational lifetime is of the Akbas HPP is corresponds to the technical lifetime of the technology. The investment analysis is performed as per Guidelines over the entire operational lifetime of 45 years and therefore no residual book value has been taken into consideration.

Parameter 9	Electricity generation
Value applied for the IRR calculation:	45,520 MWh
Source of the value:	Adopted from the revised FSR /21/
Justification by the validation team according to §113 of VVM: (cross checking and comparison as applicable)	The expected annual electricity generation is calculated in credible and unbiased manner, considering the water availability. Calculations are based on the river water flow reported in the FSR /21/.

By means of transparent calculations displayed in the workbook, it is demonstrated that the internal rate of return on equity for Akbas HPP after taxation corresponds to 9.54%. As already discussed, the validation team examined the input parameters, assumptions and any relevant statement accordingly and confirm the accuracy of the calculated parameter. Furthermore, the so established IRR for the proposed project activity is consistent with the benchmark, meaning both values are on Post tax basis.

Finally the proposed project activity is evaluated as financially unattractive since the estimated IRR, 9.54% is lower than the 12.5% benchmark, which is identified for investments in the energy sector in the republic of Turkey.

Sensitivity analysis was performed by the carbon consultant, showing that the deviation of the 3 key parameters⁷, in particular investment costs, operation costs and electricity revenues, by +/- 10% leads to IRR in the range from 7.9% to 11.5%. During the site inspection, Mrs Özçelik demonstrated the procedure for sensitivity analysis and IRR range acquisition.

- Conclusion

The validation team concludes that the proposed project activity deems financially unattractive, achieving an internal rate of return on equity after taxation of 9.54% whereas the benchmark for similar activities in the host country, defined by the “Guidelines on the assessment of investment analysis” v05 /8/ as 12.5%.

3.2.6 Quantification of GHG Emission Reductions and Removals

As it has been identified in section 3.2.1 of the report, emission reductions and removals resulting from Akbas HPP are identified according to the selected CDM methodology AMS-I.D. v17.0.0 /5/ and the relevant methodological tool “Tool to calculate the emission factor for an electricity system” v02.2.1 /6/.

- *Quantification of baseline emissions*

In order to determine the baseline emissions, the combined margin (CM) is calculated based on the “Tool to calculate the emission factor for an electricity system” v02.2.1 /6/. The described steps for identification of operating margin (OM) and build margin (BM) and all relevant assumptions are sufficiently documented within the VCS PD /12/. The choice of data vintage and calculation methods are justified in a readily comprehensible manner. All calculation on OM, BM and CM are performed by means of excel file and the

⁷ Regarding the „Guidelines on the Assessment of investment analysis“ v05 /8/

resulted workbook on emission reduction calculation /13/ was provided to the validation team for validation. The mentioned workbook is explored, data sources are examined and calculations are repeated in a separate workbook. Consequently, following issues are observed:

- All implemented data are referenced and based on reliable sources;
- Workbook cells are traceable and the calculations are presented in transparent and unbiased manner;
- The most recent available and country specific data are applied;
- Calculations are performed in complete accordance with the mentioned tool.
- The ex-ante data vintage has been selected for both the OM and BM calculation.

Finally the OM emission factor is determined as $EF_{grid,OMsimple} = 0.65613 \text{ tCO}_2/\text{MWh}$ and BM emission factor as $EF_{grid,BM} = 0.42357 \text{ tCO}_2/\text{MWh}$, which by applying the default values for weighting on OM and BM (i.e. $w_{OM}=0.5$ and $w_{BM}=0.5$) result in combined emission factor $EF_{grid,CM} = 0.53985 \text{ tCO}_2/\text{MWh}$. Upon the experience of the validation team on emission factor, the determined value is realistic and comparable to similar projects in the host country.

As per AMS-I.D. v17 /5/, baseline emissions (BE_y) are the product of net electricity supplied to the grid as a result of the implementation of the CDM project activity ($EG_{BL,y}$) and CO2 emission factor of the grid ($EF_{CO2,grid,y}$), in particular $BE_y = EG_{BL,y} * EF_{CO2,grid,y} = 24,574 \text{ tCO}_2/\text{year}$ for Akbas HPP.

- *Quantification of project emissions*

In general, but not always, renewable power generation project are considered to have zero GHG emissions, thus $PE_y=0$. Since the Akbas HPP is run of river hydroelectric power plant with a single reservoir and an auxiliary generator installed at the powerhouse in order to support electrical motors carbon consultant opt to estimate project emissions from those units.

For determination of project emissions from water reservoirs of hydro power plants ($PE_{HP,y}$), the selected CDM methodology AMS-I.D. v17 refers to large scale CDM methodology ACM0002 v13, which suggests that

- in case $4 \text{ W/m}^2 < \text{Power density of the single or multiple reservoirs} \leq 10 \text{ W/m}^2$

$$PE_{HP,y} = (EF_{Res} * TEG_y) / 1000;$$

- in case Power density of the single or multiple reservoirs $> 10 \text{ W/m}^2$

$$PE_{HP,y} = 0$$

The power density (PD) of the project activity was determined to $1,756 \text{ W/m}^2$, where the validation team proved by cross check that all calculations are based on relevant formula from the methodology ACM0002 v13 and all input data refer to reliable sources. Since apparently PD of Akbas HPP is greater than 10 W/m^2 , the project emission is estimated to $PE_{HP,y} = 0$.

The estimation of project emissions from diesel generators has been performed in accordance to "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion" v02 /10/ as pointed out in the applied methodology AMS-I.D. v17 /5/

In the course of the on-site inspection the way to measure diesel fuel consumption and the accuracy of that measurement was discussed between PO and carbon consultant. Finally it was agreed and revealed in the VCS PD, section 4.2 that the amount of diesel would be determined either based on records of working hours of the diesel generator or based on precise records of diesel fuel consumption.

Carbon emissions from on-site consumption of fossil fuels due to the project activity was accordingly estimated to ca. 1 tCO₂/year by implementing following formula

$$PE_{FC,y} = FC_{diesel,y} \times COEF_{diesel,y}$$

Where the calculations for COEF_{diesel,y} is also suggested by the same tool.

Finally total emissions related to the proposed project activity are appropriately estimated to be approximately PE_y = 1 tCO₂ /year

- Quantification of leakage

The proposed project is a green field one, thus no leakage emission related to the project are expected and regarded.

- Summary of GHG emission reductions or removals

The Akbas HPP deems to induce GHG emission reduction, which is estimated as per approved methodology AMS-I.D. v17 as

$ER_y = BE_y - PE_y - LE_y$ (where ER_y = emission reductions in year y ; BE_y = baseline emissions in year y and PE_y = project emissions in year y and LE_y = leakage emissions in year y)

In the particular case the emission reduction corresponds to $ER_y = BE_y - PE_y = 24,573$ tCO₂/year.

The validation team confirms that the emission reduction calculation are performed properly, by applying approved CDM methodology AMS-I.D. v17 /5/ and referenced methodology ACM002 v13.0.0 and “Tool to calculate the emission factor for an electricity system” v02.2.1 /6/, which are accepted by the VCS standard. The proposed project is proved to fulfil all eligibility criteria listed under the methodology. Furthermore, considering the experience of the validation team with renewable electricity generation projects, the estimated annual GHG emission reductions are assessed as reasonable.

- Uncertainties associated with the calculation of emissions

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

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.

3.2.8 Monitoring Plan

Assessment of the monitoring plan for the proposed project activity is an essential part of the validation process and basis for the verification of the GHG emission reductions. For that reason, considerable part of the site inspection was focused on the project monitoring. Since the proposed project has been in construction phase and the metering devices have not been installed yet, the validation team was not able to observe any electricity meters, calibration procedures, etc. Nevertheless PM and carbon consultant explained in depth the concept of the designated monitoring plan and provided the validation team with substantial details from project design phase.

- Data and parameters available at validation

The following 6 parameters are used for the calculations of emission reduction created by the Akbas HPP and are available at the time of project validation.

- $FC_{i,y}$ amount of fuel i consumed by relevant power plant in Turkey in years 2008, 2009, 2010
- $NCV_{i,y}$ – net calorific values for fossil fuel type i in years 2008, 2009, 2010
- $EF_{CO_2,i,y}$ - CO_2 emission factor of fossil fuel type i in year y
- EG_y - Net electricity generated in the project electricity system in year y
- $EG_{m,y}$ - Net electricity generated and delivered to the grid by power unit m in year y
- $\eta_{m,y}$ - Specific electrical efficiency for all relevant energy sources (natural gas, lignite, coal/anthracite, fuel/motor oil), default values.

As it has been already mentioned, the operating emission factor and the build emission factor are calculated ex-ante. Therefore, the applied parameters are determined or/and monitored once per crediting period.

In line with the approved methodology AMS-I.D., the parameters are listed in the VSC PD, together with the applied value, source of data and justification of data/description of measurement methods and procedures. The list is determined to be exhaustive, providing important information and guarantee on data consistency and reliability.

- Data and parameters monitored

The applied ex-post parameters are subject to regular measurement, namely once per monitoring period. In the case of the proposed project, 4 parameters are included in the monitoring plan, i.e.

- $EG_{PP,net,y} = EG_{PP-GROSS,y} - EG_{PP-self\ consumption,y}$, where
 - $EG_{PP-self\ consumption,y}$ - quantity of electricity imported by the power plant from the Grid for self-consumption, in year y ;
 - $EG_{PP-GROSS,y}$ - quantity of electricity produced by the power plant, in y ,
- Cap_{PJ} - installed capacity of the hydropower plant after the implementation of the Project Activity;
- A_{PJ} - Area of the reservoir measured in the surface of the water, after the implementation of the Project Activity, when the reservoir is full.
- $PE_{diesel,y}$ – Project emissions from fossil fuel (diesel) consumption in during the year y .
 - $FC_{diesel,y}$ – mass/volume unit per year
 - $EF_{CO_2,y}$ – weighted average CO_2 emission factor of diesel in year y

Description of measurement for each of the identified parameters and procedures to be applied is included in the monitoring plan. The PO is aware of its obligation to archive the recorded data for at least 2 years after the last crediting period.

It is indicated in the VCS PD and confirmed during the site inspection PM that the net electricity generation will be measured continuously by 2 main and 2 back up electricity meters Elster A 1500 and recorded on monthly basis. The installation, calibration and maintenance of monitoring devices is under the responsibility of the TEIAS., and is required to comply with The ICE/TSE 62053-22: Electricity metering equipment (a.c) – Particular requirements - Part 22: Static meters for active energy (Classes 0,2 S and 0,5 S) /43/. Records on electricity generation could be cross-checked with the PMUM database, which delivers information on net electricity generated excluding transmission loss.

In summary, the validation team is convinced of compliance of the monitoring plan with the requirements of the selected approved methodology AMS-I.D. v17 and all supplementary implemented methodologies, and tools such as ACM0002 v13 and Tool to calculate the emission factor for an electricity system” v02.2.1 /6/. As a consequence of the discussions during the on-site assessment, the validation team considers the planned monitoring arrangements as described in the monitoring plan feasible within the project design.

3.3 Environmental Impact

“Environmental Law” No. 2872 (Issued in 1983), Annex 2 of Environmental Impact Assessment (EIA) Regulation defines that run-of-river hydro power plant with installed capacity equal or less than 50MW is not subject to complete EIA. Thus, the Akbas HPP is required to prepare only project introduction file (pre EIA report) /25/. No significant impacts on the environment were identified and the EIA exemption certificate /22/ was issued on 01/07/2011. Possible environmental impacts during the construction and operating phases, which were discussed within the pre-EIA report /25/ are summarised in the VCS PD.

Furthermore, interviews with local authorities confirmed that the Akbas HPP is in-line with the national legal obligation and performs respectively. The local stakeholders confirmed that mitigation measures regarding the expected impacts during construction phase are undertaken; for instance – spraying water to roads, careful loading and unloading and covering the top of loaded trucks, in order to minimise dust formation.

3.4 Comments by stakeholders

It is the validation team opinion that the local stakeholders were accurately identified and appropriate invited to the stakeholders’ meeting as part of expropriation process. The meeting took place in the winter 2010-2011. The validation team was provided with pictures from the meeting. In addition, villagers notified the validation team that they are glad to have the project in their vicinity and believe to profit from the Akbas HPP. It has been observed that village inhabitants are involved in the construction phase of the project.

During the site inspection, the validation team experienced high involvement of the PO to ensure good relationship to the local stakeholders and willingness to assist them in any reasonable manner.

VALIDATION CONCLUSION

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13/02/2013

RE: Validation Statement – Akbas Hydroelectricity Power Plant, Turkey under VCS, first crediting period from 03/08/2014 to 02/08/2024.

ARI SU ENERJİ ÜRETİM A.Ş.with registered office Rasimpaşa Mah.Rihtim Cad.Petrol İşhane No:58/2 Kadıköy-İstanbul/Turkey, has contracted TÜV Rheinland to review and validate the VCS PD and all assertions related to the GHG project under VCS v.3.2. The GHG assertions, indicated in the VCS PD v2.0 /12/ issued on 01/02/2013 indicate annual achievable GHG emission reductions of 24,573 t CO₂e per annum.

By generating electricity using renewable resources, the project is likely to result in reductions of GHG emissions by partially displacing the electricity that would have been generated using fossil fuels. Investment analysis demonstrates that the proposed project activity is neither the financially attractive nor 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.

The validation of the GHG assertion is conducted in accordance with the requirements of the VCS standard v3.2, the standard ISO 14064-3 and the approved UNFCCC methodology AMS-I.D. version 17.0 to a reasonable level of assurance by applying a materiality threshold of 5%. In the course of the validation process, VCS PD, substantiations and any additional supportive documents are reviewed and reflected in Chapter 2.2 in the validation report issued on 13/02/2013.

The validation team came 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 13/02/2013



Denitsa Gaydarova-Itrib
TL/Auditor

4 APPENDIX

Table 1: Validation requirements (Based on the VCS standard v3.2 and VCS Program Guidance v3.3)

Checklist question	Ref.	MoV[1]	Findings, comments, references, data sources	Substantiation/ means of validation	Draft conclusion	Final conclusion
1. VCS Project Description Document						
1.1. Is the VCS PD presented for validation based on the latest template available at the VCS website?	VCS PD	DR	The latest version available at the time of submission of the VCS PD to the VVB (28/05/2012), namely VCS PD version3	VCS PD template on the VCS webpage	ok	OK
1.2. Has the VCS PD been established in accordance with the VCS requirements for completing VCS PD issued by the VCS Association?	VCS PD	DR	The template has been filled in accordance with the actual VCS requirements	VCS Standard, ver. 3.2; VCS Programm Guide ver. 3.3 and VCS Program Definition ver. 3.3	ok	OK
2. Project Description						
2.1. Does the VCS PD contain a project title and project description, which provides the reader with a clear understanding of the project activity and the technical aspects of its implementation?	VCS PD 1.	DR/on-site visit	Project name appointed in VCS PD corresponds to project name assigned in other legal project related documents, such as EMRA generation licence, permits, etc. Section 1 of the PD provides details on the proposed project activity, incl. Description of the project, project scope and scale, project location, legal compliances and information on the VCS aspects.	EMRA generation licence, feasibility study, permits	ok	OK

Are names, roles and responsibilities of PP and any other entities involved in the project indicated?	VCS PD 1.3 & 1.4	DR	Project owner and carbon consultant are identified, where the complete entity name and address and ist responsibilities is listed.		ok	OK
Is the correct type, scope and scale of project activity selected?	VCS PD 1.7 & 1.2	DR	Project is identified as sectoral scope 1, grid connected electricity generation from renewable sources and is identified as project, since it results in annual emission reduction of 24,573 tCO ₂ , which is much less than the identified benchmark of 1,000,000 tCO ₂ /year.	VCS standard, ver 3.2; spreadsheet on ER calculations; EMRA generation licence; Connection Agreement	ok	OK
2.2. In the case of green-field project activity, is the project design described sufficiently by means of specifications, drawings and manuals?	VCS PD 1.8 & 1.1 figure 3	DR	the proposed project activity is a green-field project and the design is described sufficiently by means of figures, tables and comprehensive explanation.		ok	OK
2.3. Does the project activity reflect current good practices, uses state of the art technology or would the technology result in a significantly better performance, than any commonly used technologies in the host country? (Provide the description of how validation has been carried out and what comparisons have been made.)			good practice technology, but not common practice			
2.4. In cases where the project activity involves the alteration of an existing installation or process, does the VCS PD provide a clear description of the differences between the project and the pre-project scenario?	VCS PD, Feasibility study	DR/on site visit	Proposed project activity is a green-field power plant. No power plant existed before the initiation of the project activity	interviews with PO and analyses of the projects feasibility study; observation during the on-site visit; interviews with responsible people	ok	OK

2.5. Does the project grouping apply for the proposed project? If yes, does the VCS PD include a description of one central GHG information system and controls associated with the project and monitoring?	VCS PD, Feasibility study	DR/on-site visit	Proposed project is not part of a grouped project activities	VCS web	ok	OK
2.6. Does the central GHG information system and controls include items identified in ISO14064-3:2006, clause 4.5?			N.A			
2.7. How has the sampling been determined? Have any of the sub groups and associated activities within each sub group been considered? Does the sampling meet the requirement set out under IAF Guide to ISO/IEC 66/1999 at a minimum?	VCS PD, Generation Licence	DR/on-site visit	Since there is only 1 project activity, no further sampling procedure is required. On-site assessment of project activity took place on 21/11/2012 - 24/11/2012	N.A.	ok	OK
3. Project Start Date and Crediting Period						
3.1. Is the project's start date clearly defined and evidenced? Does the project start date meet the requirements as stated in VCS v3.2 clause 3.8?	VCS PD 1.5	DR/PP interviews	Confusion by indicating the Project's start date. Finally, the project start date is identified in accordance with the VCS requirements, as the date on which project began generating GHG emission reductions or removals, namely the expected commissioning date - 03/08/2014	EMRA generation licence; Interviews with construction manager	CAR:	Revised accordingly OK
3.2. Is the start of the crediting period clearly defined? Is it reasonable?	VCS PD 1.6	DR	Start of crediting period corresponds to the expected commissioning of the power plant. First crediting period is over 10 years, as prescribed by the VCS standard, ver 3.3		ok	OK
4. Baseline and Monitoring methodology						
4.1. General requirements						

<p>4.1.1 Is the methodology used in the project activity an approved VCS Program methodology or a methodology from a VCS-approved GHG program? Is the selected methodology version still valid?</p>	<p>VCS PD 2.1</p>	<p>DR</p>	<p>UN CDM methodology, tools and guidelines, which are identified as eligible for VCS project evaluation, has been applied for the assessment of the proposed project activity. The latest version of methodology, tools and guidelines has been used</p>	<p>AMS-I.D. ver17.0.0, Tool for demonstration and assessment of additionality, ver.6; Tool to calculate emission factor for an electricity system, ver.2.2.1, etc.</p>	<p>ok</p>	<p>OK</p>
<p>4.2. Applicability of the selected methodology to the project activity</p>						
<p>4.2.1 Are all applicability conditions of the selected baseline and monitoring methodology and all tools involved satisfied by the project activity?</p>	<p>VCS PD 2.2</p>	<p>DR/on-site visit</p>	<p>All applicability criteria referred in the selected methodology are fulfilled, as indicated and justified within the relevant section of PD. The correctness of PD specifications, such as number and size of reservoirs, etc. have been confirmed during the on-site visit.</p>	<p>AMS-I.D. ver17.0.0</p>	<p>ok</p>	<p>OK</p>
<p>4.2.2 Is the selection of the applied baseline and monitoring methodology justified?</p>	<p>VCS PD 2.2</p>	<p>DR</p>	<p>The selection of the applied methodology has not been explicitly justified within PD. Nevertheless it is the common understanding, since the proposed project is small scale, generating grid connected electricity from renewable sources.</p>	<p>AMS-I.D. ver17.0.0</p>	<p>ok</p>	<p>OK</p>
<p>4.2.3 Is the selected methodology correctly quoted in all related documents?</p>	<p>VCS PD</p>	<p>DR</p>	<p>The selected approved small scale methodology and all relevant tools and guidelines are correctly quoted in the VCS PD, indicating the relevant version.</p>		<p>ok</p>	<p>OK</p>

<p>4.2.4 Does the VCS PD sufficiently describe all the GHG emission sources or sinks occurring as a result of project activity, which have not been accounted for under the selected methodology and are expected to contribute more than 1% of the overall expected average annual emission reductions?</p>	<p>VCS PD 3</p>	<p>DR/ on-site visit</p>	<p>All GHG emissions which are mentioned in the methodology and could result from the project activity have been indicated and discussed in VCS PD. Therefore emissions from reservoir and auxiliary diesel generators are included.</p>	<p>AMS-I.D. ver17.0.0</p>	<p>ok</p>	<p>OK</p>
<p>4.3 Project boundary</p>						
<p>4.3.1 Does the VCS PD correctly describe the project boundary?</p>	<p>VCS PD 2.3</p>	<p>DR</p>	<p>Project boundary is correctly described.</p>		<p>ok</p>	<p>OK</p>
<p>4.3.2 Does the VCS PD correctly indicate and describe the emission sources and sinks of GHG gases that are included in the project boundary?</p>	<p>VCS PD 2.3, table 3</p>	<p>DR</p>	<p>Project emissions are summarized in a table as per methodology, indicating source, gas and consideration and justification. According to the methodology the emissions from the reservoir and the auxiliary generators are also included.</p>		<p>ok</p>	<p>OK</p>
<p>4.3.3 In cases where the methodology allows project participants to choose whether a source or gas is to be included in the project boundary, is the choice explained and justified by PPs?</p>			<p>N.A.</p>			
<p>4.4 Baseline identification</p>						

<p>4.4.1 Has the procedure contained in the selected methodology to identify the most reasonable baseline scenario been applied correctly and documented in the VCS PD?</p>	<p>VCS PD 2.4 VCS PD 3.1</p>	<p>DR</p>	<p>Baseline scenario is prescribed by the selected methodology and accordingly adopted for the proposed project, i.e. "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)."</p>		<p>ok</p>	<p>OK</p>
<p>4.4.1.1 Is the identified baseline scenario plausible?</p>	<p>VCS PD 2.4 VCS PD 3.1</p>	<p>DR</p>	<p>The identified baseline scenario is the only one prescribed by the selected approved methodology, and thus regarded as plausible and realistic</p>		<p>ok</p>	<p>OK</p>
<p>4.4.1.2 Are all assumptions stated in a transparent and conservative manner?</p>	<p>VCS PD 3</p>	<p>DR</p>	<p>the conservativeness principle was followed firmly and thus assumptions and calculations are transparent and stated in a conservative manner.</p>		<p>ok</p>	<p>OK</p>
<p>4.4.2 Does the selected methodology require the use of tools <u>and</u> does VCS PD reflects that correctly?</p>	<p>VCS PD 2.1</p>	<p>DR</p>	<p>Selected approved methodology refers to 3 methodology related tools which are accordingly listed and used for the assessment of the project</p>		<p>ok</p>	<p>OK</p>
<p>4.4.2.1 Were all the tools applied correctly?</p>	<p>VCS PD</p>	<p>DR</p>	<p>Tool to calculate the emission factor for an electricity system, version 02.2.1 has been followed to calculate combined factor (CM) emission factor. The tool was applied step -wise, whereas some calculation corrections are requested.</p>		<p>ok</p>	<p>OK</p>

4.4.3 In case the methodology requires several alternative scenarios to be considered in the identification of the most reasonable baseline scenario, have all scenarios been considered <u>and</u> have no reasonable alternative scenario been excluded?	VCS PD 3.1	DR	The baseline scenario is prescribed by the methodology and is evaluated as the most reasonable and credible one.		ok	OK
4.4.3.1 Has the choice of the baseline scenario been done using conservative assumptions?			N.A.			
4.4.4 Is the identified baseline scenario reasonable according to the assumptions, calculations and rationales used in the VCS PD and other reference sources?					ok	OK
4.4.5 Does the VCS PD describe how the national and sectoral policies relevant to the baseline scenario have been identified and considered in the VCS PD?	VCS PD 2.5, sub-step 1b	DR	Consistency of baseline scenario with mandatory laws and regulation was discussed. It was concluded that the baseline scenario is in compliance with all relevant national and sectoral policies.		ok	OK
4.4.6 Does the VCS PD provide a verifiable description of the identified baseline scenario, including a description of the technology that would be employed and/or the activities that would take place in the absence of the project activity?	VCS PD 2.4 VCS PD 3.1	DR	Baseline scenario is sufficiently described.		ok	OK
4.5 Algorithm and/or formulae used to determine emission reductions						




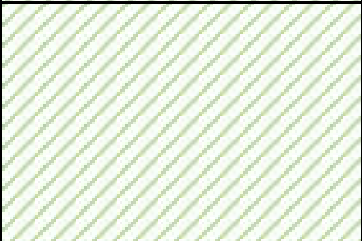
<p>4.5.1 Are all calculations applied and documented according to the selected methodology and in a complete and transparent manner?</p>	<p>VCS PD 3</p>	<p>DR/on-site visit</p>	<p>Selected methodology and tool are followed stepwise for the calculation of emission reductions. All applied data are presented in transparent and traceable manner. Revision of CO2 emission factors is requested because of the reference.</p>		<p>CAR</p>	<p>Revised accordingly OK</p>
<p>4.5.2 In case the methodology allows a selection between different options for equations or parameters, has adequate justification been given and have the correct equations and parameters been used, in accordance with the methodology selected?</p>	<p>VCS PD 3.1</p>	<p>DR</p>	<p>The selected methodology as well as the relevant tool, provide different options, and it is PP choice which is most appropriate and adequate for the proposed project activity. Nevertheless, each decisions is sufficiently substantiated. Thus the correct equations and parameters were adopted for the calculation of project's emission reductions.</p>		<p>ok</p>	<p>OK</p>
<p>4.5.3 In case some data and parameters will not be monitored throughout the crediting period, but have already been determined and fixed, are all data sources, assumptions and calculations correct, applicable to the proposed VCS project activity and conservative?</p>	<p>VCS PD 3.1 Step 3 & 5; VCS PD 4.1</p>	<p>DR/on-site visit</p>	<p>Emission reduction calculations, i.e. OM & BM emission factors, are performed ex-ante, thus following parameters are determined once per monitoring period, i.e. FC(i,y), NCV(i,y), EF(co2,i,y), EG(y), EG(m,y) and $\eta(m,y)$. Applicability, source and description, etc. of each implemented parameter are listed in a table.</p>		<p>ok</p>	<p>OK</p>

<p>4.5.4 In case data and parameters will be monitored on implementation and hence become available only after validation of the project activity, are the estimates provided in the VCS PD for these data and parameters reasonable?</p>	<p>VCS PD 4.2</p>	<p>DR/ on-site visit</p>	<p>4 parameters are identified to be monitored, namely EG(pp-self consumption,y), EG(pp-gross,y), Cap(pj), AP(j) and PE from diesel generators. However assumption for the emissions from combustion of fossil fuel on project site was not provided in the VCS PD v1.</p>		<p>CAR</p>	<p>Revised accordingly OK</p>
<p>4.6 Leakage</p>						
<p>4.6.1 Has the leakage been identified and calculated according to the approved methodology?</p>	<p>VCS PD 3.3</p>	<p>DR</p>	<p>>In accordance to the AMS-I.D. leakage results in case of transfer from energy generating equipment. Therefore - No leakage for the proposed Project activity. >In addition the methodology suggests: CO2 emissions from on-site consumption of fossil fuels due to the project activity shall be calculated using the latest version of the “Tool to calculate project or leakage CO2 emissions from fossil fuel combustion</p>	<p>AMS-I.D,</p>	<p>ok</p>	<p>ok</p>
<p>4.6.2 Have the leakage been addressed in complete, conservative and substantiated manner?</p>						
<p>4.6.3 Are uncertainties in the leakage emission estimates properly addressed?</p>						
<p>5. Additionality</p>						
<p>5.1 Identification of alternatives</p>						

<p>5.1.1 What additionality tool has been selected in the VCS PD? Does it comply with the requirement of VCS ver.3.2 clause 3.15?</p>	<p>VCD PD 2.1</p>	<p>DR</p>	<p>Additionality is examined against the AMS-I.D. requirements. Therefore, barrier analysis, with investment barrier is applied. For the purpose the latest version of "Tool for the demonstration and assessment of additionality, ver.6" is used.</p>	<p>AMS-I.D.</p>	<p>ok</p>	<p>OK</p>
<p>5.1.2 Does the VCS PD identify and list credible alternatives to the VCS project activity in order to determine the most realistic baseline scenario, unless selected approved methodology prescribes/identifies the baseline scenario and no further analysis is required?</p>	<p>VCD PD 2.5 (p.18)</p>	<p>DR</p>	<p>For the purpose of investment analysis, PP identified and evaluated 3 alternatives, with the outcome that the project is not the only credible and plausible alternative</p>	<p>Tool for the demonstration and assessment of additionality, ver.6</p>	<p>ok</p>	<p>ok</p>
<p>5.1.3 Does the list of alternatives include as one of the options that the project activity is undertaken without being registered as a VCS project activity?</p>	<p>VCD PD 2.5 (p.18)</p>	<p>DR</p>	<p>The first alternative resembles the project activity without VSC revenues and is assessed as very unlikely since it is not financially feasible.</p>	<p>Tool for the demonstration and assessment of additionality, ver.6</p>	<p>ok</p>	<p>ok</p>
<p>5.1.4 Does the list contain all realistic/credible alternatives that the DOE, on the basis of its local and sectoral knowledge, considers to be viable means of supplying the outputs or services that are to be supplied by the project activity? (Note: All alternatives listed in the selected methodology should be included, as well as those not covered by the methodology.)</p>	<p>VCD PD 2.5 (p.18)</p>	<p>DR/interviews</p>	<p>The tool prescribed alternatives are assessed for being realistic and credible and for consistency with laws and regulations</p>	<p>Tool for the demonstration and assessment of additionality, ver.6</p>	<p>ok</p>	<p>ok</p>
<p>5.1.5 Is the exclusion of the alternatives for legal reasons justified?</p>	<p>VCS PD 2.5 (p.18)</p>	<p>DR</p>	<p>The alternatives were excluded because 1 - financially unattractive & 2 - not realistic because of lack of required env.resources</p>	<p>Tool for the demonstration and assessment of additionality, ver.6</p>	<p>ok</p>	<p>ok</p>
<p>5.2 Investment Analysis</p>						

5.2.1 Are all sources of revenues (including savings) considered in the VCS PD and all calculations?	VCS PD 2.5; investment analysis workbook	DR/on-site visit	Earnings from the electricity generation are expected to be the only revenue from the proposed project activity.	Feasibility study report, interviews with PO representatives	ok	OK
5.2.2 Is the type of investment analysis selected correctly in the VCS PD?	VCS PD 2.5 Step 2	DR	The benchmark analysis is selected and justified as an appropriate investment analysis method for the proposed project		ok	OK
5.2.3 Is the selected financial indicator chosen and applied correctly?	VCS PD 2.5 Step 2	DR	IRR on equity is selected as financial indicator and applied correctly. IRR on equity is determined on a post-tax base, which is also the assumption of the selected benchmark.		ok	OK
5.2.4 Is the guidance on IRR calculation and assessment correctly applied? (Means of validation should be recorded.)	VCS PD 2.5	DR	Latest version of guidance on IRR calculation was implemented for the calculation of the IRR and performance of analysis. In addition, the benchmark value listed in the Appendix to the guidance is used for the investment analysis and project attractiveness' assessment.		ok	OK
5.2.5 In case project participants use values from Feasibility Study Reports (FSR) is it possible to verify that the period between the FSR date and investment decision was reasonably short and FSR values did not change materially?	VCS PD 2.5 table 5 investment analysis workbook	DR	Use of data from FSR for the investment analysis are proved to be reasonable and credible, since period between both is about 9 month, which is evaluated as insignificant. However at the time of investment decision, more recent data on the costs for EM equipment are available, namely the MOU.	FSR MoU	CAR	Revised accordingly OK

5.2.6 Are all the values consistent between FSR and VCS PD and are inconsistencies properly justified?	VCS PD 2.5 table 5 investment analysis workbook	DR	Beside the loan agreement, all other data required for the investment analysis were adopted from the feasibility study.	FSR	ok	OK
5.2.7 Were all the values from FSR applicable and valid at the time of the investment decision?	VCS PD 2.5 table 5 investmetn analysis workbook	DR	Since the FSR was issued at the time of investment decision by independent body and validated by DSI, all values are considered to be realistic and applicable.	FSR	ok	OK
5.2.8 Is it reasonable to assume that no investment would be made at a rate of return lower than the benchmark by, for example, assessing previous investment decisions by the project participants or some verifiable circumstances that have lead to a change in the benchmark?	VCS PD 2.5 table 5 investmetn analysis workbook	DR/on-site visit	Selected approach, benchmark analysis, identify the lowest level of return on equity for the energy sector, and since IRR on equity for the proposed project activity is lower than the benchmark it is reasonable to assume that the project is financially unattractive.	Guidelines on assessment of investment analysis	ok	OK
5.2.9 Is the Investment Analysis prepared in compliance with the latest version of the “Guidelines on the Assessment of Investment Analysis” as provided by the CDM EB?	VCS PD 2.5 table 5 investmetn analysis workbook	DR	As already mentioned, investment analysis is based on the latest version of Tools for the demonstration and assessment on additionality and in compliance with the latest Guidelines on assessment of investment analysis		ok	OK
5.3 Barrier analysis	N.A. as per Tool, since investment analysis identifies proposed project as financially unattractive					
5.4 Common practice analysis						

<p>5.4.1 Does the additionality tool require common practice analysis for the project?</p>	<p>VCS PD 2.5 step 4</p>	<p>DR</p>	<p>no, the common practice analysis is not required since according to the AMS-I.D. and the "GUIDELINES ON THE DEMONSTRATION OF ADDITIONALITY OF SMALL-SCALE PROJECT ACTIVITIES" the demonstration of existence of investment barrier is sufficient.</p>	<p>AMS-I.D. & GUIDELINES ON THE DEMONSTRATION OF ADDITIONALITY OF SMALL-SCALE PROJECT ACTIVITIES</p>	<p>ok</p>	<p>OK</p>
<p>5.4.2 If the PPs claim in the VCS PD that VCS project activity is the “first of its kind”, is it justified?</p>	<p>VCS PD 2.5 step 4</p>	<p>DR/on-site visit</p>	<p>It is not claimed that the project is the "first of is kind"</p>		<p>ok</p>	<p>OK</p>
<p>5.4.3 Are the geographical scope of the project activity identified correctly?</p>	<p>VCS PD 2.5 step 4</p>	<p>DR/on-site visit</p>			<p>ok</p>	<p>ok</p>
<p>5.4.4 Does the VCS PD provide an explanation why this region was selected and deemed more appropriate <u>and</u> is this explanation traceable and reliable?</p>	<p>VCS PD 2.5 step 4</p>	<p>DR/on-site visit</p>			<p>ok</p>	<p>OK</p>
<p>5.4.5 Are there similar operational project activities, other than VCS activities, “widely observed and commonly carried out” in the defined region? Note: Use official sources and local and industry expertise.</p>	<p>VCS PD 2.5 step 4</p>	<p>DR/ on-site visit</p>			<p>ok</p>	<p>OK</p>
<p>5.4.6 In case there are similar commercially operated project activities, other than VCS activities, already “widely observed and commonly carried out” in the defined region, are there essential distinctions between the VCS project activity and the other similar activities?</p>	<p>VCS PD 2.5 step 4</p>	<p>DR</p>			<p>ok</p>	<p>OK</p>
<p>6. Monitoring plan</p>						

<p>6.1 Are all parameters required by the selected approved methodology or tool identified <u>and</u> listed in the VCS PD?</p>	<p>VCS PD 4</p>	<p>DR/on-site visit</p>	<p>All relevant parameters are recorded in the monitoring section, including their unit, description, source, monitoring frequency and justification of data's source.</p>		<p>ok</p>	<p>ok</p>
<p>6.2 Is the measurement method clearly stated for each value to be monitored and deemed appropriate?</p>	<p>VCS PD 4.2</p>	<p>DR/ on-site visit</p>	<p>Description measurement method and frequency as well as identification of monitoring equipment and explanation of quality of assurance/control procedures are contained within the table. Measurement methods are clearly stated and deemed credible and applicable.</p>		<p>ok</p>	<p>OK</p>
<p>6.3 Are values of the ex-ante parameters / monitoring parameters selected correctly and conservative in accordance to methodology or tools?</p>	<p>VCS PD 4.1</p>	<p>DR</p>	<p>Values of ex-ante parameters are selected correctly. Implemented values are either default values, or ones obtained from reliable sources, such as the TEIAS webpage, etc. Most recently available data are used</p>		<p>ok</p>	<p>OK</p>
<p>6.4 Is the measurement equipment for each parameter described and deemed appropriate?</p>	<p>VCS PD 4.2</p>	<p>DR/ on-site visit</p>	<p>no information on electricity meters is provided, since project is in construction phase, i.e. no info available. > Water/level meters are also not installed yet, nevertheless as per law (DSI regulations) a meter will be installed just after the weir. > not clear how the PE_diesel would be measured</p>		<p>CL</p>	<p>OK</p>
<p>6.5 Is the measurement accuracy addressed and deemed appropriate?</p>	<p>VCS PD 4.2 & 4.3</p>	<p>DR</p>	<p>Measurement accuracy, as well as equipment calibration is addressed.</p>		<p>ok</p>	<p>OK</p>

6.6 Are procedures in place on how to deal with erroneous measurements <u>and</u> are the corrective actions identified?	VCS PD 4.2 & 4.3	DR	It is pointed out, that TEIAS is responsible for calibration and maintenance of the meters.		ok	
6.7 Is the frequency of measurement identified and deemed appropriate?	VCS PD 4.2	DR	The frequency of measurement is clearly stated for each parameter in the respective section. Ex-ante data would be measured/ calculated once per monitoring period, whereas parameters which are subject to monitoring, would be monitored on specific time intervals		ok	OK
6.8 Is the monitoring plan documented according to the approved methodology and in a complete and transparent manner?	VCS PD 4.3	DR	monitoring plan follows methodology's requirements and assures transparent and unbiased monitoring of project emissions reductions		ok	Ok
6.9 Are the sampling, measurement methods and procedures defined?	VCS PD 4.3	DR	yes, see sections above		ok	OK
6.10 Are procedures identified for maintenance of monitoring equipment and installations?	VCS PD 4.3	DR	monitoring equipment for EG, i.e. meters, would be maintained by TEIAS		ok	OK
6.13 Are the monitoring arrangements described in the monitoring plan feasible within the project design?	VCS PD 4.3	DR	Monitoring arrangement and procedure are presented unambiguously within the relevant section of VCS PD and are considered to be feasible.		ok	OK
6.14 Are the means of implementation of the monitoring plan, including the data management and quality assurance and quality control procedures, sufficient to ensure that the emission reductions achieved by / resulting from the project activity can be reported ex post and verified?	VCS PD 4.3	DR	the data are ex-ante!		ok	OK

<p>6.15 Do the PPs make provisions for personnel training needs?</p>	<p>VCS PD 4.3</p>	<p>DR</p>	<p>It deems that no specific personal trainings are required for adequate monitoring performance. Monthly reading of electricity meters is accomplished by TEIAS representatives and the water level - by the DSI workers</p>		<p>ok</p>	<p>OK</p>
<p>6.16 Is the authority and responsibility of overall project management clearly described?</p>	<p>VCS PD 4.3</p>	<p>DR</p>	<p>responsibilities of overall project management are depicted by Table: typical plant operation organization chart</p>		<p>ok</p>	<p>OK</p>
<p>6.17 Are procedures identified for emergency preparedness for cases where emergencies can cause unintended emissions?</p>	<p>VCS PD</p>	<p>DR</p>	<p>no unintended emissions are expected to result from the power plant, even during any emergencies</p>		<p>ok</p>	<p>OK</p>
<p>6.19 Is the data archiving period for this project activity stated in the VCS PD and appropriate? Note: All archived monitoring data, required for verification and issuance, should be kept for at least two years after the end of the crediting period or the last issuance of CER.</p>	<p>VCS PD 4.3</p>	<p>DR</p>	<p>It is explicitly declared that all monitored data records would be kept for at least 2 years after the end of last crediting period</p>		<p>ok</p>	<p>OK</p>
<p>7. Monitoring of the leakage</p>			<p>N.A</p>			
<p>8. Sustainable development</p>						
<p>8.1 If VCS PD indicates any additional environmental benefits of the project, other than GHG emission reductions, were those benefits properly substantiated?</p>		<p>on-site vsit</p>	<p>Proposed project activity ensures constant river water flow around the year. Besides the project contributes to sustainable development of the region, regarding social aspect, which would be discussed in details within the project validation for Social Carbon standard</p>		<p>ok</p>	<p>OK</p>

9. Environmental impacts							
9.1	Is the documentation supplied by the PPs regarding environmental impacts relevant and accurately reflected in the VCS PD?			The pre-EIA, the EIA exemption letter as well as other environment related permits are introduced in the VCS PD and provided to the VVB as substantiation		ok	OK
9.2	Is an environmental impact assessment (EIA) required for the VCS project activity? Note: determine by using a review of relevant legislation and local expertise.			According to the national regulation, No complete EIA assessment is required. PIF was submitted to the MoEUP		ok	OK
9.3	In case an EIA is required, has the EIA has been approved by local authorities and is the outcome accurately reflected in the VCS PD?			N.A.			
9.4	Does the VCS PD include a brief description of the environmental effects of the project, including transboundary?			The issues are sufficiently discussed in section 5 'Environmental impacts' of the VCS PD		ok	OK
9.5	Are those effects properly addressed in the design of the project activity?			yes		ok	OK
9.6	Does the project comply with environmental legislation in the host country?			Yes, the VCS provide sufficient information on this topic		ok	OK

Table 2: List of Requests for Corrective Action (CAR) and Clarification (CL)

CAR	CL	Observation	Reference	Summary of project owner response	Validation team conclusion
x		please revise table 1, in order to have clearer overview of the most significant milestones of the project	VCS PD sec 1.1, p.4, table 1	The table is revised please see version 1.1 of the PDD	ok
	x	Please clarify how is the "set of Penstock" planned	VCS PD sec.1.1, p.5	The water is conveyed to the turbines via the penstock structure. Since there are three turbines there is a penstock that brings the water in one tube and then divides it into three, in other words the penstock trifurcates and the water is fed to each one of the three horizontal Francis turbines.	ok
x		please revise the first paragraphs of section 1.8, in order to eliminate repetitions	VCS PD sec1.8, p.7	The paragraph is revised please see version 1.1 of the PDD	ok
x		please provide the accurate geographic coordinates for the weir and the power house	VCS PD sec1.9, p.10	The coordinates of the weir and the power house are provided in the	ok
x		please revise the version of the used VCS standard, and VCS requirements	VCS PD sec1.13, p.11	The version is revised as version 3.3, please see version 1.1 of the VCS-PD.	ok
x		please revise the list of implemented methodologies, so that the Guidelines for SSC projects is reflected	VCS PD sec2, p.14	Revised, please see version 1.1 of the VCS-PD.	ok
x		please correct the projects installed capacity as per EMRA generation licence	VCS PD sec2.2, p.14	Corrected, please see version 1.1 of the VCS-PD.	ok
x		please expand the PE calculations, so that the calculation of power density is presented in the section and the estimation of reservoir surface area is clearly explained	VCS PD sec3.2, p.34	The VCS-PD is updated to reflect the calculation of the power density, and the reservoir coverage map is added as Annex 4, please see version 1.1.	ok

x		please include under the PE calculations the emission calculations resulting from the usage of diesel generators	VCS PD sec3.2, p.34	In the VCS-PD it is mentioned that the diesel consumption related calculations will be accounted for but it is not possible to predict its usage, at this stage.	ok
x		please expand the monitoring parameters as per the AMS-I.D.	VCS PD sec4.2, p.45	Updated Please see version 1.1 of the VCS-PD.	ok
x		Please revise the Project's start date. The date provided in the VCS PD v1 differs from the one indicated in the EMRA generation licence.		Corrected, please see version 1.1 of the VCS-PD.	ok
X		please revise the costs for the EM equipment, since at the time of investment decision more recent data are available. The MoU provides information for the precise cost, which are less than the one estimated in the FSR, therefore are more conservative as well		corrected	ok
	X	please clarify how the PE from on-site fossil fuel consumption would be monitored		See section 3.2	ok